## **THE PHYSICS**

## OF

# CREATION

BY

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## Introduction

Whatever your religious beliefs concerning the role of God in the Creation of this our universe, there can but be satisfaction in deciphering the messages coded in what we see around us, and which surely reveal some of the secrets of Creation.

The language involved is itself universal, being that of mathematics, the logical foundation of physics, and so, for those who understand algebraic equations and integral calculus, let me now guide you along a path of exploration as we confront those coded messages.

### CHAPTER 1

## Nature's Coded Messages

#### Introduction

The processes by which Nature creates the fundamental particles which combine to form atomic matter and so our whole universe determine certain numerical factors which are precisely the same whenever and wherever measured. These are known as the fundamental dimensionless constants. They are merely numbers but yet those numbers are encoded expressions which tell us that Mother Nature has, for some special reason, determined a definite relationship between certain physical quantities.

There are three such numbers that, collectively, can reveal to us the secrets of Creation, if only we can discover their physical formulation.

One is the numerical factor which relates the mass of the proton to that of the electron, an important ratio, given that the partnership of these two fundamental particles constitutes the hydrogen atom. This is the primary atomic element from which all matter evolves. The numerical factor here is 1836.152.

Another, equally important numerical factor, is that having the measured value of 137.0359. This relates the speed of light c in vacuo with the electric charge e of the electron and Planck's constant h. Planck's constant is the factor by which the frequency of an electromagnetic wave is determined as a function of the energy quanta involved. That number 137.0359 is Nature's message which says:

"Decipher me and you will understand what governs the phenomena of quantum physics as evidenced by matter at the sub-atomic level."

Thirdly, there is the numerical quantity that relates the constant of gravitation G and the charge to mass ratio,  $e/m_e$ , of the electron. Unlike the first two numbers, this does not appear in the tables of physical constants. It is not one that is measured directly, but has to be inferred from separate measurements of G as the force of attraction between two bodies of known mass, and  $e/m_e$  as by measurements using a cathode ray tube. One simply cannot hope to fathom the mysteries of Creation without an understanding of the physical processes that govern the value of G. The measurement data applicable to G and  $e/m_e$  depend upon the units physicists have chosen to use.

Concerning units, it is intended in this work, to use the system of units that prevailed during the period in history when our knowledge of physics at the fundamental level expanded by the discovery of the electron. This system, the cgs system, regards the force between two unit electric charges separated in vacuo at unit distance as being itself unity, whereas the practical system of units as used in modern physics complicates the force formulation by ascribing properties to the vacuum medium itself, properties which need expression in their own units. To use the practical system of units for the purpose of this work would over-complicate the mathematical equations and add unnecessary complexity to the project at hand, that of understanding the creative forces at work in our universe.

So, to summarize, the task ahead is to examine the factors which govern the physical actions that determine the three numerical quantities introduced above. Our object is simply to unravel, so far as we can, the secrets of Creation and, at the very least, decipher the three numbers introduced above, by which is meant the discovery of the mathematical formulae which they signify as relations between the physical quantities involved.

#### **Historical Foundations**

An appropriate starting point is provided by Newton's Law of Gravitation as seen in the context of Coulomb's Law concerning the force acting between two electric charges. Although Isaac Newton established that gravitation was governed by an inverse-square-of-distance law of force which implied the constant of gravitation G, it was not until a century later in 1797/8 that Henry Cavendish, using a delicate torsion balance for measuring the attraction of two small bodies, could quantify its value.

Joseph Priestley in 1767 proposed that the electric force acting between two charged objects was also subject to an inverse-squareof-distance law. Having been advised by his friend Benjamin Franklin that when a small charged body is placed anywhere inside a hollow charged conducting sphere, no electric force is exerted on that body, Priestley recalled that Newton had shown mathematically that the gravitational force attributable to the mass of a hollow spherical shell is zero everywhere inside that shell. This is only true if the gravitational force is inversely proportional to the square of the distance between the two interacting bodies. Therefore, Priestley reasoned that the electric interaction force must itself be of the inverse-square-of-distance form.

In 1750 an Englishman Michell had devised an instrument in which the known torsion of a thread balances an unknown force acting at the ends of a bar magnet and had used this to show that an inverse square law acts between magnetic poles. Coulomb reinvented the torsion balance and with it, in 1785, verified the law for both magnetic pole interaction and electric charge interaction.

So we see that, by the end of the 18<sup>th</sup> century, physicists were able to formulate the magnitude of the force acting between bodies as a function of their mass, their electric charge and, indeed, their magnetic pole strength, but, still two centuries later, there remains the need to decipher the messages implied by those measured quantities to understand how Nature determines their values.

In this pursuit we should find inspiration in the account above by which Priestley deduced that the electric force had to be of the inverse square form. The mathematics involved is of the kind we shall be using in this work as we explore the same force laws to probe the mysteries of Creation and this will include an account of the small but very significant modifications affecting the law of gravitation to cater for the planetary perihelion anomaly. This is a question of how energy travels between interacting bodies when their separation distance is changing.

Just as Newton was able to prove mathematically that there is no gravitational force acting on a body within a spherical shell of uniform mass density per unit area of the spherical surface, so we shall prove, on the same assumption, that the interaction component of the field energy of two electric charges separated by a distance R sums to zero within a sphere of radius R centred on either charge [See Appendix I]. It is analysis of this kind that can point to the connecting links between electric, magnetic and gravitational laws of force and provide the elements of a unified theory by which to comprehend how Nature regulates the values of those dimensionless constants already mentioned.

As to the historical picture, take note that the electron did not present itself as something whose electric charge and mass could be measured until another hundred years or so had passed. J. J. Thomson in 1897 made progress in his cathode ray tube measurements by which the charge to mass ratio of the electron was measured and by 1911 Millikan, by his falling-drop technique of measurement had discovered how we can measure electron charge and so separate it from the mass of the electron.

Early in the 20<sup>th</sup> century, therefore, and especially after the introduction of wave mechanical theory with the advent of the photon, physicists had all that was needed to decipher Nature's messages, the subject of this work. Yet, the task has, it seems, been left to this author, whose interest was aroused when engaged on

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Ph.D. research in 1950-3 on the subject of anomalous energy losses found in electrical steels when reacting to oscillating magnetization. The reaction phenomena associated with magnetization of electrical conductors has an analogy with the reaction which must of necessity exist when a magnetic field acts across space devoid of matter. It was the study of that reaction that opened the door leading to the pathways we are to explore in this work.

So how shall we proceed? Well, it seems appropriate to present at the outset a glimpse of what lies on the far horizon, the answers to our deciphering exercise. Hopefully, this will allow the reader to anticipate some on the onward steps as the theory develops and so share some of the excitement which this task arouses. There is, however, one preliminary historical feature that must be presented first. This concerns the 'Thomson electron'.

#### **The Thomson Electron**

There has to be a starting point from which one can build a picture of the electrical structure of the space medium and matter which sits in that medium. The electron is the embodiment of the unit of electric charge in physical theory. It is the appropriate foundation for our exploration of the electrical properties of the medium that pervades all space, it being well established that the vacuum medium has properties by which it can store electrical energy.

The reader well versed in modern physics will now wonder how one can possibly justify the need to refer to this space medium in terms which seek to revive what amounts to the old-fashioned notion of the aether. After all, every physicist today is indoctrinated in the belief that space is a four-dimensional medium referred to as 'space-time' and subject to the relativistic principles which Albert Einstein introduced between 1905 and 1916. E=Mc<sup>2</sup> is taken as a sufficient testimonial in proof of Einstein's theory and no one can argue with the experimental evidence which gave birth to the atomic bomb.

Indeed, quoting from p. 287 of '*Science since 1500*' by H. T. Pledge, a 1939 Ministry of Education publication then available from the U.K. Stationery Office:

"With Einstein's work, the old substantial aether vanished from higher physics. In spite of the internal difficulties which had dogged it, it was long mourned by the older school of physicists, who found the reasoning of Einstein perilous - and hard to follow."

Well, it is this author's submission that it is due time for the younger physicists of today to visit the graveyard where the aether was put to rest and consider its reincarnation. That visit takes us back to the year 1904, one year before Einstein launched his theory. In that year 1904 a book entitled *'The Recent Development of Physical Science'* was published in its second edition. Its author was W. C. D. Whetham, a Fellow of Trinity College, Cambridge and so a close associate of J. J. Thomson, the discoverer of the electron, who had entered Trinity College in 1876 at the age of 20 and who remained there for another sixty-four years, becoming Master of Trinity College from 1919 to his death in 1940.

In now quoting a section of text from that 1904 book, one can see that it gives basis for one to wonder why our modern generation is so impressed by Einstein's  $E=Mc^2$  contribution. This is a quotation from pages 283-284 of Whetham's book, which include the table below:

"The property of mass, the most fundamental property of matter for dynamical science, is explained by the electron theory as an effect of electricity in motion. Forasmuch as a moving charge carries its lines of electric force with it, it possesses something analogous

to inertia in virtue of its motion. The quantitative value of this effect has been calculated by Thomson, Heaviside and Searle. Definite experimental evidence has been given by Kaufmann, who finds that the ratio e/m of the charge to mass of the corpuscles ejected by radium diminishes as their velocity increases. The charge is almost certainly constant, and thus the mass must increase with velocity. Theory shows that, for a slowly moving corpuscle, the electric inertia outside a small sphere of radius a, surrounding the electrified particle, does not depend upon the velocity, and is measured by  $2e^{2}/3a$  where e is the electric charge on the particle. But when the velocity of light is approached, the electric mass grows very rapidly; and, on the assumption that the whole of the mass is electrical, Thomson has calculated the ratio of the mass of the corpuscle moving with different speeds to the mass of a slowly moving corpuscle, and compared with the results of Kaufmann's experiments.

In this remarkable manner has it been possible to obtain experimental confirmation of the theory that mass is an electrical phenomenon."

| velocity in cm/s        | calculated mass ratio | observed mass<br>ratio |
|-------------------------|-----------------------|------------------------|
| 2.36 x 10 <sup>10</sup> | 1.65                  | 1.5                    |
| 2.48 x 10 <sup>10</sup> | 1.83                  | 1.66                   |
| 2.59 x 10 <sup>10</sup> | 2.04                  | 2.0                    |
| 2.72 x 10 <sup>10</sup> | 2.43                  | 2.42                   |
| 2.85 x 10 <sup>10</sup> | 3.09                  | 3.1                    |

That is a commentary on the state of knowledge of the electron in the year 1904 but that knowledge seems not to have been heeded by future generations of physicists. Today, if you refer to the tables of physical constants, you will find that the electron radius is not formulated according to the above formula, but rather as something that is 50% greater, a notional parameter that has no physical meaning as justified by theory that explains why the radius expressed in relation to mass, electric charge and the speed of light should have that particular value.

However, that energy quantity  $2e^2/3a$  is the true measure of the electric energy of an electron of radius *a* and students of physics should see it as important and know how to derive this formula themselves. Just assume that the charge e is confined within a sphere of radius *a*. Take note that the speed of light c is also the ratio of electrostatic to electromagnetic units in the cgs system. Then assume the charge is moving in a straight line at velocity v so that it defines a current circuit element of strength ev/c and formulate the strength of the magnetic field produced by that circuit element at points distant from the charge. From that work out the magnetic field energy density at such a point and then integrate that energy over all space external to that charge sphere. You will obtain the formula (ev/c)<sup>2</sup>/3*a*. Now equate that to kinetic energy mv<sup>2</sup>/2 and the result will be that mc<sup>2</sup> is  $2e^2/3a$ .

This was, no doubt, the manner in which this result was obtained in that 1904 report, but there is another quite simple derivation that has more merit. Take note that the electric energy of a sphere of charge e and radius a, having all of its charge at the surface of that sphere, as if it were of conductive material, is  $e^2/2a$ , but if we do not make that assumption and simply declare that the charge e is actually distributed within that sphere of radius a so as to have uniform electric energy density or pressure inside that sphere that equals the energy density just outside the boundary radius a, then it is easily proved that the component of electric energy inside

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the sphere is  $e^2/6a$ . Add that to the energy outside the radius *a* and one obtains  $2e^2/3a$ .

This is surely the energy of the electron that accounts for its inertial property. It is the formula referred to in this work by reference to the 'Thomson electron'. It is equal to the mass of the electron as multiplied by the square of the speed of light, as you have just seen, and yet physicists see  $E=Mc^2$  as something we owe to Albert Einstein's theory of relativity that came along after 1904.

As to the so-called 'relativistic mass increase' that one also attributes to Einstein's philosophy, was this not explained in that 1904 text in deriving the data for that table presented above? The gain in energy with speed adds inertial mass and, if whoever computed that data did not use the formula  $E=Mc^2$ , it becomes an interesting exercise to discover how, given the measured electron speeds, the increase of mass factor could have been calculated.

The known speed of light in 1904 was much the same as it is today, very nearly  $3x10^{10}$  cm/s, and using the formula for mass increase that one derives from electron theory, the same as that later obtained by Einstein's methods, one sees, using this speed of light value, that an observed mass increase by the factor 3.1 corresponds to an electron speed of  $2.84x10^{10}$  cm/s. The difference between this and  $2.85x10^{10}$  cm/s as listed in the above table is only marginal and probably attributable to approximations in the calculation.

In any event, the point made here is that the Thomson electron formula can be relied upon in our onward theoretical investigation. It is, however, noted that the formal derivation of  $E=Mc^2$  as an expression relating the electrical energy E of a charge with its inertial mass M is possible, as this author has shown. See discussion in Appendix II. One has merely to accept that the charge, when subjected to acceleration by an electric field, will move in just such a way as to conserve its intrinsic electric field energy from being radiated.

Based on the physics of 1904, with its aether, we can now confront those messages that pertain to Creation and we do so by using the Thomson electron formula in a quite fascinating way, as will emerge in chapter 4 when we show how the proton is created.

#### **Concerning a Theorem and the Aether**

19<sup>th</sup> century physicists went adrift by assuming that the aether had certain properties, notably that of providing a universal and absolute frame of reference for the constant speed of light in vacuo. They should, instead, have studied the aether with an open mind, allowing its properties to be revealed by their experiments. First and foremost is the fact that the aether can and does store energy, electrical energy, and so it must have an electrical composition.

19<sup>th</sup> century physicists were obsessed by its properties as a medium in which electromagnetic waves propagated. They were baffled because it seemed, in one sense, to exhibit the properties of a solid medium and, in another sense, the properties of a fluid. Considered as an electrical system having structure as if it comprises electric particles formed into a kind of crystal pattern, the problem was one of stability, as was pointed out by Samuel Earnshaw, a Cambridge scientist, by presenting his famous mathematical theorem. In 1839 he read a paper before the Cambridge Philosophical Society, which was later published in their *Transactions* at pp. 97-114 of volume 7 of 1842. That paper was entitled: 'On the Nature of the Molecular Forces which regulate the Constitution of the Luminiferous Ether'. Quoting from that paper one reads:

"It is therefore certain that the medium in which luminiferous waves are transmitted to our eyes is not constituted of such particles (acted upon by purely inverse-square forces). The coincidence of numerical results, derived from a medium of such particles, with experiment, only shows that numerical results are no

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certain test of a theory, when limited to a few cases only."

So, at the very outset of the project undertaken in this work, one has it on the authority of an eminent scientist, speaking some 164 years ago, that an aether constituted by electric particles conforming with the inverse-square-of-distance force law is an impossibility on mathematical grounds, whatever our number deciphering exercise might prove.

Earnshaw's Theorem was a basis for rejection of early attempts by this author to secure publication in the mainstream science publications and, indeed, this was how the author first came to know that there was such a theorem.

Why then are we proceeding with our quest? Well, there was something about this author's perception of the aether that made that theorem helpful rather than obstructive. Earnshaw had overstated his case. If the medium contains electric charges of like polarity governed by the inverse-square law then they can arrange themselves in a stable configuration, provided they are immersed in a uniform continuum of charge of opposite polarity. Conversely, one might say, if the evidence supports an aether having a structured form composed of electric charges governed by the inverse-square law, then, with certainty, that aether must incorporate a background continuum of electric charge which envelops those charges.

So, you see, dating from 1839, physicists seeking to understand the aether were wandering in the dark as they confronted problems of this kind and confronted an aether that had to exhibit the properties of both a fluid and a solid. The fluid crystal of modern physics with its state dependent upon electric field excitation had not been discovered and, almost as soon as the electron had been discovered and its charge and mass measured, Einstein came onto the scene and gone was all hope of salvaging the aether from the wreckage.

This author, however, having committed so much effort into the project of understanding the aether, aether of a form that overcame Earnshaw's theorem, could but soldier on without support from the physics community. By 1966 the author had published two works based on aether theory, both entitled *'The Theory of Gravitation'*, the first, dating from 1960, being only 48 pages in length and the second, dating from 1966, being an enlarged 170 page second edition.

Coincidentally, in that year 1966, as the author discovered later, a book by an author named W.T. Scott appeared with the title: *'The Physics of Electricity and Magnetism'*, published by Wiley, and this included a commentary on Earnshaw's theorem. It is relevant to mention it because Scott had also seen where the theorem fails. A passage in his book reads:

"In a region of continuous charge distribution, a maximum or minimum could exist, but a continuous distribution is an idealization. We have to consider each electron or proton as an isolated charge, so that pure electrostatic equilibrium is impossible."

Earnshaw's theorem sought to prove stability by showing how a differential equation could have a maximum or minimum but the analysis denied that possibility for the interaction of discrete electrical charges immersed in a true void. Scott had seen what this author had seen, namely that the presence of a uniformly charged background could provide that stability. However, Scott says that involves 'an idealization'. One may answer that by saying that the aether could well be an idealization, meaning a physical medium of such ideal and simplified form that it has rather special properties not shared by matter. One may also say, given the evidence to be presented in this work, that the aether has to have that uniform background continuum of charge as a kind of sea in which the other

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charged particle forms are immersed and in which a stable array of such charges can exist.

This brings us to the stage where we can begin to introduce the formulae which emerge from the deciphering of what is implied by those numerical constants and so we move on to chapter 2 and begin by exploring the factors that determine the force of gravity.

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### CHAPTER 2

## Gravitation and the Continuum

#### Introduction

In chapter 1 our consideration of Earnshaw's theorem established that all space must be permeated by a uniform continuum of electric charge. Since space overall is electrically neutral that continuum must contain numerous electrical charges having a charge polarity opposite to that of the continuum. Those charges can, notwithstanding Earnshaw's theorem, form into a stable array, a simple cubic structure, which gives the aether certain characteristic properties.

One such property arises when there is an intruding presence of something that takes up space in that continuum. That something, if itself electrically neutral overall, may be assumed to be, in effect, the occupant of a hole in that continuum. Consider then two such holes, spaced apart, each of volume V within an electrical continuum of charge density  $\sigma$ . Given that the continuum charge, being everywhere of the same charge polarity, will repel itself owing to its electrostatic action, this means that those two holes will experience a force of mutual attraction.

It is tempting, therefore, to suggest that this may account for the force of gravitation should whatever it is that occupies those holes have the appropriate association with matter.

Note that the charges of the structured array, which will be referred to as lattice charges, will not interfere with this force of attraction because they merely attract the charge of the continuum, which, being of uniform charge density, takes precedence of position in keeping those holes away from these aether lattice charges.

By way of illustration two such holes in a background charge continuum are depicted in Fig. 2.1. The arrows indicate a mutual force of attraction and one can imagine that as the holes come together, at the relatively slow speeds we associate with matter moving owing to gravitational attraction, the continuum charge will flow around the holes without there being any significant concentration of the charge density  $\sigma$ .

Fig. 2.2 depicts the presence of the lattice charges. The relative sizes of these compared with the gravitating holes are far from being represented by this figure. In fact, those aether lattice charges each have a volume that is quite enormous compared with the occupants of those holes, but even so, in displacing continuum charge they do not themselves contribute to the overall gravitational attraction between regions of space. The reason for this, as we shall see, is that the lattice charges are moving relative to the charge continuum at a very high speed, so fast in fact that, in being thereby forced by sudden pressure to flow around such a charge, the continuum charge is compacted in the regions denoted X in Fig. 2.3 to increase  $\sigma$  in those regions enough to ensure that the net continuum charge in the vicinity of the hole the lattice charge occupies compensates the effect of that hole and so does not contribute to the gravitational action. Gravitation is simply a question of the speed of whatever it is that takes up space within the charge continuum, a difficult concept perhaps, but one offering a convincing insight once we see how it leads us to the theoretical derivation of the value of G, the constant of gravitation. More will be said about this later, but meanwhile suffice it to say that we have introduced the theme of gravity as a property dependent upon the aether and our task now is to develop the formulation by which G is determined

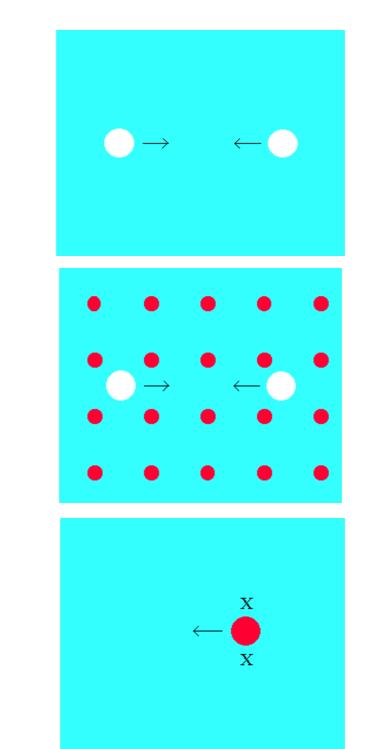


Fig. 2.1

Fig. 2.2



#### **Introducing the Graviton**

Suppose that those holes of volume V are each associated with a mass M so that the mutual force of attraction between two such holes is  $(\sigma V)^2$  at unit distance. The force law will be of inverse-square–of-distance form and so it can be said that this force is a gravitational force GM<sup>2</sup>.

If we know the value of  $\sigma$  and M has some standard value, which we can also evaluate in terms of the mass of the electron, then we can formulate that basic numerical factor involving G.

Now, the problem with gravitational mass is that it is not something that comes in specific units. The smallest amount of energy can exhibit the mass property. To cater for this under normal conditions Nature has adapted by creating two types of what we will here refer to as gravitons. These are unit charges e of either polarity that occupy those holes but they have different mass values.

Although it may appear to be mere assumption to say that Nature creates charged particles as needed and given the necessary energy, this is a fact evident from the phenomena of quantumelectrodynamics, where pairs of oppositely-charged electrons are produced by energy activity in the vacuum medium. These electron pairs, or rather electron-positron partnerships have a short lifetime, because, after their creation as charges spaced apart from one another, those charges come together by mutual attraction and are annihilated. They vanish to leave the energy quantum from which they were first created. Somehow the aether in its ongoing and well organized activity then contrives to recreate the electron and positron in a spaced relationship and so the cycle of charge pair creation and annihilation is repeated. The electron and positron are members of the lepton family. They are leptons and, indeed, those gravitons just mentioned are also leptons. We need to know their mass values and the amount of space which their charges occupy if we are to derive a formula for the constant of gravitation G. We also need to know the value of the continuum charge density  $\sigma$ .

The latter quantity will be the unit of charge e as divided by the volume d<sup>3</sup> of a cube of side dimension d, where d is the lattice spacing of the cubic array of those aether lattice particles that permeate the aether continuum. Later in this work it will be shown that d is  $108\pi a$ , where a is the radius of the Thomson electron. Therefore we have the following value for  $\sigma$ :

 $\sigma = e/(108\pi a)^3$  .....(2.1)

Note that this equation applies without adjustment to cater for the volume of the lattice charges or particles of matter that might be present and sharing the motion of those lattice charges. The reason is that the compaction of  $\sigma$  in flowing around these intruding objects exactly balances the continuum charge displaced by their presence.

Concerning the charge volume to mass ratio of the graviton, this is complicated by the fact that there are two basic types of graviton, each type having a different role. By their creation and existence the gravitons create holes in the charge continuum which their charges fill. The ratio of the volume of those holes to the graviton mass is the primary factor determining G. Now, considering a group of three gravitons, if two have the same mass and so the same charge volume it is possible for them to exchange energy by very slight volume fluctuations where one expands in radius slightly as the other contracts slightly. Keep in mind that formula for the Thomson As charge radius expands, so the energy and mass electron. decreases and vice versa. The existence or non-existence of that group of three gravitons is a quantum transition for which gravitating mass changes in steps of whole units. Yet we need to cater for the smallest element of gravitating mass-energy. The third graviton in the group is deemed therefore to have the property that, if it sheds energy, its gravitational action, as represented by its increase in

volume, will increase in just the right amount to match that quantity of mass-energy.

Now, a little exercise in mathematics will reveal that, if the graviton mass changes slightly, so the graviton charge volume will change in inverse proportion by an amount that is precisely three times the basic volume to mass ratio of that graviton.

Let the mass of one graviton form, the one of larger charge volume, be denoted as  $\tau$  times that of the electron and the mass of the other graviton form be denoted as g times that of the electron, there being one g-graviton present for every two  $\tau$ -gravitons. We will justify this ratio presently. What this then means is that, in terms of the charge volume to mass ratio of the electron, the graviton charge volume to mass ratio will be given by:

 $(2/\tau^3 + 1/g^3)/(2\tau + g)$  ......(2.2)

Then, owing to that third graviton of a group of three, the g-graviton, having that threefold differential property in respect of the charge volume to mass ratio, we know that this ratio must equal:

From which one can write:

$$3(\tau/g)^4 + (\tau/g)^3 = 1$$
 ..... (2.4)

and so find that:

 $g = (1.452627)\tau$  .....(2.5)

We can now progress in formulating the value of G as:

$$G^{1/2} = (4\pi)(1/108\pi)^3(1/g)^4 e/m_e$$
 .....(2.6)

which provides the numerical factor concerning gravity that we set out to find.

However, we have yet to justify that  $108\pi$  factor and we confront also the task of deriving the value of g from pure theory. Also there is that question of the two to one ratio of the  $\tau$ - and g-graviton population, not to mention the many unanswered questions that can be raised as to how all this relates to the mass of many forms of matter that exist in our universe. We can but proceed in stages, but, by way of reassurance, the reader is invited to take note that the

known varieties of charged leptons in physics are limited to but a few. There is the electron family, the heavy electron family otherwise known as the mu-mesons or muons, and then the even heavier lepton form, the tau lepton. It would seem that the latter is the  $\tau$ -graviton. As to the g-graviton form this seems rather elusive in the spectrum of particle physics, but we shall point to some evidence later as we refer to the Japanese H quantum in chapter 9 [See section entitled: Numbers Game].

Meanwhile, from the above formulations (2.5) and (2.6), the reader may check the value that  $\tau$  must have to satisfy the relationship between G as 6.67259(85)x10<sup>-8</sup> dyne.cm<sup>2</sup>/gm<sup>2</sup> and e/m<sub>e</sub> as 0.527281x 10<sup>18</sup> cm<sup>2</sup> esu/gm. The answer you will find is that  $\tau$  is 3485, meaning that the tau-lepton should have a mass energy of 1.781 GeV, some 3485 times 0.511 MeV, the mass-energy of the electron. On this basis g is 5062.3, which corresponds to a mass-energy of 2.587 GeV. Now, of course, these values for  $\tau$  and g are empirical, having been derived from measured data on the assumption that the theoretical formulation is valid. However, it is our intention to show in chapter 4 that both  $\tau$  and g can be derived theoretically and found to have values quite close, indeed very close, to those just presented and this will then mean that we have deciphered Nature's message implicit in the value of the constant of gravitation G.

#### The 2:1 Graviton Ratio

The two to one ratio of the  $\tau$ -graviton to g-graviton population can be justified in the following way. Imagine the  $\tau$ -graviton as having the primary existence as a kind of parent from which the ggravitons are born. The isolated  $\tau$ -graviton is suddenly confronted with an influx of energy which it has to absorb. It has a unit charge e which can be positive or negative but we will take the case of it being positive. It has a certain charge volume. It can absorb energy by contracting in radius but we need to accept that space in the aether

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charge continuum is at a premium and, in contracting, some space becomes available for occupation by other charge. However, it takes time for the aether to adjust to changes associated with energy deployment.

The scenario envisaged therefore is one where the sudden influx of an appropriate quantum of energy absorbed by the  $\tau$ graviton will contract it approximately to the g graviton form, whereupon, to take up the volume of continuum vacated, two similar g-graviton forms will be created, one of charge +e and the other of charge -e. This is a process of lepton charge pair creation which must be followed soon thereafter by the onward quantum transitions that occur with a time delay as the movement of continuum charge imports the added space commensurate with the net amount of energy that is absorbed.

Since, for the case of the initial  $\tau$ -graviton having a positive charge, the transition state has two positively charged pseudo ggravitons and one negatively charged pseudo g-graviton, those quantum transitions, given that added space, will mean a decay back to the  $\tau$ -graviton form with charge pair annihilation, except for the one case where the two positively charged g-gravitons decay before the third graviton in the group is affected. The residual three graviton group will comprise two positively charged  $\tau$ -gravitons plus one negatively charged g-graviton. This is a combination which resists spontaneous decay by charge pair annihilation and so there is a physical basis for saying that the graviton system that pervades space will have two graviton forms, which exist in this two to one ratio.

As to the reference to the pseudo g-graviton form, this arises because, in dividing into three gravitons, the primary graviton will allot one third of its charge volume to each newly created pseudograviton with the result that the latter have a charge radius smaller by a factor of 1.44225 as compared with the  $\tau$ -graviton. This means that during the rapid transition in adjusting to the energy fluctuations under consideration, the transient g-graviton form will be about 0.7%

smaller in mass and so energy as compared with the ultimate ggraviton form. The completion of the transient phase therefore involves the residual g-graviton absorbing that extra energy.

It will, of course, be understood that it is the displaced volume of the continuum of charge density  $\sigma$  that matters in determining G, there being overall as many positively charged gravitons as negatively charged gravitons of either the  $\tau$  or g form and graviton charge pairs being close enough together to preclude their actual charge from having any gravitational effect.

#### **The Onward Quest**

The task ahead involves us in an extensive analysis of the aether as that charge continuum permeated by those aether lattice particles. There is relative motion between these charge forms and that motion gives us the insight we need into the physical activity giving foundation for quantum mechanics and leads us to the derivation of equation (2.1) above and so that factor  $108\pi$ .

Then there is the challenge of discovering how matter is created from the activity of the aether medium, and we will find that the creation of the proton and of those  $\tau$ -gravitons, along with the g-gravitons, go hand-in-hand.

In this pursuit we find an answer to one of the great mysteries of physics. Physicists have long been puzzled as to why the muon, the mu-meson, the lepton particle form intermediate the electron and the taon, the tau particle, exists at all. It seems to serve no purpose whatsoever. Unlike the electron it is not seen as present in matter but yet it appears transiently in high energy particle physics.

It forms the subject of our next chapter but, as our story unfolds, you will see that the energy of a pair of muons is actually present in each unit cell of volume d<sup>3</sup> of the aether. The resulting energy density is that pertaining to those aether lattice particles, meaning their charge volume as divided by their electric energy according to the Thomson charge formula. We shall find, by the analysis from which that  $108\pi$  factor is derived, that the aether lattice particle, which we name the quon, is of much larger charge volume than the electron, by a factor N, which will be shown to have the integer value 1843. This leads us to the equation:

 $E_o = (3/4\pi)(108\pi)^3(1/N)^{4/3} m_e c^2$  ...... (2.7) as the energy contained within each unit cell of the aether. With N as 1843, the factor in this equation has the numerical value 412.6658. Note that the muon that materializes in experiments of high energy particle physics has a mass somewhat greater than 206 times that of the electron. The numerical quantity just calculated represents the energy in electron terms of two virtual muons, meaning the lepton pair of muons that populate the aether.

The proton/electron mass ratio,  $P/m_e$  will, as we shall see, be that given by a quantity:

 $P/m_e = \{9 - 2[(3/2)^{\frac{1}{2}} - 1]^2\}E_o/2m_ec^2$  ......(2.8) which has the value 8.8989795 as multiplied by half of the above factor 412.6658, and so is 1836.152, which compares well with the measured value of 1836.152701(37).

This rather incredible degree of precision for the measured value of the proton/electron mass ratio is a daunting challenge for anyone who ventures in search of a theoretical explanation of this quantity. Having indicated that this theory, in its basic structure, succeeds to within a few parts in 10 million, it seems best now to await acceptance of the foundations on which the theory is constructed, namely the aether of the form introduced in this work, and leave onward progress for future generations of physicist.

One has to assume that the purpose of precision measurements of physical constants is to establish just how constant such quantities are, just in case they vary from place to place and with the passage of time. Also, whereas the constants themselves may not vary, history indicates that variation does occur in the assumed values, especially as new techniques of measurement are developed and more measurements are reported. However, it would seem that the proton/electron mass ratio as now measured is likely to survive as an adequate indication of its ultimate value.

Having introduced the  $\tau$ -graviton and its alternative role as the tau-particle, the taon, it is appropriate here to note that the theory also gives a formula similar to (2.8) that accounts for its mass in terms of the rest mass of the electron. It is:

 $\tau = 2(P/m_e)(1 - [(3/2)^{\frac{1}{2}} - 1]^2).....(2.9)$ which is 3487. This corresponds to a mass-energy 1.782 GeV. This is a little higher than the empirical value 3485 derived above from the G formula (2.6) and this raises the fascinating issue of what factors are at work in determining the quasi-stable energy state of the taon, a topic to be mentioned in the discussion chapter 9.

Finally, as part of this preliminary glimpse of the power of this theory in revealing how Nature determines the fundamental dimensionless constants of physics, it is noted that the quantity referred to by physicists as the fine-structure constant has also been deciphered as being that of the formulation:

 $hc/2\pi e^2 = 108\pi (8/N)^{1/6}$  ..... (2.10) where N, as before, has that value 1843.

This expression is that of the inverse of the fine-structure constant which physical tables list has having a measured value of 137.0359895(61). In contrast our theoretical value as it applies in the true vacuum environment remote from matter is, as may be verified from (2.10), 137.0359153. In this case there are reasons why some slight upward modification of this quantity can occur for measurements made in laboratories that are moving through enveloping space at the speeds we associate with the cosmic motion of the solar system.

At this stage the author yields to temptation by pointing out that Einstein's acclaim owes a great deal to the support he received from the Cambridge scientist Sir Arthur Eddington in the early years when his General Theory of Relativity was under scrutiny.

Eddington is well known also for his attempts to decipher Nature's numerical factors, those dimensionless physical constants. However, at the time (1930) the fine structure constant had not been measured to a degree of precision which allowed one to be sure that that 137 figure was other than an integer. Eddington, who was impressed by Einstein's four-dimensional notions of the space medium, evolved a theory by which 137 was seen as being:

 $(16^2 - 16)/2 + 16 + 1$ 

which theory, in the words of B.W. Petley of the U.K. National Physical Laboratory (p. 161 in his book '*The Fundamental Physical Constants and the Frontier of Measurement*', Adam Hilger Ltd. (1985), declared as coming:

"from considerations of the number of independent elements in a symmetrical matrix in 16-dimensional space where 16 equals 4 times 4 (4 being the number of dimensions in Minkowski's world)."

However, Petley then added the comment:

'The theory lost respectability partly because Eddington at first predicted the number as 136.'

It is noted that on that same page 161 of Petley's book there appears a table listing theoretical expressions that have been, as the author puts it, 'derived' for the fine structure constant. The last entry in this table, in date sequence, before the experimental review value, is the one dated 1972, being the formulation of this author's theory giving that value 137.035915, the reference being to the paper entitled: '*Aether Theory and the Fine Structure Constant*' in Physics Letters **41A** at p. 423. This paper was jointly authored, by this author, Dr. H. Aspden, who was with IBM at their Hursley Laboratory in England, and Dr. D. M. Eagles of the National Standards Laboratory, Sydney, Australia, who had contributed to the development of the theory by involving Dr. C. H. Burton who used

the computer power of that laboratory to verify the author's analysis of the electrical structure of the aether and thereby cooperating in the determination of the 1843 value of that factor N mentioned above.

However, reverting to the Eddington theme by reference to his book '*New Pathways in Science*' (1935, Cambridge University Press) one surely must agree with a comment he made on p. 234 in introducing his theory:

'I think that the opinion now widely prevails that the constants (A), (B), (C), (D) are not arbitrary but will ultimately be found to have a theoretical explanation.'

Here (A), (B), (C) and (D) were, respectively, the proton/electron mass ratio, the fine-structure constant, the ratio of the electrical force between an electron and proton to the gravitational force between them, and a rather curious quantity 'the ratio of the natural radius of curvature of space-time to the wave-length of a mean Schrodinger wave'. Eddington, being Professor of Astronomy at Cambridge University, saw this latter quantity as important, its value, as he states, "depending upon the observed recession of the spiral nebulae and being about  $1.2 \times 10^{39}$ ." Readers will therefore find it of interest, as we proceed, to see that this author's theory can rise to the challenge posed by this fourth constant but we shall derive instead a formulation including the value of the Hubble constant as that is a more familiar quantity. See chapter 8.

It is somewhat hilarious to see that Eddington, in explaining his theory for the fine structure constant on p. 237 of that book, says the following:

"It is a feature of quantum theory that the particles are so much alike that we can never tell which is which; and we shall later see that this indistinguishability is actually the source of the energy that we are studying, so that we must not ignore it here. We have then to make one of 16 possible presents to one particle and one of 16 possibly

similar presents to the other; but the particles are communists, not believing in private ownership, and it makes no difference which present has gone to which particle. There are 16 ways in which the commune can receive two like presents and 120 in which it can receive two unlike presents, making 136 in all."

That is a curious way of saying that for each of 16 components to have two unlike or two like quanta, given that 16 of each variety are available, is, mathematically 16x15 divided by 2 plus 16. However, Eddington was puzzled by the 136, when he really needed a figure of 137. He ends his account on p. 237 by saying: "Is it unreasonable to suggest that the fact that (each of those quanta) is one of a gang of 136 may have something to do with it? Apparently the majority of physicists think that it is. But for my own part the clue seems to me good enough to follow up."

Clearly, Eddington is on the defensive here, but he struggles even further in seeking to derive a figure of 137. He concludes with the words:

"But, you may say, the fraction is really 1/137, not 1/136. I think if we can account for 136/137 of the quantum, the remaining 1/137 will not be long in turning up. There is a saying: One spoonful for each person and one for the pot."

As to another of the basic constants, Eddington, by an argument based on wave functions, formulated a quadratic equation of the form:

 $10m^2 - 136mm_o + m_o^2 = 0$  ...... (2.11) relating two mass quantities and, taking  $m_o$  as a standard unit, argued that, since the equation had two solutions for the value of m, these

were, respectively, the electron mass and the proton mass. From this he derived the proton/electron mass ratio as having the value 1847.6, which, albeit in 1935, he declared "agrees very well with the observational determination of the mass-ratio".

Eddington deemed there to be such a mass unit  $m_0$  "furnished by the universe as a comparison object". It would have a mass which the above equation shows as being 135.926 times the electron mass. Readers should note here that this author's theory in no way supports the notion that a mass unit having this particular value exists and that we shall be using the symbol  $m_0$  extensively later in this work to signify a different mass quantity, that of the aether lattice charges depicted in Fig. 2.2.

As to Eddington's formulations, it was this kind of physics that caused the physics community to develop a great distaste for any attempts to account for physical phenomena that were guided solely by prior knowledge of the measured numerical factors involved. Where numbers seemed to dominate the argument this outlawed the theory and caused physicists to find more appeal in factors such as symmetry in mathematical formulations purporting to describe physical phenomena. Yet those numbers, as they evolved from high precision measurement, do convey Nature's message, whereas the notional pictures of symmetry in an imaginary mathematical picture of space are merely the product of wishful thinking.

This author hopes, however, that with the passage of time since Eddington's days and with the failure of existing techniques in physics to bridge the gaps which link gravitation with quantum theory and particle physics, physicists of this 21<sup>st</sup> century era will take note of what this author is offering in this work.

In our next chapter, we will come to the introduction of our overall theme, an account of the physics governing the creation of our universe, and this brings on stage the principal player, the virtual muon that was mentioned above as the primary energy form in our aether. In a sense, one could say that Eddington led the way in

trying to decipher those numbers and he was headed in the right direction in postulating something in the universe having a standard mass intermediate the proton mass and the electron mass. However, it was too fanciful an argument to attribute those masses to the two solutions of a quadratic equation. The logical approach was to heed what J. J. Thomson had already presented as the mass-energy defined by the electron as a charge confined within a spherical volume of space and apply the general formula to other charges, including our unit mass form, the virtual muon, and combine these in an energy equation which seeks a minimum value.

#### CHAPTER 3

### The Ubiquitous Muon

#### Introduction

The mu-meson, or muon, is the ghost particle that inhabits all space. It is 'ubiquitous', which, according to dictionary definition, means it is 'omnipresent; being everywhere or in an indefinite number of places at the same time'. Yet it has no recognized role in the structure of matter. When it does appear, as in cosmic radiation or as a decay product of the pi-meson, the pion, it has a fleeting existence, but it has been found to have properties of the kind we associate with electrons. Indeed, as mentioned earlier, it is sometimes referred to as 'the heavy electron' and it can, though only transiently, drive an electron out of its orbit around the nucleus of an atom and itself move around that nucleus, though in an orbit of much smaller radius.

So why do I refer to it as the 'the ghost particle that inhabits all space'? Well, although it is there, everywhere in space, we cannot sense any resistance to our motion that we can attribute to such a presence. Why is that?

I can but suggest that it is because that is characteristic of its ghostly behaviour. You might, of course, be tempted to suggest much the same by assuming that I am merely 'imagining ghosts that do not exist at all', but do, please, stay with me as I show you how muons cooperate in the creation of the proton, the primary particle constituent of all matter.

Muons exist in pairs of electrical charges that can simply dissolve by annihilating one another and shedding energy which can

meld into a uniformly dense background which allows those charges to reappear once an intruder has moved on. Indeed, we should not expect what is hidden from us in the quantum underworld of space to exhibit the same properties that are revealed to us by the atoms and molecules of our material world. If we meet resistance to our motion and press forward then we exert force and energy is dissipated as heat, but that heat energy is merely energy we have transferred to the obstructing object and that object is normally an atom, meaning a unit of matter and not a member of the lepton family that exists in the aether in a state of equilibrium consistent with uniform energy. If the medium that fills all space is already in a state of uniform equilibrium with pairs of muons conserving their energy in spite of material bodies moving amongst them and has already shed any surplus energy to create matter (protons and electrons), it will surely contrive to stay that way.

At best, therefore, with the exception of a phenomenon to be referred to as 'vacuum spin' or 'aether spin' as we proceed, we can expect that ghost world of the aether to cooperate in making it possible for matter in motion to suffer events in which that matter transforms itself into some other form of matter. In this respect, since electrons and positrons exist as matter and not as a constituent of the aether, we can look to the participation of the electron-positron lepton family when contemplating energy transfer processes that involve photons and deployment of kinetic energy as in electrodynamic actions. It would be foolish, indeed, to reject the picture of space as populated by the 'ubiquitous muon', solely on the ground that it offers no resistance to our passage through it. So, you may say, "If it is there and we cannot feel its presence, then why should we concern ourselves with its existence? Also, why use the word 'muon', given that is already the name of a particle that has materialised and has been seen as part of the particle spectrum in physics?"

The answer to this first question is that we can feel its presence indirectly, but not in the way one might expect. We do sense those

muons by the existence of their reaction to our presence as a function of our mass, because they regroup in a stronger ghostly form (the tauparticle, the  $\tau$ -graviton of chapter 2) in which they assume a role that we sense as the phenomenon of gravitation. In other words, they react to ensure that we mortals, for example, stay put on body Earth and do not drift off into outer space.

The answer to the second question is, to be frank with you, simply that I did not want to invent a new name for what I found was a pristine, newly born, version of an electrically charged energy quantum it is naked state, before it added just a little weight by consuming, as it were, an electron-positron pair, which then gave it a momentary presence as matter on the stage where we also perform. I have tried referring to it as the 'virtual muon' to distinguish it from the real muon, but, in the end, I have chosen to call it the 'muon' and, before leaving this chapter, I will enlighten you on the details of what I have just introduced.

Reverting to the first question and that link with gravitation, it is this gravitational connection that is the reason why we should not ignore the 'ubiquitous muon'. The story of Creation is based on the muon as the building block from which the edifice of our universe has been constructed and the muon is also the agent giving birth to the action accounting for the force of gravity, without which the stars and planets could not have formed.

So please accept as our starting point that space is primarily a densely populated ocean of muons in which we, as intruding matter, have very little relevance. As we, with awe and due reverence, worship God, the Creator, those physicists amongst us might find a measure of satisfaction that can strengthen one's faith concerning the Creation of the universe by studying what now follows from this introductory insight into the creative workings of Nature.

A snapshot overview of what lies ahead in later chapters is evident from Fig. 3.1.

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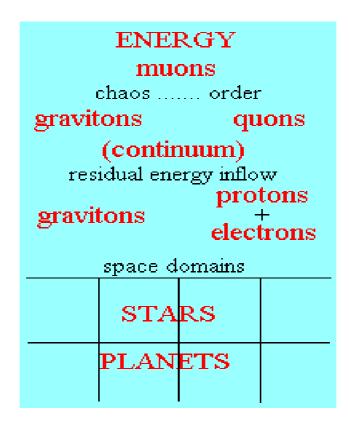


Fig. 3.1

In view of the audacity of this attempt to explain Creation, it seems not inappropriate to use the following words to summarize, just briefly and only by this intervention, what is illustrated, in a biblical style of wording. The justification for this is that we now have 21<sup>st</sup> century knowledge and the terminology of physics at our disposal but the sterile tone of modern scientific writings cannot convey the message of Creation with the same meaning as that of biblical times.

"And in the beginning there was Energy and that Energy packaged itself into units of electrical charge, in pairs of opposite polarity, that bear the name of Muons and

which form a uniformly dense electrically-neutral plenum that fills all space. As this plenum evolved, the Muons gave birth to a system of Quons immersed in a uniform Continuum of electrical charge of opposite polarity to the charge of the Quons and there evolved from the chaos a state of order amongst those Quons as they acquired a rhythmic motion which was duly balanced dynamically by an accompaniment of Gravitons, specially created for that purpose. Then, with the passage of time, as some residual Energy needed accommodation, matter appeared in the form of Protons and Electrons which joined the Quons in the rhythm of their dance and which also had a Graviton counterpart. And those Gravitons, by their presence in the Continuum amongst those electrically charged Muons, gave rise to a force that acted over vast domains of space and between all matter in each such domain, thereby drawing that matter together to form a star or pair of stars in each of those domains. And so it was that the universe was created and those Protons and Electrons combined to form atoms some of which developed into the more complex forms from which Mankind and other life forms duly evolved."

With this introduction the reader now has a choice. That muon form we see in experiments on particle physics is found to have a mass-energy by which a pair of muons would have a combined energy of 211 MeV. The reader can move on immediately to Chapter 4, to be introduced to the creation of the proton from those muons and, hopefully duly impressed by what has been discovered. Nature's coded message there resolved is the one encoded in the number 1836.152, the proton/electron mass ratio.

However, if the reader is reluctant to be led along a path where numbers may seem to be more important than the underlying physics, then such a reader may prefer to plough through the remainder of this chapter, where we will delve into some of the intricacies that distinguish the muon in its primeval, bare or 'virtual', form from its real form in its transient presence as matter. Numbers will still play a major part in this pursuit, simply because the measure of muon lifetime in seconds is a mere number, as is its mass ratio relative to the electron, but at least you will see that number derived from a rigorous theoretical exercise in physics. The reader needs to keep in mind that so much of what one reads in advanced theoretical physics is dominated by complex notions and even more complex equations which really have no clear meaning and, if given numerical form, seldom conform in precision with what is actually measured. It is very different from the realm of the engineer where one can design machines and structures that, in operation, match up well with theoretical prediction. I will give one example of this that pertains to the muon at the outset as we now proceed, but do realise that, in addressing this muon issue in detail, I am departing along a kind of side-track from the line of argument that I would otherwise follow, given a reader interested to learn something new by following a new theoretical route without being handicapped, in a sense, by prior indoctrination, as, for example, on the subject of time-dilation. You see, the muon and its lifetime variation as a function of speed is deemed to be a test verifying Einstein's Theory of Relativity and certain aspects of that theory are not in keeping with the process of Creation that I have introduced above.

I hope these words of introduction will justify the diversion now offered by the remainder of this chapter.

# The Muon Lifetime

The muon, as reported in *Review of Modern Physics*, (v. **48**, 2, Part II, April, 1976), has an observed mean lifetime of:

#### 2.197134 +/- 0.000077 microsconds

and it is an interesting task in physics to discover what it is that determines this particular lifetime period.

Physicists have seen a way in which to progress in this quest by using the techniques of what is termed 'Electroweak Theory'. Under a chapter heading 'Feynman Rules for Electroweak Theory' on p. 236, Bailin and Love in their book '*Introduction to Gauge Field Theory*' (Adam Hilger Ltd, 1986) derive a theoretical value for the muon lifetime, namely:

 $2.90 \pm 2.61$  microseconds

Of this result they say:

"Thus, while our result is consistent with the data, the large errors on this theoretical value of muon lifetime mean that this is hardly a rigorous test of the theory."

So if one is really interested in delving into the theoretical foundations which govern much of particle physics and particularly physics pertaining to leptons, the realm of quantum electrodynamics, one presumably should not be concerned with the kind of aether advocated in this work.

However, do note that the theoretical derivation of numerical quantities that arise in basic physics is seen as a test of the theory involved. So let us put our alternative theory to the test by trying to derive the lifetime of the muon.

First of all, we ask, "What is a muon, meaning the one that appears in the matter frame of high energy particle physics?" It will, according to the theory already presented, comply with the formulation used by J. J. Thomson for the electron, though having its charge radius reduced by a factor equal to the muon/electron mass ratio. Yet, given that electrons and positrons are prevalent in the quantum electrodynamic arena, one can wonder if a simple positive muon charge might attract two electrons and form a three-charge entity having the character we recognize as a negative muon.

With this in mind, the author has surmised that such muon entities might well comprise a core charge that, of itself, has a mass that is an odd integer multiple of the electron mass, that multiple being 207. The reason is that those two electrons, in repelling one another, take up positions in near-contact with the muon charge but at diametrically opposite locations and, by adding two units of electron mass as offset by the negative mass-energy of their electrostatic interaction, the net result is that the muon entity would have a mass of approximately 206.75 electron mass units.

The measured muon/electron mass ratio is 206.76835(11) (*Physical Review D*, **25**, 652; 1982) but onward analysis which involved a resonant wave interaction governing the actual spacing of the core muon body and the satellite electrons (or positrons) led to the author's theory giving the mass ratio as:

 $207 + 2 - 9[207/(208 + 2\pi/9)]/4$ 

which is 206.7683078. The full theory for this is of published record in the Italian Institute of Physics publication *Lettere al Nuovo Cimento* (**38**, 342; 1983). So, this result being precisely in accord with the measured value, you see why the author is confident that this model of the muon is the proper basis from which to seek to explain the lifetime and so test the theory further. Indeed, what is now to be described supercedes the theory for that lifetime that features at p. 146 of the author's book '*Physics Unified*', published in 1980.

Concerning muon lifetime, physicists well know that Einstein's theory requires the lifetime of a particle to increase with speed according to a relativistic formula, just as the same theory requires the energy of a particle to increase according to the same formula. Already in this work, in discussing electron energy theory as advocated by J. J. Thomson, we have seen why the mass of a particle moving at high speed is increased in accordance with what is observed, as in the Kaufmann's experiments of the 19<sup>th</sup> century. There is no particular merit in Einstein's derivation of the mass-increase formula. Concerning muon lifetime, however, the lifetime

enhancement with speed is best explained once one has an acceptable theory for the muon lifetime with the muon virtually at rest. Otherwise, it makes no sense at all to theorize about the lifetime changing with speed when it would seem that all one needs to do is to argue that lifetime is proportional to mass-energy and, as Einstein does, then argue that time itself is perceived to change in its rhythm as a function of speed.

We will confine our concerns here with deriving that muon lifetime for the rest condition, but if readers wish to see how this same aether theory does give account of muon lifetime dilation with speed then the appropriate reference is this author's paper entitled: '*Meson Lifetime Dilation as a Test of Special Relativity*', (Lettere al Nuovo Cimento, **38**, 206; 1983). Einstein's theory is not involved in this exercise, but one can point to a section of that paper where one may read:

"A primary publication on this subject is that of Bailey and Picasso (Progress in Nuclear Physics, 12, 62; 1970) who measured muon lifetime at very high speed for which the theoretical relativistic value was 26.69 microseconds compared with a rest lifetime of 2.198 microseconds. Thus ... (this author's theory) .... tells us that the observed lifetime at this value (of energy at the high speed compared with rest-mass energy) should be 0.56% low compared with the relativistic value. This is quite small, but it is also significant because Bailey and Picasso reported measurements to an experimental accuracy of 0.2% and did in fact find that the observed value was lower than the relativistic value by 1.2%. Though they regard this as adequate agreement the difference was sufficiently concerning for them to speculate at some length about the possible reasons for the difference. Only further research can verify the speculation, but it can be said that the question remains

open and the indications are that the relativistic expectation is up to 1% above the measured value of the muon lifetime at these energy levels."

Concerning the muon and this author's theory, one further point of interest before we come to the derivation of that lifetime property is that the very same model which the author used for deriving the mass of the muon gave a full account of the muon g-factor, again without involving Einstein's theory or, indeed, the standard arguments based on Feynman diagrams. The principles involved are much the same as those this author has applied in deriving the anomalous magnetic moment (g-factor) of the electron, the latter being presented in this work as Appendix III.

The periodical reference is this author's paper: '*The Muon g-factor by Cavity Resonance Theory*', Lettere al Nuovo Cimento, **39**, 271; 1984. The theoretical value for the muon g-factor was found to be 2(1.001165918), a result in quite remarkable agreement with the then measured value of 2(1.0011659230), given the simplicity of the theory used.

One can see, therefore, in this digression from the main topic of this work, that concerning the physics of Creation, we need not lose sight of the reality of what is observed concerning the muon in our laboratory experiments. This point is made particularly because, in introducing the 'ubiquitous muon' of the aether medium as something different but active in the quantum underworld of space, it may seem that we are invoking arbitrary assumptions, whereas the analysis, once we reach the realm of quantum theory, will be seen to lead us to a mass-energy for that 'ubiquitous muon' which is indeed very close to that of the real muon which reveals itself in our experiments.

Now we come to the question of the muon lifetime. The aether we are considering in this work has a unit cell volume that is  $(108\pi)^3$ times the cube of the radius of the electron charge and it will emerge as we proceed that the aether has a rhythmic cycle at the Compton electron frequency, the photon frequency corresponding to the electron mass-energy quantum. In every such cycle there is a quantum-electrodynamic event associated with the energy quantum of a pair of virtual muons but such events occur at random positions in space. The proposition now advanced is that if those two electron charges associated with the core muon form sustain a hit simultaneously in the same rhythmic period, then the muon will be conditioned for decay.

By 'hit' it is meant that the virtual muon of opposite charge polarity is created within the space occupied by the electron charge. By 'conditioned for decay' is meant the transient creation of a system which statistically has the prospect of decaying in the manner now explained.

Given one unit of muon energy plus two similar units owing to the impact of the two virtual muons, there are three units of muon energy. Given also the fact, as we shall see later in this work, that the space occupied by material charge forms is conserved in particle reactions, the muon, when subjected to such a 'hit' is converted to a higher energy level, pending decay or reversion to the normal state.

Some muons so affected are transiently elevated to an energy level that is less than three times their normal rest-mass energy, whereas others are elevated to an energy level that is greater than three times their normal rest-mass energy. The latter are the ones that experience decay. The energy deployment determines the ratio of the two states as being 17:8, meaning that the chance of decay for each 'hit' is 8 in 25.

This immediately leads us to the formula for muon lifetime as being:

$$(25/8)(3/4\pi)^2(108\pi)^6(8.093)10^{-21}$$
 s

which is:

2.199 microseconds

a value that is within one part per thousand of the experimental value.

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If a muon core charge +e is suddenly forced to shed its two electron (or positron) associates and is driven to an energy level some three times greater then one could contemplate the space occupied by its basic charge form being shared equally by three charges, +e, -e and +e. Each such new charge form will have a charge radius that decreases by a factor equal to the cube root of 3. Conversely, each such charge will have a mass-energy enhanced by the same factor 1.44225, according to the Thomson formula already introduced.

Now, depending upon how these three charges arrange themselves in a group, the overall mass-energy can be greater or less than that of three basic muons.

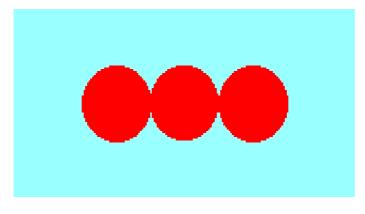


Fig. 3.2

One possible configuration of the three charges is depicted in Fig. 3.2 and such a charge group has an electric energy that, in the basic muon units, is 3 as offset by the sum of three components of electrostatic interaction energy. This leads to the following quantity: 3 - 0.75 - 0.75 + 0.375 = 1.875

and, upon multiplication by 1.44225, this becomes 2.7042.

We could then expect that, since muons are involved and are subject to pair creation and pair annihilation, the number of such configurations that might be created as a group would require an energy threshold that is an appropriate integer multiple of the basic

muon energy quantum. If now one multiplies 2.7042 by successive integers until one comes to a value that is itself well within one part in 1,000 of being an integer value, then it is found that the necessary multiple is 17.

As such a group forms by deploying a total of three muon units of energy at each step there will be a surplus of energy of 0.2958 units, some of which is likely to be deployed in helping to create a more energetic version of that three-charge system, as shown in Fig. 3.3.

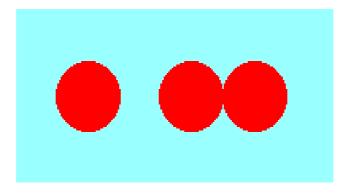


Fig. 3.3

Here one of the charges is separated from the other two and the energy at separation to a distance far in excess of the charge radius may then be as high as:

3 - 0.75 = 2.25

times 1.44225, which is 3.2451.

It seems then possible that, as each of the Fig. 3.2 charge combinations forms by shedding that energy of 0.2958 units, there is the possibility that the two such quanta of energy shed by the nearby activity of creating two similar charge combinations will converge on the primary combination and act to separate the charges and so form the Fig. 3.3 charge system. This is because 2(0.2958) exceeds (0.2958 + 0.2451), meaning that 0.0507 units of energy disperse at this second stage of action to leave three charge combinations, two of the Fig. 3.2

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form and one of the Fig. 3.3 form. Therefore, in progressing to the threshold stage at which 17 of the Fig. 3.2 combinations have been created one has by then also created 8 of the Fig. 3.3 form. This is very satisfactory because 8 times 3.2451 is 25.96, which is itself within one part in 650 of being an integer.

As to the muon decay process, the Fig. 3.2 charge combination will revert to the basic muon state because two adjacent charges will annihilate one another and, being close to the remaining charge, their charge volume will be conserved for use by that residual charge as it sheds surplus energy. However, for the Fig. 3.3 charge system, the decay by charge pair annihilation occurs at a distance from the residual charge and that charge, in shedding energy, cannot capture the space vacated by the charge pair and so revert to its basic muon form. It stands in isolation and lacks the stability assured by the close presence of other charges having the same properties. The latter is important because a group of three or more like charges conforming with the J. J. Thomson formula for energy in terms of charge volume can preserve equilibrium by exchanging energy and still conserve their overall energy and charge volume. Hence, owing to that isolation, the Fig. 3.3 charge combinations must decay at the end of the rhythmic quantum cycle.

For this reason there is the statistical probability that in every group of 25 muons that happen to be excited to the potentiallyunstable condition, there are 8 that will decay and 17 that survive decay, thereby substantiating the above formula for the muon lifetime.

Now, the author will be the first to concede that the above account is somewhat complicated in the derivation of that 8 to 17 ratio and there may be a better alternative yet to be discovered, but it does give what seems to be the right answer. Accordingly, it is included here for the record and also to make the case that, in comparing this aether theory with Einstein's theory or what is referred to as 'Electroweak' theory, there is really no contest, given that Einstein's theory does not even offer any estimate of the muon lifetime that one can define in numerical terms, whereas the other standard theory gives, as stated above, a figure well off target and is anyway subject to an uncertainty having a standard deviation amounting to 90% of the estimated value.

Concerning other particle lifetimes we shall not, elsewhere in this work, be seeking to derive further theoretical values as evidence supporting this theory. Our primary concern in this work is the problem of Creation on the universal scale. However, by way of reference, readers interested in particle lifetime theory may find it of interest to look up the following papers by this author.

*A Theory of Pion Lifetime*, Lettere Nuovo Cimento, **33**, 237 (1982).

*'A Theory of Neutron Lifetime'*, Lettere al Nuovo Cimento, **31**, 383 (1981).

'*The Finite Lifetime of the Electron*', Speculations in Science and Technology, **7**, 3 (1984).

The latter paper discusses the reason why the electron has a finite lifetime evident from its electron tunnelling properties. It must have a lifetime if the above theory for muon lifetime is correct, because it is the dual 'hit' of two electrons (or positrons) as a target that gives basis for muon decay. That electron lifetime, based of course on a single 'hit', is of the order of  $0.75 \times 10^{-13}$  seconds and may be derived from what has been presented above by using the formula:

 $(3/4\pi)(108\pi)^3(8.093)10^{-21}$  s

One of the most fascinating questions one can then consider is whether the proton has a finite lifetime. As for the electron, standard physics offers no suggestion that these two most fundamental of all particles of matter may be subject to eventual decay. However, may not the reason for this be that decay sheds energy which our aether has to take under its wing and look after pending finding a new home for that energy in the system of matter? It is simply a question of equilibrium as between the energy the aether can store to meet its own structural needs and surplus energy it may possess transiently pending shedding it to create matter. Given then that the basic forms of matter in the local space domain of our experience consist in negative electric charges assuming the form of the electron and positive electric charges forming as protons, need we be surprised if we were to find that both an electron and a proton may have finite lifetimes but, upon decay, they are recreated almost at the point where they suffered their demise?

As to the proton, though we shall see in the next chapter how it is created, we will later in this work discuss an aspect of this process that explores the broader picture of proton creation even in outer space, or rather the aether's attempts at proton creation that fail owing to lack of surplus energy. That ongoing scenario of an aether subject to quantum fluctuations involving those 'ubiquitous' muons in trying to create protons is one from which we can derive the theoretical value of the Hubble constant as a feature of a non-expanding universe necessarily set in that aether. Such is the scale and scope of the subject of this book concerning Creation.

# CHAPTER 4

# The Creation of the Proton

#### Introduction

In this chapter we will address the problem of proton creation. The proton is the most fundamental particle in the composition of matter. Our task here is to explain how it is created and how similar creation processes attempt to create other particles that we only glimpse by their transient existence.

The proton is indeed very special as there is something unique about the conditions under which it is created, something which assures its stable existence. However, contrary to general belief, even a proton must have a finite lifetime, but in view of its creation propensity its decay is followed by its immediate re-creation and so it appears to be immune from decay. It is the same for the electron, but we can infer a measure of its lifetime from its ability to tunnel across potential barriers.

The starting point in this account is the activity of the virtual muon system that populates all space. The muon is a lepton form intermediate the taon and the electron. It decays to form the electron but it can also, in its game play with other muons, build the particle forms that include both the taon and the proton and, once created, those protons are survivors for the reason now to be explained.

### **The Proton Creation Formula**

Earlier in this work there has been extensive use of the formula ascribed to J. J. Thomson for the mass-energy of a charge e

confined within a sphere of a radius we here denote by the symbol x. The energy E is simply:

Suppose now, given such a combination, that one charge, that of radius x is not susceptible to x changing in value but that the other charge can adapt by adjusting the radius y to suit some optimum energy condition. This is an electrostatic system and we are familiar with the energy of such systems seeking to minimize. Therefore, now let y change until the total energy of the combination is a minimum.

This will mean that:

The energy of the charge combination in this minimal energy state is then found to be even less than that of the stable charge of radius x by the small factor of 0.2247 squared or 0.0505, meaning that the overall combination has an energy slightly less than 95% of that stable charge.

The two-charge unit just described is electrically neutral and, with the dominant component having a mass-energy A and the dependant component having a mass-energy B, we now adopt the following expression to symbolize its energy:

 $(A:B)_{MIN}$ 

that energy being 0.9495A.

Now suppose that a proton of energy P and charge +e has been created from the turmoil of excess energy in the aether that is seeking a state of equilibrium by deploying that energy into a standard particle form. Remember that in discussing the graviton in chapter 2 it was evident that the volume of the charge continuum displaced by the existence of the graviton bore a crucial relationship with the energy of that graviton. If that volume expands slightly, signifying a loss of some of that energy, there had to be other gravitons that absorbed that energy by contracting in equal measure. Such a scenario implies greater particle stability where all those particles have identical form.

In the aether the taon is one such particle form and in matter the proton is such a particle form. Then there is that ubiquitous virtual particle form, the muon of chapter 3, and its 'double', the dimuon now introduced, the mystery particles of the vacuum medium.

Once created the proton will be stable by virtue of its association with so many other protons of identical form, but the proton, along with other particles, can engage in a violent encounter if one of those muons or dimuons gets too close. The result is that an amount of energy z will be shed in a form nucleated by a charge +e but the muon or dimuon will escape unscathed to leave a neutral entity:

## $(P:k\mu)_{MIN}$

where k is 1 or 2 and  $\mu$  signifies the energy of the muon.

The existence of the dimuon is explained by considering the combination of two muons, one of charge +e and one of charge -e, with the energy being retained without loss in a neutral combination represented by:

## (2µ:µ)

To understand this simply put y equal to 2x in the system described at the beginning of this section to signify that one charge has twice the radius and half the mass-energy of the other and you will see that the Coulomb interaction energy exactly cancels the energy of the second charge. The dimuon is a latent component in the neutral system transiently formed by muon pair combination.

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It seems possible therefore that k could be 2 and, keeping this in mind, we now write the equation:

 $(P:k\mu)_{MIN} + z = P$ .....(4.3)

Given that the proton is somehow created and is a survivor, this equation is presumably one that is reversible in the sense that it says something about the creation of a positively charged particle zwhen P does get embroiled in a decay incident but it is equally a statement that has bearing upon how P is created. Somehow that particle of energy z has an independent origin and, if we can discover what that origin is, then we will discover the secret of proton creation.

Well, one can now utter the word "Eureka", because the answer is so obvious. In that (A:B) expression put A as  $2\mu$  as if we are considering that transiently neutral combination of a muon charge pair, but suppose the muon component B sheds energy to become z as that combination adopts its minimum energy state. One then has a neutral particle form of energy:

### $(2\mu:z)_{MIN}$

This then becomes the target for attack by an odd number n of muons which drive out the z component and combine as a charge of energy P within the new neutral entity. The formulation of this is:

$$P = 8.899(\mu) \dots (4.5)$$

which was evident anyway once k was seen to be 2 but the theory has relied on the assumption that P rather than the dimuon is the dominant partner in the neutral combination yielding this result.

That assumption has to be justified and it is here that the factor n comes into the picture. It sits in that two-stage equation (4.4) indicating that the major energy input needed for proton creation is a muon source but, absent verification, we have no assurance that its

integer value n will give the now-expected answer, nor whether it will prove to be an odd integer.

Also there is so much scope in particle physics for energy discrepancies owing to Nature not complying with one's ideal theoretical portrayal that one would surely expect to find that some adjustment in regard to charge spacing or whatever will become necessary to satisfy the odd integer n requirement.

Now take note that the value of:

# $(2\mu:z)_{MIN}$

is simply 0.9495 times  $2\mu$  or  $1.899(\mu)$  which tells us that precisely 7 muons have to be added to create the proton. It just so happens that the mathematics of all this works with such perfection in requiring n to be an odd integer that can only have the value 7 given the dimuon foundation.

It is an almost miraculous feature of the underworld activity of the aether medium that it has this truly amazing unique energy resonance property which causes a particle to form which locks its energy level at a unique value so precisely related to that of the prevalent lepton of the aether, the virtual muon.

In saying this I can but emphasize the fact that we have here the secret of the feature of Creation by which one, and only one, high mass-energy particle form has a dominating presence in matter. It is the proton family, by which I include the antiproton. The electron is equally prevalent but its existence is linked to the unique value of the universal rhythm of time, owing to its relatively low rest-massenergy being that given by the frequency of the aether as multiplied by Planck's constant h, as will be discussed in chapters 6 and 7. Although physicists may argue that the neutron can claim also to be very prevalent in matter, I deny that claim, because the neutron has only been detected as a short-lived particle form, which decays into a proton and an electron. Its imagined existence in atomic nuclei is based solely on theory which pretends there is no aether and tries to balance the books accounting for mass and charge. An atomic nucleus having n units of charge and N units of mass is deemed to comprise n protons and N-n neutrons, but given the role played by the aether, with atomic nuclei having charges which meld into the aether particle lattice by adopting its structural form, one can imagine that atomic nucleus having n protons and N-n antiprotons, but with those antiprotons each having displaced a quon from its seat in the aether lattice. So, by understanding how protons are created in terms of aether activity, we are opening the way forward for a better understanding of the structure and composition of atomic nuclei. However, that is digressing from our main theme and we must get back on track.

Once we have derived from first principles the precise energy quantum of the aether's virtual muon we shall know the precise mass-energy of the proton. Our progress so far assures us that it is 8.899 times that of the virtual muon or, as may be shown by the very simple mathematics involved, to be far more precise as 8.898979486 times that quantity.

Note that, the equivalent algebraic formulation for this quantity is:

9 - 2
$$[(3/2)^{\frac{1}{2}} - 1]^2$$

which is the expression used in equation (2.8) in chapter 2.

## The Mass-Energy of the Taon

In the effort to understand the myriad of particles that have revealed themselves in high energy experiments by particle physicists, one has sought to build patterns of their relationship and classification. This seems not to be aimed at understanding how these particles are created but rather more directed at spotting gaps in the pattern and looking for evidence that might fill those gaps. All that is a rather futile exercise, bearing in mind that those particles are all so short lived that one wonders whether they are Nature's creation or man-made resonance effects arising from the high energies used in their manufacture. Nevertheless, there has to be a natural process by which those gravitons discussed in chapter 2 are created and, given the argument that the activity of the muons in the aether creates the proton, it is logical that we should try to build on that theme in considering graviton creation.

I would expect that, since the creation of protons can mean that matter is being added to the E frame of the aether and this implies the need for gravitons to be created to provide dynamic balance by settling in the G-frame, the creation of protons and gravitons could well occur as if from the same manufacturing process. One needs to imagine that the aether is ever trying to deploy its energy to create protons but failing to keep them alive if the energy surplus to its equilibrium requirements is insufficient. Also, and with equal vigour, it will surely seek to create gravitons as well, given the necessary energy and vacancy in the graviton frame that provides dynamic balance for the quantum jitter of matter, such as those protons that are created amongst the quons in their reference frame.

So proton creation and graviton creation go hand in hand. Note, however, that what you will see emerge from this exercise is the creation of the more prevalent graviton, the taon form already discussed in chapter 2, where it was shown how the taon and the more massive g-graviton form were related. The latter, as we have seen, has a mass that is 1.452627 times that of the taon.

If taons are created with protons, why not just consider the possibility that they can emerge from the very same process as that represented for proton creation in equations (4.4) and (4.5)? All we need to do is to imagine that two proton creation events occur side by side, meaning a proton and an antiproton, so that, in energy terms, the overall equation is:

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being of opposite charge e, as otherwise they would not come together, merely combine first and so decay to dissipate their energy. That would leave the energy of those two neutral combinations of charge which might find a way of combining with a similar neutral energy entity to then divide as two particles of opposite polarity charge e. If the product were a pair of taons then, by the following equation:

The mass of each of those taons would be 2(0.9495)P or 1.899(P). Now, since the proton P has the mass-energy 938.3 MeV, this means that the taon has the mass-energy value close to 1.782 GeV. This corresponds with the algebraic formulation of equation (2.9) in chapter 2.

So here we have the taon that assumes the role of a graviton emerging from the very same process that accounts for proton creation. This mass-energy quantum is that found from measurements of the taons that appear transiently in the matter state.

Moreover, there is something we can even add in connection with this process that is a kind of additional check of our analysis. It is the fact that:

 $(P:k\mu)_{MIN} = 891 \text{ MeV} \dots (4.8)$ and that there is a meson in the experimental particle spectrum that is denoted K\*(892) to signify that its measured mass-energy is approximately 892 MeV and this meson is the only one intermediate the proton mass-energy of 938.3 MeV and the mass-energy 783 MeV of the  $\omega$ (783) meson.

This, therefore, endorses both the above derivation of proton mass and this more direct route of accounting for the taon creation process.

Now, at this stage, it is interesting to explore this subject of taon creation just a little further and ask ourselves what happens if Nature tries to create more massive particles by bombarding the taon with pairs of muons. Well, once the energy involved is high enough then it would seem that the onward decay could bring those heavier gravitons into their transient existence. However, other particle forms having a much shorter lifetime will surely be created as well and it is of interest to consider this, as we now see.

### **Hyperon Creation**

Taons are leptons. They decay by mutual annihilation and such decay can be triggered by muons. Consider then their combination with a pair of muons of opposite charge. Might the taon be converted into a charged particle of higher mass-energy? If it were and this new particle, lacking the company of an abundance of similar particle forms, found it was unstable, then how might it stage that decay? Well, since space in the continuum cannot be created by a spontaneous demand, it seems likely that it would share its own charge volume with that of two of its brethren of opposite charge e, so that, by decay of an opposite charge pair, the single charge could take up residence in a space having three times the volume as the original charge form.

This would mean that the particle so formed would have a charge radius larger by the cube root of 3 than the original particle and so smaller in mass-energy in inverse proportion.

What this means is that, if N muon pairs merge their energy with the taon to create a single particle of charge e and energy  $\tau$  plus 2Nµ, then three such particles could come together and shed much of their pooled energy in a high energy environment to leave a new residual particle having a mass given by:

## $0.693(\tau + 2N\mu)$

Note that 0.693 is the inverse of the cube root of 3. With  $\tau$  as 1.782 GeV and  $2\mu$  as 211 MeV this suggests that, depending upon N, a series of particle by-products might be generated in high energy particle experiments, their mass-energies being:

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1.235 GeV for N = 0 :  $\Delta$ (1235) 1.381 GeV for N = 1 :  $\Sigma^*$ (1385) 1.527 GeV for N = 2 :  $\Xi^*$ (1530) 1.674 GeV for N = 3 :  $\Omega^-$ (1675)

These mass-energy values can be seen to correspond to hyperons that feature in the high energy particle spectrum, as indicated by their standard symbols. The data listings from which these are quoted evidently rounds-off energy values to multiples of 5 MeV, no doubt owing to the approximate nature of the measurements.

It is submitted that on this basis we can be quite confident about the physics underlying the particle creation processes here discussed. The taon is clearly a major player on the aether scene and it is very reassuring to find that its creation stems from activity which also produces the proton.

It is not intended here in this discussion of the physics of creation that we should try to delve into the creation of the many other particles that are found in high energy experiments. All I seek is to give account of the creation of the primary matter particles and the particles hidden but ever at work in its governing agency, the aether. The task, as we have already seen, has taken us into the realm of unified field theory and there is much more to discuss concerning cosmic issues.

This has to be after we have really delved deeper into the mathematics of the aether to show how its structure and form give basis for wave mechanical phenomena and determine the fine-structure constant. The latter is a key factor in any pursuit to understand the foundation for the creation of our universe.

Also much has to be said to reinforce the case for the aether already presented, given the strength of conviction of theoretical physicists on the relativistic front, the group hostile to aether theory with its three-space dimensions, and those of the quantumelectrodynamic front, the group hostile to attempts at deriving the dimensionless constants of physics by methods they see as unorthodox.

This effort, which may seem a little tedious, will include the theoretical derivation of the virtual muon mass, thereby allowing full theoretical evaluation of the proton-electron mass ratio, but, for those who have skipped over the latter part of the previous chapter, one can see by referring back that we have not ignored the slightly different mass of the muon in evidence in the matter frame.

Happily, once through the detail of the next three chapters, we shall arrive at the more exciting prospect of seeing how stars are created and the spin-off from that pursuit which brings us down to Earth as we explore the scope for using the knowledge so gained to tap into the energy resource of the aether itself.

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# CHAPTER 5

# *The Law of Gravity*

### Introduction

Here in this chapter we will revert to a consideration of the phenomenon of gravitation as it is seen from the perspective of orthodox physicists. They do not have insight into the processes by which Mother Nature develops the force of gravity and have no way of regulating its action, which means that there is little they can do, apart from measuring the laboratory value of G and observing gravity's action in the astronomical arena.

Having, as this work shows, spent many years developing and publishing accounts of the theory which forms the subject of this work, this author can but be a little depressed upon reading something concerning gravity and published in the British press during the days when this chapter is written.

The TIMES newspaper dated January 9, 2003 highlighted a feature as 'News' under the heading: '*Einstein vindicated at Newton's expense*'. It would seem that at the annual meeting of the American Astronomical Association the results will be announced which 'show that Einstein was right'. The 'speed of gravity' has been measured at 1.06 times the speed of light, with a margin of error of plus or minus 0.21 and 'since the speed of light is the only possibility for the speed of gravity that falls within that range', so gravity complies with Einstein's prediction. Newton suffers defeat! His theory has failed because Newton deemed the force of gravity to be an instantaneous action-at-a-distance.

On such a basis those involved in this research justify the following statement as quoted at the end of this newspaper article.

"We also hope that over the next decade Russia, Japan and the United States will succeed in extending the largest radio telescope arrays beyond the diameter of Earth by putting radio telescopes in orbit, and that this will confirm and greatly increase the accuracy of our result."

One can but wonder why it is that scientists believe they can justify vast expenditure on future research enabling them to look deeper and deeper into outer space in search of inspiration by which to find solutions to the problems they confront here and now on body Earth. Accordingly, in this chapter the author will indulge in a critical survey of the 'state-of-the-art' pertaining to gravity and ask the reader to weigh the case for and against the opinions expressed. The issue is not whether Einstein was right and Newton was wrong. The issue is simply that of understanding how fast gravitational action does assert itself and here, in this chapter, one can open the debate by reference to an assertion often made concerning quantum theory that electrostatic action is an instantaneous action-at-distance. Having, in chapter 2, introduced the notion that gravitation might well be rooted in electrostatic action, readers will then see why, in the light of the above newspaper article, this debate is needed.

I will in this chapter discuss the theme generally but nevertheless show how the evidence of record deemed to support Einstein's gravitational theory is better explained by analysis based on the role played by the aether. The 'debate' which follows is merely an introduction.

## Quotations

The TIMES article was authored by Mark Henderson, Science Correspondent. It included as aside remarks the following statements:

**"General theory of relativity:** Einstein's most famous work, which accounts for the nature of the cosmos, was proved in 1919 by the British astronomer Sir Arthur Eddington, who showed that light from distant stars was bent by the Sun during a solar eclipse.

**Quantum theory:** Einstein's other great work remains the best model that physicists have for understanding the forces that govern the interior of atoms, matter's building blocks. But it does not incorporate gravity, and scientists are still seeking a "grand theory of everything" that unites relativity and quantum mechanics, knitting together every aspect of physics."

So, there you are, Einstein's theory is 'proved' and to move forward to achieve the ultimate target of all physicists one must seek a way of uniting relativity and quantum mechanics.

Well, the aether theory on offer in this work does unite quantum mechanics with gravity but ignores Einstein's doctrinaire distortions of a four-dimensional space medium that physicists refer to as 'spacetime'. Those scientists who follow the Einstein track can never, ever, reach their Holy Grail, that 'grand theory', without getting off that track and setting off on ground first trod by Sir Arthur Eddington and confronting with an open mind the task of deciphering the significance of Nature's physical constants.

The TIMES article tells us that the speed of gravity being equal to the speed of light has:

'never been anything more than an assumption and has always been impossible to test. ..... The experiment to measure gravity's speed was conceived by Ed Fomalont, of the National Radio astronomy Observatory in Charlottesville, Virginia, and Sergei Kopeikin,

Professor of Theoretical Physics of the University of Missouri-Columbia.'

That experiment involved the use of radio telescopes to measure the effect of planet Jupiter in traversing across the path of the radio waves we receive from a very bright quasar named JO842-1835 and, owing to Jupiter's gravitational field, thereby deflecting the path of those signals so that the quasar's position appeared displaced.

# The Debate

The reference to the 'speed of gravity' is itself something that needs definition. If one considers the speed of light, at least one can interrupt the light beam at a distance from the point of measurement and so relate time and distance as needed to make the measurement. Gravity as a force exists given the existence of a source body and we really have no way of turning that force on and off. All we can do is to move the body itself and then the question arises as to whether the gravitational field shares that motion as if rigid (instantaneous action) or adjusts to the motion with a time delay.

Keep in mind that there is a world of difference in physics as between the notional retardation of the action of a force such as gravity and the delay involved in gravitational potential energy redeploying in the field system which envelops the mass involved. The reader, in yielding to theoretical notions, has to decide whether to think in terms of force or in terms of energy, whereas Mother Nature does not 'think' but simply 'acts' by a process of adjusting the distribution of the energy in the system to optimise action leading to a minimum energy potential state.

If the motion of a planet around the sun were truly a circular motion with the planet's orbit having a constant radius, then the mutual gravitational energy potential between sun and planet would surely be constant as no energy is being transferred to cater for changes of kinetic energy by the two interacting bodies. If, however,

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there were to be a cyclical change of that radius, as applies for elliptical orbital motion of the planet, then there would be energy transfer to and from the planet drawing on, or replenishing, that gravitational potential resource. Now, in the context of this situation, what is meant by 'speed of gravity'? Gravity does not move, so are we referring to the speed of energy that is traversing between planet and the gravitational field system? Then one must ask where that potential energy is seated as it can hardly be that it sits at the Sun's centre and to apply the proposition that the energy we associate with gravity travels at the speed of light we need to know where it sets out from in its journey in order to reach the planet and resettle as it adds to the kinetic energy of that planet.

As to the basic orbital component of circular motion, the radius is determined by a balance of centrifugal force and the force of gravity. The balance is an unchanging quantity and if 'gravity has a speed' is this something that was only a factor when the solar system was first created or is it somehow something that affects the planet's motion on an ongoing basis?

The history of this subject tells us that, if we assume the circular component of orbital motion is not affected by the 'speed of gravity' but the radial component of motion is so affected, then the radial period of the oscillations will be slightly retarded in relation to the orbital period. This explains why the orbit is subject to a slow progressive advance of its perihelion, something observed and particularly noticeable in the case of planet Mercury.

Indeed, to get the theory to fit what is observed, namely the 43 seconds of arc anomalous advance of perihelion per century, the speed of that radial gravitational retardation effect has to be deemed to involve the speed of light. Gerber in 1898 (*Zeitschrift f. Math. u, Phys.*, **43**, 93), in explaining this 43 second of arc advance per century, assumed the gravitational action to have that speed of light limitation.

Readers who regard Einstein as the genius who discovered why the planet Mercury has such an anomalous motion should take note

that Gerber's paper was published 18 years before that of Einstein. Gerber's formula for the anomaly was exactly that which later appeared in Einstein's paper. Gerber's paper was entitled: *'The Space and Time Propagation of Gravitation'* and, though not published until after Gerber's decease, a second paper repeating and expanding on Gerber's analysis appeared in January 1917 in Gerber's name in the same German scientific periodical: *Ann. d. Phys.* in which Einstein's 1916 paper had appeared. It was obvious that there was concern that Gerber's contribution had been ignored and there was then onward debate as Seelinger drew attention to a mathematical flaw in Gerber's analysis. Oppenheim responded, stressing that the issue of finite speed was still open, but Seelinger reasserted his position to ensure that his arguments were not eroded by Oppenheim's views. (See: *Ann. d. Phys.*, **52**, 415; 1917: **53**, 31 & 163; 1917 and **54**, 38; 1917).

That debate revealed the difficulties of picturing how gravitational action asserts a retarded effect, given that one can hardly expect the flow of energy to be along a pencil thin line drawn between Sun and planet and given that point above that one is not even sure where the energy that is fed to the planet is seated before it sets off on that journey. However, one can be certain that somehow the speed of light is a governing factor and that what was needed was the proper interpretation of that observed 43 arc-second value to gain insight into the physical action.

Since physics involves matching assumptions with observations to verify those assumptions we then have a kind of chicken and egg argument. If the measurement is made before the assumption is recorded then that is not regarded as proving the theory, but if the assumption is made and duly found to be consistent with later measurement that is said to prove the theory. Such is the illogical arena in which the contests between theoreticians are staged. One must, it seems, predict what is later verified by experiment in order to be applauded by acceptance of one's theory. To explain by theory what is already known is not a respectable pursuit. In the case of the anomalous perihelion motion of Mercury the measurement antedated the theory, but in the case of gravitational bending of light Einstein's theory predated the measurement by the eclipse expedition in which Eddington was involved.

Thus one may wonder how one can ever explain why gravitation deflects a ray of light, except by Einstein's argument, given Eddington's assertion that this latter phenomenon is 'proof' of Einstein's theory.

Well, light-energy quanta, photons, supposedly travel at the speed of light and energy E has mass  $E/c^2$ , in accordance with classical electron theory, so those light-quanta, in moving past an astronomical body, are subject to the pull of gravity. Since, as light from a distant star, they do not travel around that body in a circular orbit, their distance from the body is changing constantly and so energy transfer should be occurring. Now here there is a real problem. How can those photons change their energy, energy surely gained by them as they approach the deflecting body and lost later on receding from it? Does the light frequency change during passage? Do they travel faster in their close transit past that body? If so then their deflection would be away from the body rather that towards it. Alternatively, maybe we should be thinking in terms of electromagnetic wave theory, rather than photon theory. Maybe we should be wondering how the gravitational action of that body affects the refractive index of the aether and thereby the speed of light through that aether which becomes a function of that refractive index.

That TIMES article, in telling us about the 'speed of gravity' does not provide any answers. I believe that photons, the product of quantum theory, do not in fact travel at the speed of light. Photons are events at localities in the aether where energy shed by matter is absorbed into the aether or energy shed by aether is absorbed by matter. A photon is deemed to travel between two such localities but in reality all that travels is an electromagnetic signal which is a mere ripple of energy already present in the aether, a ripple characterised by

direction and frequency. Such hypothesis is not tested by the quasar radio wave deflection observations. However, if you think of photons as energy quanta travelling at the speed of light as part of a ray in close transit past the Sun, then, since energy has mass, but yet photons seem to have no mass, you confront a conflicting situation, one made all the worse by the fact that, owing to the gravity, a mass quantum, as just indicated, should go faster in its transit past the Sun and that means that, as a part of a ray of light, that ray will surely be deflected away from the Sun rather than towards it, contrary to what is found by observation.

Do be assured, therefore, that a ray of light cannot be the flow of a train of photons and so seek instead to understand how gravity affects the refractive index of the medium that pervades all space. To base one's arguments on vague terminology, the expression 'speed of gravity', is only a way of raising more unanswerable questions rather than explaining unanswered questions!

### **The Way Forward**

To reach a position on common ground with that of physicists familiar with Einstein's theory I will proceed by making an assumption and I will show how this leads directly to the formulation of Einstein's law of gravitation. This should be seen as verification of that assumption. Then I will show by separate aether-based theory that the formulation governing light ray deflection arises from the effect of gravity upon the refractive index of the aether. The inference is that, whereas Einstein's theory explains the perihelion anomaly and light ray deflection by the same modification of the Newton's law of gravitation, the physics of gravitation requires two separate theoretical foundations for these two phenomena, because there is no analogy between planetary mass and the electromagnetic wave.

I note, however, that before leaving this chapter I will discuss the fascinating topic of whether gravity is an electrodynamic

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phenomenon, as assumed so far by those who seek a unified field theory, or an electrostatic phenomenon as implied earlier in this work.

The assumption is that the gravitational potential energy GMm/R that arises between two bodies of rest-mass M and m, respectively, having their mass centres spaced at a distance R is enhanced by the factor:

if there is relative motion at velocity v between the two bodies, c being the speed of light.

For Sun and planet v will, in the main, comprise a component of motion tangential to the orbit of the planet as supplemented by a radial lesser component of motion in that orbit. Such motion is, by standard physical principles rooted in Newtonian mechanics, subject to conservation of angular momentum and v being very small in relation to c. One can therefore, by close approximation, write h as vR, assuming the mass m to be constant.

However, though I know that this latter assumption is made in developing Einstein's General Theory as applied to gravitation, I appeal to the relativistically-minded reader familiar with Einstein's Special Theory and say that one could designate m as given by:

 $m = m_o [1 - (v/c)^2]^{-\frac{1}{2}}$ .....(5.2) I then argue that retardation of the force of gravity GMm/R<sup>2</sup> at the speed c will be equivalent to its value having to be enhanced by a factor sufficient to account for the work done by m in moving a distance fT<sup>2</sup>/2 against such a force, f being the acceleration v<sup>2</sup>/R and T being R/c, the time taken to traverse distance R at speed c. That factor then becomes:

 $[1 + (v/c)^2/2]$  .....(5.3)

Taken collectively, the effect of (5.2) and (5.3) is, to a close approximation, equivalent to requiring the gravitational potential to increase by the factor (5.1) as a result of that planetary motion at velocity v, which then means that our 'assumption' has been derived

by analysis based on standard physical logic founded on classical electron theory that recognizes increase of mass with speed .

As an aside remark I now stress here that, in quoting the 'relativistic' mass increase formula, I am in no way accepting Einstein's doctrines. My reason is that that formula, as already noted in chapter 1, in no way requires use of Einstein's theory, as I well know from textbook data of my student years.

Now, provided our expression for the gravitational potential is based on the rest-mass  $m_0$  of the planet, we derive Einstein's law of gravitation on the presumption that h, meaning vR, is constant by writing it as:

 $(GMm_o/R)[1 + (v/c)^2]$  ..... (5.4)

Replacing v by h/R, differentiate with respect to R to obtain, after reintroducing v by eliminating h as vR, the result that the gravitational force acting on the planet is:

 $(GMm_o/R^2)[1 + 3(v/c)^2]$  .....(5.5)

Note here that gravitational potential is a negative quantity, which explains why we avoided introducing a minus sign in deriving this force. Note also that energy is shed by the gravitational potential as R increases, which is consistent with the force being one of mutual attraction.

I now point out the fact that, by writing u as 1/R, and introducing polar coordinates based on an angle  $\phi$ , the force can be equated to the dynamic pull of the planet in orbit to lead to an equation for that orbital motion:

 $d^2u/d\phi^2 + u = (GM)[1/h^2 + 3(u/c)^2]$  ......(5.6) The corresponding Newtonian equation for planetary motion does not include that quantity  $3(u/c)^2$ . Equation (5.6) is the law of gravitation derived from the General Theory of Relativity. That additional term which distinguishes it from Newton's law corresponds to the progressive advance of the perihelion of the elliptical orbit of the planet.

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It takes about 20 textbook pages of mathematical analysis that is beyond the comprehension of most students to progress to the above equation through the jungle of relativistic dogma. Here I refer to a book entitled '*Modern Physics*' by H. A. Wilson that I purchased in 1946 when I was a university student. This is also the student textbook just mentioned above by reference to electron theory.

Starting from the doctrine of equivalence, one encounters 'geodesics' and 'world lines' as one enters the realm of 'curvilinear co-ordinates'. Then one comes to the 'curved Minkowski world' and encounters 'tensors', where one is introduced to a 'covariant' form of tensor called 'the fundamental tensor', of which there are three. Next come the 'Christoffel symbols', one of which has particular importance, the 'three-index symbol'. After that the next hurdle is 'covariant differentiation' which, once mastered, brings one to a second covariant derivative, developed in two forms, the difference of which has a special name: the 'Riemann tensor'. This brings us in sight of 'Einstein's Law of Gravitation', but only after we have digressed to calculate the values of a whole series of 'three index symbols' that apply to space surrounding a single heavy particle. To conclude the exercise we then have to introduce and formulate the path of an 'infinitesimal particle' to represent the planet that is to move in orbit around that heavy mass and finally, Lo and Behold, we arrive, after another page and a half, at that equation (5.6) above.

I cannot now resist the temptation of quoting a few words from the front page of a Newsletter that I have just received from the U.K. Institute of Physics South Central Branch (January, 2003). The Chairman, Howard Watson, tells us about his preparations to give a public talk on the subject of Physics Nobel Prize Winners and his perception that Einstein is usually about the only Nobel Laureate whose name is recognised by the so-called 'man-in-the-street'. He goes on to say:

"The deliberations of the committees in Stockholm are not released for 50 years after the awards. They show, for example, that Einstein was vetoed many times before he finally received the award in 1921. One committee member resolved: 'Einstein must never receive a Nobel Prize even if the entire world demands it'. Part of the problem was that the physicists there could not get their head around the new relativity physics, regarding it as something almost evil and reflecting the undesirable changes that were taking place in the world generally at the time."

So, with the slogan in mind: 'Einstein is right; Newton is wrong', but with that 20 pages of relativity physics still there to mystify the student, are we to accept that the paths of planets are determined and starlight is deflected thanks to Einstein's relativistic doctrines or are we to come to terms with the simple fact that a little commonsense physics that the student can understand will suffice for our onward perception of the universe and its Creation?

That equation (5.6) does hold valid, but surely it must be derived in a different way, as by starting from that formulation of (5.4) and understanding its physical basis.

## The Bending of Light by the Sun

Given Newton's law of gravitation as a starting point, equation (5.6) without that term  $3(u/c)^2$ , the solution for u is:

 $u = (GM/h^2)(1 + e \cos \phi)$  .....(5.7) where e, being less than 1, signifies the eccentricity of an ellipse.

Since the additional term added by the Einstein formulation is very small it may then be shown, by a process of successive approximation based on the approximate solution of equation (5.7), that the result corresponds to a slow rotation of the major axis of the ellipse. We shall not work through that analysis here but one will find

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that the result, as applied to planet Mercury, gives the answer that the major axis of its orbit turns at the rate of 43 seconds of arc every 100 years.

Note that we are not involved in four-dimensional space once equation (5.6) is formulated. The answer applies to motion in space of three dimensions. It is, indeed, a trick of relativity to take one into a notional space of four dimensions to justify the distortion of Newton's equation before converting the result back into the threedimensional world of reality. It is surely so much better to stay in the world of reality and, by understanding the physics which accounts for the gravitational potential expression of (5.4), progress without reliance on the General Theory of Relativity.

Now, so far as the effect of gravitational potential on a ray of light is concerned, Einstein's theory proceeds from the law of gravitation (5.6) and regards h as infinite, which is quite an assumption, one which I prefer to avoid. However, for the record, this leaves us with the equation:

 $d^2u/d\phi^2 + u = (GM)[3(u/c)^2]$  ..... (5.8) compared with the corresponding expression based on Newton's law of gravity:

$$d^2 u/d\phi^2 + u = 0$$
 .....(5.9)

The latter has a solution:

 $u = (1/p)\cos\theta$  ......(5.10)

which is the equation of a straight line, p being the perpendicular from the origin. This solution represents a first approximation that we can now substitute in (5.8) to obtain the equation:

 $d^2u/d\phi^2 + u = (3GM/p^2c^2)[1 + cos2\phi]/2$  ......(5.11) a solution of which is:

 $u = (1/p)\cos\phi + (3GM/p^2c^2)[1 - (1/3)\cos2\phi]/2$  ...... (5.12) where the angle  $\phi$  is measured from the point where u is a maximum, the point of closest transit.

The value of u has to be zero at a far distance and so, putting u as 0 in equation (5.12), with  $\phi$  as  $\pi/2+\epsilon$  or  $\phi$  as  $-\pi/2-\epsilon$ ,  $\epsilon$  being small, we obtain:

$$0 = (1/p)(-\varepsilon) + (3GM/p^2c^2)[1 + 1/3]/2 \dots (5.13)$$
  
which gives:

$$\varepsilon = (2GM/pc^2) \dots (5.14)$$

This parameter  $\varepsilon$  is the amount of deviation of a ray of light in transit from a far distance to the point of closest approach to the mass M. Therefore, since a similar further deviation occurs as the light ray continues on its way, the total deviation is  $4GM/pc^2$ .

With the mass of the Sun as  $2x10^{33}$  gm, G as  $6.67x10^{-8}$  dynecm<sup>2</sup> per gm squared, p as  $7x10^{10}$  cm, the Sun's radius, and c as  $3x10^{10}$  cm per second, the total deflection is therefore indicated by the theory as being 8.47 micro-radians or 1.75 seconds of arc. Since this is consistent with the observation of the deflection of light from stars that grazes past the Sun during a total eclipse of the sun, it has been taken as verification of Einstein's theory.

The reader will, however, have noticed that the mass  $m_o$  has somehow dropped out of the equation, but, though its value does not affect the numerical result just obtained, its presence is essential to the formulation of the theory. Clearly, Einstein's theory requires light, as a stream of photons, to be a ballistic phenomenon or, alternatively, requires energy that gravitates to be transported by the electromagnetic light wave. But here I stress that one must keep in mind that the ray of light cannot be deflected in the manner observed unless its components closer to the Sun travel more slowly than its components further removed from the Sun so we have to believe that the speed of light in vacuo need not be constant, given the presence of a nearby body. Furthermore, I again make the point that the energy or mass quanta that are conveyed by the light ray must somehow be slowed down, retarded, as they approach that body, whereas gravitation is supposed to attract and so accelerate such quanta

because the gravitational potential is shedding energy and augmenting their kinetic energy.

This poses a dilemma, but relativists are not daunted by this, because it is assumed that such problems can be answered by looking into the fabric of four-dimensional space and, accepting that a constant speed in four-space means a variable speed in three-space, so that the resulting formulations override the normal physics encountered in the three-dimensional world of reality.

We reach then a position where the formula for  $\varepsilon$  derived above is seemingly valid but its derivation is questionable, whereas the law of gravitation according to equation (5.6) holds valid, because it does account for the anomalous advance of planet Mercury's perihelion.

To add further confusion one can refer to authoritative works aimed at helping the student to better understand Einstein's theory. Here I will quote two contrasting statements, one by Einstein himself in his final and fifteenth edition of his book '*Relativity*' (Crown Publishers Inc, New York), where, in his Appendix III concerning experimental confirmation of his theory, he arrives at the  $1.7/\Delta$  arcsecond value for light deflection by the Sun at a distance of  $\Delta$  solar radii from its centre:

'It may be added that, according to the theory, half of this deflection is produced by the Newtonian field of attraction of the sun and the other half by the geometrical modification ("curvature") of space caused by the Sun.'

The other statement is quoted from a book by V. Fock (1964) entitled: *'The Theory of Space Time and Gravitation'*, (2<sup>nd</sup>. Ed., Pergamon Press, London), where, on p. 222, one reads:

'The fictitious medium of refractive index n is optically more dense in the vicinity of the Sun than it is far away from it. Therefore, light waves will bend around the sun.'

This is said in relation to a formula for refractive index:

 $n = 1 + 2GM/Rc^2$  ...... (5.15) where M is the mass of the Sun, and R here is distance from the centre of the Sun.

So, you see, Fock does not agree with Einstein on this aspect of Einstein's own theory. Einstein thinks that the deflection of light by the Sun is half due to the pull of gravity acting on mass-energy of the light itself and half due to refraction by the space medium, whereas Fock finds that all of the deflection arises from that refraction. Also, the space medium has become 'fictitious' rather than 'curved'.

I ask the reader what he or she, as a student, would learn from such enlightenment and note that the caption on the front cover of that book by Einstein (printed in 1961) reads:

'A CLEAR EXPLANATION OF THE FAMOUS THEORY THAT BROUGHT ABOUT THE ATOMIC AGE. With Only a High School Education The Reader Can Understand Albert Einstein's Explanation of His Epoch-Making Theory'.

I submit, therefore, that since equation (5.15) gives the appropriate measure of the light deflection observed by starlight grazing past the Sun, we should seek to derive it without thinking it represents the action of gravity on mass moving at the speed of light, but rather as the action of gravity on the aether itself. The aether should not be regarded as a 'fictitious' medium but rather as a real medium, the properties of which are rather subtle and somewhat elusive until we probe to discover the answers we seek.

## Introducing the E and G Frames of the Aether

The aether itself must be the seat of something in motion, something having a mass density and an energy density and so a characteristic that provides the relationship between energy and mass, which accounts for its light-speed determining property.

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The aether must have a rhythmic motion, a frequency, by which it acts as a kind of clock which determines what we call time.

With this cursory introduction I will now present a formula for its kinetic energy density that appears on p. 82 of my book '*Physics without Einstein*', published in 1969:

This formula represents the kinetic energy density of the aether, on the assumption that it has two systems, each of mass-density  $\rho$ , moving at speed c/2, but having a relative velocity c. Because that motion is an orbital motion that is strictly harmonious, having a fixed frequency,  $\rho$  does not depend upon speed and so is not subject to 'relativistic' mass increase owing to the way in which energy is deployed in such a system. It is therefore correct to use the Newtonian expression for kinetic energy even though the speeds involved are c/2.

The reader may have already guessed that one of those systems is provided by the gravitons introduced in chapter 2, whereas the other system is that of mass for which those gravitons provide gravitational interaction. So, even with no matter present, the aether intrinsically does have a state regulated by gravitation.

Now, since  $\rho$  cannot exhibit the inertia of translational motion owing to the preservation of equilibrium within the aether, its selfgravitational interactions are merged with the electrostatic interactions of its electric charge properties and so the gravitational feature only reveals itself when matter is present.

Suppose that a material object of mass M exists and interacts gravitationally with the mass-density  $\rho$ . Then at a distance R from M, one can expect the gravitational potential energy density to be GM $\rho$ /R, which we denote as  $\phi\rho$ . This will deplete the kinetic energy density of the aether, because gravitational potential is a negative quantity and its increase in magnitude sheds energy. So we expect the expression in (5.16) to be reduced, but with  $\rho$  remaining constant. Therefore c must itself be reduced in proportion to  $\phi$ . One then finds that:

 $\phi \rho = \rho c(\delta c)/2 \dots (5.17)$ 

This means that the aether itself has a refractive index n, a quantity we formulate as:

which can be written as:

$$n = 1 + 2\phi/c^2$$
 ..... (5.19)

or:

which is the above formula (5.15) said by Fock to be a result derived from Einstein's General Theory of Relativity.

However, we have derived it from aether theory. So, you see, the slowing down of light in its close passage past the Sun and its deviation as a result of the Sun's mass and also, for radio waves, that deflection by the planet Jupiter in the recent observations reported at the start of this chapter, are aether-based phenomena.

It is the energy deployment that governs what is observed and, just to show that the aether interpretation can add further insight into this energy deployment process, we can go one step further by asking and answering the question: "If energy is shed by that mass M acting on  $\rho$  at a point distant R from the centre of that mass M, where does that energy go? All you have done is to tell us that the kinetic energy density of the aether has been depleted, but surely energy cannot just vanish."

Well, the answer is that it does not vanish. It merely transfers into another kind of motion and is still held at that point. It has been shed by its ordered motion state in those rhythmic orbital cycles and has become kinetic energy associated with what we can regard as thermal vibrations, as if the aether lattice system that provides the mass density  $\rho$  has a temperature T. Owing to the fixed rhythm of time the motion involved has only two degrees of freedom, one radial to that orbital motion and one lateral to the plane of that motion. Thus we may well ask if the space here in cosmic regions close to Earth exhibits a temperature. If so, what would that temperature tell us about  $\rho$ ? The message would be that  $\rho$  consists of units of mass m<sub>o</sub> for which kT is equal to GMm<sub>o</sub> /R, where the gravitational potential here is that of the combined effect of the sun and body Earth, k being Boltzmann's constant. Before we embark on the detailed analysis of the aether we already know therefore that the 2.7 K cosmic background temperature of local space can indicate the mass value of that lattice particle, the quon, depicted earlier in Fig. 3.1. Furthermore, once we have derived that mass value independently by theoretical analysis, then we can deduce the very important fact that gravitation has a limited range of action, because distant stars do not contribute much to the gravitational potential matching that mass value.

An astute reader will have noticed that in deriving equation (5.3) I assumed that the energy transit time T was R/c, which is tantamount to saying that the gravitational action travels the distance between the two interacting masses at the speed of light. Here there is an interesting analogy evident from analysis of the deployment of electrostatic interaction energy in the case of two interacting charges. It may be proved (H. Aspden, 'The Spatial Energy Distribution for the Coulomb Interaction', Lettere al Nuovo Cimento, 25, 456; 1979) that if the distance between those charges is R, there is no net interaction energy within a sphere of space centred on either charge and of radius equal to R [See Appendix I]. It may also be shown that the interaction field energy in a spherical shell of radius greater than R does not change as R changes. This means that the field energy associated with that interaction, if it has to be deployed by transfer to or from the kinetic energy of either charge, must traverse exactly that distance R. In other words, if this analogy applies equally to the gravitational interaction, as seems to be the case, then the designation of that transit time T as R/c is fully justified if the energy involved travels at the speed of light. I further point out that, because we are considering an aether that has an underlying energy density, energy can be deployed at what may seem to be the speed of light but without actually moving

at the speed of light, just as a tidal wave can travel across the ocean without the water it conveys actually moving at the speed of that wave.

As to the so-called E and G frames mentioned in the heading of this section, the G frame is that defined by the graviton system, whereas the E frame is that defined by the system of aether lattice particles. The onward discussion and analysis pertaining to these aether frames in the next chapter takes us into the world of quantum physics and so we now enter the more serious phase of this quest to probe the secrets of Creation. A final word on the subject of gravitation is, however, needed before concluding this chapter.

## **Gravity: An Electrostatic or Electrodynamic Phenomenon?**

When we come to discuss the Neumann potential in chapter 9 it will be seen why the answer to this question favours electrostatic action. As just shown, since electrostatic action and gravitational action, both involving direct inverse-square of distance forces, this puts the emphasis on electrostatic action as the seat of gravitation. One finds from analysis based on the electrodynamic interaction that the distribution of interaction energy in the field does not conform with that we relied on above to derive the factor (5.3). One then confronts the need for special assumptions in seeking to accommodate to the retardation time factors involved. Also, as we shall see in deriving the Neumann potential from Coulomb's Law in chapter 9, I can no longer hold to a position I took in my earlier accounts of the theory of gravitation. This was that the gravitons, in moving with the G-frame at a speed c relative to that of the E-frame, were, in effect, interacting current elements ( $\sigma V/c$ ) moving mutually parallel at the same speed c relative to the electromagnetic frame of reference. To apply the Neumann potential to their mutual interaction can then be argued as giving an attractive force of  $(\sigma V)^2$  at unit distance, which admittedly implied this was a gravitational action, but this argument is now thwarted by the proof in chapter 9 that the basis of the

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Neumann potential is the relative velocity of the interacting charges and this is zero. This means that to sustain the argument that gravitation is an electrodynamic phenomenon, one loses the theoretical foundation for the Neumann potential or one has to wander into unacceptable territory by saying that the gravitons, in their motion with the G-frame, exist themselves as leptons by ongoing charge pair creation and annihilation at an enormously fast rate, far greater than that of the rhythmic G-frame motion at the Compton electron. These factors militate against gravity being an electromagnetic phenomenon and favour the electrostatic interpretation. Fortunately the quantitative aspects of the theory affecting the determination of G remain the same as that of the author's earlier theory. Here, then, is the lesson that in developing theoretical accounts of physical phenomena one must persist in probing deeper to understand more and more and must be ready to change direction if Mother Nature guides one along a different path.

I therefore now hold firm to the position I took in chapter 2; gravitation is an electrostatic phenomenon or rather a negative electrostatic phenomenon in the sense that holes in the G-frame continuum charge of density  $\sigma$  mutually attract according to the inverse-square law. Those holes are filled by pairs of oppositely charged gravitons, the motion of which provides the dynamic balance for matter sharing the motion of the E-frame.

## [End of Chapter Footnote]

Concerning that TIMES article mentioned in the opening section of this chapter, it is noted that, in the *News and Analysis* section of the February, 2003 issue of *Physics World*, (page 7), the member's monthly journal of the Institute of Physics in U.K., under the title: '*Have we measured the speed of gravity?*', it was reported that the claim by Kopeikin and Formalont had been challenged. Clifford Will of Washington University is said to have calculated that any effects of the speed of gravity cancel out in the experiment

performed. However, this merely leaves the issue open. All I say is that the speed of gravity, meaning energy in transit owing to change of relative position of Sun and planet does travel at speed c, but, as to the effect Jupiter has on the deflection of the signals we receive from a quasar, this concerns energy deployment as between Jupiter and the aether through which those signals travel and, whatever the answer, I cannot see how Einstein's theory could thereby be proved.

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## CHAPTER 6

## The Quantum Underworld

## Introduction

The underworld of space, that invisible medium which pervades what we call the 'vacuum', but which we are here bold enough to refer to by its proper name, the 'aether', is the seat of quantum activity, the physical forum in which energy is packaged into quanta which have interplay with matter at the atomic level.

The best known energy quantum in physics is that denoted  $hv_o$ , where h is Planck's constant of action and  $v_o$  is the Compton electron frequency. Tables of physical data usually list the measured value of the Compton electron wavelength as  $2.42631058(22)x10^{-10}$  cm, along with the speed of light  $2.99792458x10^{10}$  cm/sec, from which one calculates that  $v_o$  is  $1.2356x10^{20}$  per second.

That energy quantum  $hv_o$  is equal to the rest-mass energy  $m_ec^2$  of the electron and so the aether is the stage on which the electron and its partner the positron are created, perform and then may die by mutual annihilation. The aether is a world seething with energy, but energy that is, in the main, held in a state of equilibrium, with a very small proportion of it involved in fluctuations as it searches for a stable home in the vastness of space.

Now, much of this chapter will merely repeat what I have disclosed in chapters 6 and 7 of my book '*Physics Unified*' published in 1980, where I began by explaining that in 1932 Dirac delivered his Nobel prize lecture under the title: '*The Theory of Electrons and Positrons*' in which he said:

'It is found that an electron which seems to us to be moving slowly, must actually have a very high frequency oscillatory motion of small amplitude superimposed on the regular motion which appears to us. As a result of this oscillatory motion, the velocity of the electron at any time equals the velocity of light. This is a prediction which cannot be directly verified by experiment, since the frequency is so high and the amplitude so small.'

I then noted in that work, on p.87, that:

'Similar proposals had been made earlier by both Einstein and Schroedinger. Einstein imagined the electron as belonging to a Galilean reference frame oscillating at a frequency determined from the electron rest mass energy and the Planck relationship, and being everywhere synchronous.'

Now, for my part, I cannot accept that electrons can share such a concerted rhythmic motion unless there is something that makes it energetically desirable for them to keep in step, as it were. That something has to be electrical in character but electrically neutral overall and it must be omnipresent, all-pervading and uniform through space. It is, of course, the presence in the aether of that lattice system of charges referred to in chapter 3 as quons and our task now is to explore the form of that aether and discuss the part it plays in governing wave mechanical processes.

## **Our Aether**

Remembering what was said about Earnshaw's theorem in chapter 1, our aether must comprise a uniform continuum of electric charge density  $\sigma$  which is populated by a uniform cubic-structured array of aether lattice particles of unitary charge, here denoted q, and of charge polarity opposite to that of the continuum.

We can set up an electric field in a vacuum, so how might the presence of such a field of uniform strength V affect the aether? It will displace those charges q through a distance D relative to the continuum charge  $\sigma$ . Each charge will move through that distance D as from a point on one side of a planar slice of the continuum to a point on the other side of this planar slice.

Since the relative spacing between those charges q will be unchanged by this collective displacement there will be no change in the Coulomb force on any particle due to the action of its neighbours. They move in register with one another locally and remote actions balance anyway owing to the large scale distortions of the lattice structure governed by the charge producing V and boundary conditions.

By Gauss' theorem a planar slice of charge density  $\sigma$  and thickness D has a total normal electric field density of  $4\pi\sigma D$  of which half is directed one way and the other half the opposite way. Hence  $4\pi\sigma D$  is the change in field density experienced by a lattice particle in going from O to P owing to the action of the field V. The restoring force on q is therefore:

because the restoring force rate is linear with displacement. The energy density represented by (6.2) is then found by multiplying by  $\sigma/q$  since the space medium is electrically neutral and there are just as many particles of charge q in unit volume as are needed to balance  $\sigma$ . Thus the energy density is given by:

But, since Vq equals (6.1), we know that D is V/4 $\pi\sigma$ . Putting this in (6.2) gives the energy density:

This is the formula for energy stored by the electric field of intensity V. Its derivation in this way means that the aether as the medium subjected to the action of a system of charge is able to deploy energy from the field of that charge and store that energy by the displacement of those charges q, the quons which form the structured lattice system set in that background continuum of charge density  $\sigma$ . Here then is the basis for the displacement currents we associate with Maxwell's theory. As to the magnetic field properties of the aether, which Maxwell attributes as the accompaniment of the field energy of propagating electromagnetic waves, one should really think instead in terms of the kinetic energy associated with oscillations of the quon lattice system represented by those waves.

Now consider the aether with no externally applied electric field presence and ask yourself whether our basic aether devoid of matter has an energy density. Consider first the energy we associate with electrostatic interaction between  $\sigma$  and the lattice charges q and also that between the q charges themselves and that of the self-interaction of the continuum charge  $\sigma$ . Without engaging in this analytical exercise, which is deferred for the moment, it can be reasoned that each q charge sits in its own cubic cell of charge density  $\sigma$  and that it will be attracted electrostatically towards the centre of that cell. Each such cell together with its q charge forms an electrically neutral unit and so there should be very little electrostatic energy owing to mutual interaction between such cells. What this means is that the net electrostatic energy density of the aether would be negative if such a condition prevailed.

Since it does not seem feasible for the space medium itself to have a state of negative energy density, especially as that state is one where each of those charges q sits rigidly at the centre of each space cell, meaning no motion and no time rhythm, we must, if we are to make any sense of involving the aether in this account of physics, accept that Mother Nature will not allow a negative interaction energy condition to prevail. The fact that we can tolerate negative energy

conditions, as exemplified by the force of gravity and electrodynamic potential where matter is involved, does not affect this argument because these actions are set in what must be a slightly positive energy density background of the aether itself. The positive energy density condition must prevail overall.

A crucial example of this emerges from our later derivation of that factor N as the odd integer 1843 as we come to formulate the theoretical value of the fine structure constant.

What all this means is that those aether lattice charges q are all displaced in unison from the centres of those cubic cells of continuum charge, displaced just enough to assure a positive, rather than a negative overall interaction energy density state. The restoring force involved in this can be set in balance with the centrifugal forces of the q charges, given that they each have mass  $m_0$ . This gives us the link between frequency, the timing of their orbital motion around those centres and the radius r of those orbits. We are then well on the way to establishing the role the aether plays in quantum theory.

The aether has become a charge system sustaining the cyclical motion of the system of the aether charges q in circular orbits with the continuum charge and its associated graviton population moving in dynamic balance also in circular orbits. Since the mass density of both the graviton system and the aether lattice charge system is the same, for space devoid of matter, we know that both systems describe circular orbits of the same radius, the radius being designated by the symbol r.

In my book '*Physics Unified*' at page 91, and also in what follows below, I prove this equality of mass density on the basis that the combined kinetic energy of these two systems in their orbital motion is a maximum, consistent with electrostatic interaction energy being a minimum.

The displacement distance between the q lattice system, which we define as the E-frame, and the system of the continuum charge  $\sigma$ ,

which we define as the G-frame, is 2r and, from the restoring force expression (6.1), this allows us to write:

So we have two frames moving as if they are diametrically opposed to each other in circular orbit of radius r and, by accepting that matter, if present, such as an electron, shares the motion of the E-frame, we can see that all matter has an intrinsic state of jitter at that frequency  $v_{0}$ .

In his 1929 book '*The Nature of the Physical World*', Eddington wrote on p. 220:

'A particle may have position or it may have velocity but it cannot in any exact sense have both.'

This was his way of saying that, when probing in the physical underworld to locate an electron, say, we cannot pinpoint its exact position because it has a high frequency jitter, but here Eddington was referring to the Heisenberg Principle of Uncertainty of quantum mechanics. The experimental support for quantum theory indicated that, for the electron, the product of uncertainty of momentum and uncertainty of position is  $h/2\pi$ , h being Planck's constant.

So an electron moving in those circular orbits with the E-frame will have an uncertainty of position by as much as 2r and an uncertainty of momentum of  $2m_e\Omega r$ , the product of which should be  $h/2\pi$ . This gives us insight into how the aether determines Planck's constant.

If we now ask how the aether determines a characteristic speed c it is fairly evident that a likely candidate is the relative velocity between the E-frame and the G-frame, meaning the quantity  $\Omega(2r)$  and so we derive the relationship:

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This is an important step which gives physical foundation for Dirac's surmise concerning the oscillatory jitter motion of the electron, but we now have the quantum underworld of the aether in our sights and the stage is set for detailed analysis of its electrical form.

## The Aether: Solid or Fluid?

Historically at the time when the aether was accepted without question, physicists nevertheless pondered on whether it had a kind of solid form or fluid form. Although we cannot sense any resistance to motion through the aether, its property in determining the speed of light was seen in the context of an analogy with the way in which the speed of light through glass or water is a function of the physical structure of those media.

There was a property of the electromagnetic wave that required a feature characteristic of propagation through a crystalline solid and yet our freedom of motion through the aether implied it could only be a fluid, a fluid of extremely low mass density.

Now, instead of trying to force the aether into the mould which we see applies to our material world, we should piece together the clues and accept the aether for what it is. It is a sea of energy with nowhere to go because that energy fills all space, almost all of it having found equilibrium and settled in a state of order, but, thankfully, as mankind would not otherwise exist, there being the ripples and fluctuations occasioned by creation and decay of certain electrical charge components of that aether which keep the aether alive with activity.

It is logical in physical terms for the aether to develop its own crystalline form because that is an optimum energy condition and, as already indicated, it must avoid a negative energy density state and so sustain a state of motion confined to that Heisenberg jitter activity. It must therefore exhibit in some measure the properties we associate with a solid. This does not preclude motion of material objects

present in the aether because those objects may nucleate their own crystalline aether territory, meaning that the aether picture before us is one of a solid moving through a solid. Is that really possible?

The answer is surely "Yes" because we are not here suggesting that energy can move through energy. The energy density of the aether devoid of matter is uniform and we can have two regions of a liquid medium of uniform mass density incorporating a crystal formation, with those crystal formations having relative motion. A laboratory analogy, were we to build it, would be a liquid crystal substance in which the liquid is crystallized by two extraneous electric fields (signifying the presence of matter) moving towards one another. It is not the liquid which moves but rather the factors which determine whether or not it is optimum in energy terms for it to adopt the crystal form. At the collision boundaries the energy would redeploy into other form but its density would remain constant.

There is nothing to be gained by speculating as to the details of such a process. All we need concern ourselves with is the evidence that emerges from the theory. Undoubtedly, at collision boundaries the ubiquitous muons have a way of absorbing energy resulting from mutual annihilation of a corresponding amount of continuum charge and the quons involved in the collision, whereas the ubiquitous muons at the separation boundaries can create new quons and add continuum charge as needed. That assumes that the continuum charge shares any translational motion of the quon lattice. If that assumption does not hold and the continuum charge is truly at rest in an absolute frame of reference, then the muons themselves have to share in the charge balance at those boundaries. The only consideration of relevance here is the fact that energy density of the aether medium remains uniform, whereas the aether lattice inertia is balanced by the inertia of the muons that provide a balance by migrating slowly in the opposite direction.

We will come back to this latter topic of aether lattice particle motion in chapter 9 in the context of the Michelson-Morley

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experiment and merely mention here that a reader interested in the formulating the speed of light in terms of aether lattice structure could refer to pp. 102-104 of the author's book *'Physics without Einstein'*, published in 1969.

Electron theory as applied to solids gives a formulation of the refractive index of a substance in terms of its atomic structure, the number of atoms per unit volume and the natural oscillation frequencies involved. A version of the formula is:

 $(c/v)^2 = 1 + \phi$  .....(6.7)

where  $\varphi$  is an expression involving parameters specific to that substance. Here v is the speed of light through the solid, which is of course smaller than c. However, if we ignore the presence of that solid material substance by writing  $\varphi$  as zero, then that unity term in equation (6.7) can be said to be the corresponding  $\varphi$  formulation of aether parameters.

There is no escape from the fact that the aether must have structure, which is why our insight into the exception to Earnshaw's theorem, as discussed in chapter 1, meaning the need for that uniform background charge continuum  $\sigma$  is so important.

## Planck's Law

Whereas, in deriving (6.4), we were concerned with the effects of the field V set up by an intruding presence of charge disturbing the aether, we now need to consider the dynamics and energy properties of the undisturbed aether. The charges q move in synchronism circular orbits of radius r governed by a balance of centrifugal force and the restoring force attributable to their displacement relative to the continuum charge of density  $\sigma$ . This gives:

 $4\pi\sigma qx = m_0 \Omega^2 r \dots (6.8)$ 

from (6.1). Here x is the separation distance between the  $\sigma$  continuum and the q charge, m<sub>o</sub> is the mass of the quon and  $\Omega$  is the angular frequency of the aether's rhythmic activity. Thus the expression (x-r) is the orbital radius of the cyclic motion of the graviton and  $\sigma$ 

continuum system. The  $\sigma$  continuum and the gravitons are best regarded as an integral system statistically smeared into a uniform whole as far as interaction with the q system is concerned. Since the gravitons are deemed to be relatively massive, they need only have a sparse population compared with the lattice particles, the quons. Let  $m_g$  denote the mass of the continuum-graviton system per lattice particle. Then:

$$m_0 \Omega^2 r = m_g \Omega^2 (x-r)$$
 ..... (6.9)

The kinetic energy density of these E and G frame constituents of the aether is proportional to:

 $m_0 r^2 + m_g (x-r)^2$  ..... (6.10)

because the aether frequency  $\Omega$  is constant. We may then expect the electrical potential energy of such a system to have minimized, so determining x, and the rest mass energy to have been deployed between m<sub>o</sub> and m<sub>g</sub> to maximize (6.10), inasmuch as kinetic energy is drawn from a source of potential energy and, with energy conservation, minimization of the latter means maximization of the former.

Write M as  $m_0 + m_g$  to obtain from (6.9):

 $x - r = (m_o/M)x$  and  $r = (m_g/M)x$  ......(6.11) Put these in (6.10) to obtain:

Since M and x are constant, we may now differentiate this energy expression with respect to  $m_0$  to find its maximum value by equating the differential to zero. This gives:

The E frame and the G frame describe orbits of equal radius r. As their relative velocity is c, they move at speed c/2 in orbit. As the aether frequency is, by assumption, deemed to be the Compton electron frequency at which quantum theory tells us that electrons and positrons are created, namely  $m_ec^2/h$ , the value of  $\Omega$  is given by:

The radius r is then known, because  $\Omega r$  is c/2. Thus, again, as for equation (6.6) we find that:

What has been said above about the electron in the context of Heisenberg's Principle of Uncertainty does imply that the electron has an intrinsic motion when at rest in the E frame. Its own angular momentum is  $m_e cr/2$  but there is a connected angular momentum due to the dynamic balance afforded by the G frame. Thus the total angular momentum intrinsic to the electron and due to the underlying jitter motion of the aether is  $m_e cr$ , which, from (6.15), if  $h/4\pi$ . This is the well known quantity associated with so-called 'electron spin'.

Curiously, this is not the quantum of angular momentum that is paramount in governing the orbital motion of an electron in an atom, Bohr's quantum unit, which is double the spin quantum. To understand this we need to address the problem of the photon, as it is this, rather than the electron, which is the regulator of action between aether and matter. The photon is not an elemental form of matter intruding into the aether. It is a feature of the aether itself which arises from a disturbance, albeit by the intrusion of an electrical charge, typically that of the electron, and we need next to examine the theory of the photon.

## **Photon Theory**

Apart from deciphering Nature's coded messages and providing what surely is a comprehensive unified field theory, we will in this work come to see how a electric field can induce what I refer to as a state of 'aether spin'. If there is to be a spin-off of practical, technological importance, from this theoretical study, I feel sure it will be the cyclical induction of aether spin aimed at inducing the inflow of aether energy which we can utilize in our efforts to secure a sustainable pollution-free environment while meeting our escalating energy needs.

'Aether spin' exists, both on a grand scale, within our stars and planets, and on a microscopic scale as the photon.

The universal rhythmic motion of the aether at the angular frequency  $\Omega$  defines a fixed direction in space. A direction anisotropy in the properties of space is not in evidence so far, though one wonders if researchers have really been looking for such a phenomenon. When we come to study the large-scale rotation of the aether medium, as with body Earth, it will then be seen that the Earth's magnetic field indicates that the axes appropriate to  $\Omega$  are approximately normal to the plane in which the planets move around the Sun. It is probable from this that the circular motion of the E frame and G frame of the aether, though  $\Omega$  has the same magnitude throughout all space, may be directed in different, possibly opposite, directions in the environment of different and widely spaced stellar bodies. There may be space domains measured in dimensions of many light years and within which  $\Omega$  is unidirectional. Yet its direction may vary from one domain to the next.

I did, in my earlier pursuit of this theory, think that this, being linked to an electrodynamic action, might account for the force of gravity not being effective across the boundaries separating adjacent space domains, thereby limiting the range of gravity to action between matter in a common space domain. As we proceed, however, it will be seen when we come to discuss space domains and evaluate their size along with the creation of stars, that the essential difference between two adjacent space domains is the fact that in one the proton has a positive charge and the electron a negative charge, with the continuum charge positive and the quon charge negative, whereas these charge polarities are all reversed in the other space domain. In a sense, we can say that we have here the picture of space and antispace together with matter and antimatter. This would also mean that gravity, as an electrostatic force phenomenon, could not be deemed to act across space domain boundaries.

Possibly, for interaction between matter in adjacent domains, there could be a repulsive gravitational interaction, the long range effect of which, as scaled over many space domains would mean that gravitational potential within a particular domain arises, in effect, solely from the presence of matter located within that domain. This proposition is supported by the explanation of the cosmic background temperature already introduced.

A further point of very special relevance concerns a theme we shall discuss in chapter 9 by reference to the Neumann potential. There are strong reasons which confine what we regard as electrodynamic forces to action as between leptonic currents in the sense that electric current flow in the circuits we use to produce magnetic fields or to detect such fields involves electrons active in a quantum-electrodynamic pair creation and decay process. Such electrons may be those active in atoms, where their apparent orbital motion about an atomic nucleus is really a quantum relocation as a newly created electron-positron pair in the path ahead of an electron involves the positron in annihilating that electron to leave the newlycreated electron in a forward position. In any event, the point at issue is that the aether itself devoid of the presence of matter is not subject to electrodynamic activity. In spite of Clerk Maxwell's interpretation of electromagnetic waves as comprising components of electric field energy and magnetic field energy, one can just as easily argue that the electric field energy which is seated in oscillating charge displacement has an associated kinetic energy and that accounts for what Maxwell regarded as magnetic field energy. Accordingly, our onward analysis will address the aether and its properties as if magnetic properties do not exist and so confine the energy analysis to its electric field and kinetic energies. Concerning Earth's magnetic field, this is a clue to the most important feature of the aether, which is that a state of spin, as of a large spherical bulk of the aether, will induce electric charge displacement radial from the axis of spin. So if Earth sits in a coextensive aether that spins, there will be an electric charge density

belonging to the aether that is neutralized by a compensating displacement of electron charge in body Earth. We cannot sense the presence of that charge by its electric action but we can sense it by the geomagnetic field it produces. In determining the geomagnetic moment much then depends upon the angle subtended by the Earth's spin axis in relation to the aether spin axis and the vector direction of that underlying quantum jitter motion at angular frequency  $\Omega$ . We will come back to this topic in chapter 8 but keep in mind that aether spin implies electric charge induction and vice versa and also the point that the vector direction of  $\Omega$  is of no significance to the analysis in this and the next chapter. The aether behaves as an isotropic medium in its quantum mechanical interactions with the atom. An electromagnetic wave is a propagated disturbance of the aether particle lattice formed by those charges q, the quons. The lattice can be disturbed if a discrete non-spherical unit of it rotates and so sets up radial pulsations. This will rotate if an intruding electric charge is present along with a quantum of energy activity that is being shed or absorbed by that charge. The aether spin thus suggested will be the smallest possible symmetrical cubic unit of aether that has the ability to disturb surrounding aether lattice and that has to be a unit of 3x3x3lattice particles.

Referring to this cubic unit as a 'photon', seen as an event when such a group of 24 quons spins about a central axis defined by 3 quons, our task now is to relate this spin to the frequency of the propagating disturbance which it causes. We will defer the detailed explanation of why it spins until chapter 8 but note here that a radial electric field acting from its centre or near-centre will so displace the superimposed E-frame orbits of the quons as to cause them to lose synchronism with  $\Omega$  unless their centres of those orbits are slightly displaced and they move transversely in a rotational sense about the charge inducing that radial field.

It is a simple exercise in mathematics to show that the moment of inertia of such a 3x3x3 unit is independent of the axis about which

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it spins [see page 94 of my book 'Physics Unified'] and one can see that the pulsating disturbance of surrounding lattice will be at four times the frequency of that state of spin. The point of interest then arises if one wonders about the effects of a high spin speed which is such that the frequency of the pulsating disturbance is at or close to the frequency  $\Omega/2\pi$ . In a sense one can imagine that the latter is a more likely circumstance, given the quantum rhythmic motion of the aether lattice at that high frequency. Then one might consider a circumstance where a slight modification in the photon spin frequency can set up electromagnetic wave propagation at the difference frequency v. In the context of electrons in atomic orbit I have explored this notion on the assumption that a pair of such photon units, one seated with the nucleus, spin in opposite sense but cooperate in propagating electromagnetic wave radiation. That, however, goes beyond the scope of this work on Creation and I can but give reference to this theme as pp. 70-73 of my book 'Physics without Einstein'.

We will proceed by terming a photon unit spinning at  $\Omega/4$  as a 'standard photon unit'. Now when an energy quantum E is added to the dynamic state of the aether it will, as with any linear oscillator, be shared equally between the potential energy and the kinetic energy. With the constant angular frequency  $\Omega$ , this means that E/2 is added to the kinetic energy. That is:

| $E/2 = H\Omega/2 \dots (6)$ | 5.1 | 6) |  |
|-----------------------------|-----|----|--|
|-----------------------------|-----|----|--|

where H is the corresponding quantum of angular momentum. Thus even though the energy E may become dispersed throughout the aether medium it introduces a related angular momentum given by:

We believe that angular momentum is conserved, which means that this event cannot occur without there being a reaction, and so our photon must be characterized by such a relationship linking an energy quantum and angular momentum.

The space medium, whether one refers to it as the vacuum or the aether, is known to react critically to certain energy quanta related to

the mass of the electron or positron at rest. It somehow permits the creation of electrons and positrons at these exact energy levels, as if there is some kind of resonance at the characteristic frequency of the space medium. It seems essential to connect this phenomenon with the standard photon unit, especially so in view of the clear connection evident from equation (6.14). The standard photon unit must be associated with this energy quantum  $m_ec^2$ . Thus, from (6.17), H is  $m_ec^2/\Omega$ , which, from (6.14), is:

Denoting I as the moment of inertia of the standard photon unit, H is given by:

$$H = I(\Omega/4)$$
 ......(6.19)

which, from (6.18), gives:

 $I = 2h/\pi\Omega \dots (6.20)$ 

Taking now a photon unit rotating at a much lower angular speed  $\omega$ , this is related to the frequency radiated by:

and since the angular momentum H of this photon unit is I $\omega$ , which (6.20) plus (6.21) show to be:

$$I\omega = h\nu/\Omega \dots (6.22)$$

we find, from (6.17) that:

which is Planck's radiation law.

At the outset of this work we set our sights on decoding three basic messages from Mother Nature. One of these was that hidden by the numerical quantity referred to as the fine-structure constant, this being  $2\pi e^2/hc$ , the reciprocal of which is 137.0359.

It is self-evident that we cannot decipher the meaning of this quantity without first understanding the physical basis for the existence of the photon and so that has been our task in this chapter. The problem ahead is to exploit this insight into the 3x3x3 quon structure of the photon and its relationship with  $\Omega$  by moving on to the real numbers that factor into the relationships between the various

components of the aether, the continuum charge density, the muons, the quons and their charges and masses, as well as that angular frequency  $\Omega$  and c, the relative speed of the G and E frames. The electron is not present in the basic make-up of the aether but its properties provide a basis of reference in our material world. Our analysis in the next chapter has to be rigorous, as we seek to decipher the primary numerical quantities, the proton-electron mass ratio and the fine-structure constant to part per million degree of accuracy.

## CHAPTER 7

# Aether Structure

## Introduction

In this chapter we delve into the theoretical foundations of the aether itself, guided by our knowledge (a) that it comprises a uniform continuum of charge density  $\sigma$  permeated by charges q arrayed in a simple cubic structure owing to their mutual repulsion subject to the constraint that the electrostatic interaction energy density cannot be negative and (b) that the continuum and q charge systems, the G and E frames, respectively, are displaced 2r one from the other owing to their relative motion at speed c in circular orbits of radius r given by:

 $r = h/4\pi m_{e}c$  .....(7.1)

The task ahead is mathematical in that we have to compute the lattice dimension d in terms of r, where d is the side of a cube of space housing each charge q. The photon will emerge as the largest symmetrical unit of that lattice structure which can spin about an axis of that structure without crashing into adjacent structure. It is also the smallest cubic unit of that lattice that has a lattice charge q at its centre. That spin involves energy and sets up pulsations which disturb surrounding lattice structure at a frequency characteristic of the energy quantum involved. Thus, in terms of the ratio of r/d, we will arrive at a formula for Planck's constant in terms of two physical quantities pertaining to the aether, the charge q and the speed c. That dimensionless formula is known as the fine structure constant.

In the process we will have established the mass-energy of the lattice charge q, that of the quon, as well as the energy density of the aether, which will thereby indicate the mass-energy of the pair of virtual muons that exists for each cubic aether cell of side dimension

d. Additionally, our analysis, by bringing the electron into the picture, will derive the odd integer value N that was introduced in chapter 2 as having the value 1843.

Such is the scope of this chapter. It is the essential foundation on which the whole of this author's theory is founded. The analysis to be presented was developed in the latter part of the 1950s and was first published privately in printed form in 1960 in the author's 48 page booklet entitled: 'The Theory of Gravitation', when the author, owing to a change in employment upon being appointed to a Senior Manager position with IBM, was obliged to arrest his private research pursuit to concentrate upon his career in the patent profession. This explains why the advancement of the theory became so protracted in development over time and lacked the endorsement which a career in academia can offer. It is a curious coincidence that Einstein's theory was conceived during his early years as a Patent Examiner in Zurich, given perhaps the stimulus of dealing with the field of invention on a daily basis, and no doubt Einstein was lucky in finding the favour of Max Planck, who supported publication of his papers. However, in moving ahead now to publish this account of my theory, which is probably my final contribution on the subject, it is for future generations to judge the merits of my work relative to that of Einstein. Hopefully, what I have to say will have some impact, but as to this chapter 7, for my part it is more a reminiscence on past work dating back some 50 years, from when I concluded my years of Ph.D. research and entered the patent profession.

Do keep in mind, however, that I have presented something of vital importance in earlier chapters, something wholly new, by changing my account of gravitation from the interpretation of gravity as an electrodynamic force consistent with the expectations of those in search of a unified field theory to the recognition that gravity is, in a sense, an 'inverted' electrostatic force. The theoretical derivation of G, the constant of gravity, in terms of gravitons is unchanged, but I will explain more fully in chapter 9 the reason why I was obliged to

alter course. The contest against Einstein's theory is nevertheless as strong as ever and I hold my ground firmly in now reproducing here in this chapter 7 an edited and slightly extended version of pages 103-115 of my 1980 book: *'Physics Unified'*.

## The Mass of the Quon

We first consider the aether particles, the quons, that form the E frame lattice system. As with the gravitons and electrons, the Thomson formula is used to relate energy E, mass and charge radius of the quon, its charge q being the same magnitude as that of the electron:

$$E = 2q^2/3b$$
 .....(7.2)

where b denotes quon charge radius.

Quons have the lowest energy quantum of all charged particles, owing to their radius b being larger. The least energy state is justified by the fact that the lattice structure of the undisturbed aether must be the ultimate in stability, a feature which demands also that the quons must be in a state of equilibrium in their interaction with the rest of the aether system. This is assured if the energy E, as a property of a charge sphere of volume  $4\pi b^3/3$ , implies an energy density which is common to the aether as a whole and so shared by the surrounding medium. Thus, with d as the lattice dimension, the cube side length or spacing of the cubic array of quons, we can say that the total energy per unit cell of volume  $d^3$  is:

$$E_{o} = (1/2\pi)q^{2}d^{3}/b^{4} \dots (7.3)$$

This is the energy density of the aether, on average, attributable to the notional rest-mass energy, and is deemed to be that of a pair of virtual muons as if there is one such pair in each cubic cell of aether. Such muons are active by creation and decay by mutual annihilation followed by recreation as on ever-ongoing process. This needs a little clarification concerning the interplay between the muons and the quons and so is subject to later commentary near the end of this chapter. The effective mass of the quon is not found by using the formula  $E = Mc^2$ , because, when the quon moves in that uniformly dense background sea of energy, it behaves as if its mass is halved. This is akin to a known property of the motion of a spherical body through a liquid. We know from the study of hydrodynamics that, if that body has a mass density equal to that of the liquid, it seems weightless owing to buoyancy, but there is an apparent increase in mass when a sphere is accelerated as if that mass is half of the true mass of the body.

We proceed by accepting that this analogy applies to the problem of the aether and so our lattice particles will exhibit an effective mass in their orbits of radius r of:

 $m_0 = q^2/3bc^2$  .....(7.4)

The lattice particles, the quons, mutually repel by their Coulomb interaction. As in the formation of crystal structure within matter, we may then expect some kind of cubic or hexagonal lattice to form. This is the minimum energy structure that applies in the circumstances, but those circumstances as they exist in matter are quite different from the situation in the aether, because the minimum energy criterion in matter usually results in what is an overall negative energy density. This is because the omnipresent aether has a slightly positive energy density and so it can permit matter to exist in a crystal structure that the aether is denied owing to the fact that its minimum energy density attributable to electrical interaction has to be positive.

I then found, from my analysis of the aether, that if minimum energy conditions were applied to the space medium and negative energy density were to be permitted, then the aether lattice particles would all be at rest at neutral positions in that charge continuum, each quon sitting in its own cell and in a structure that was body-centred cubic, as in iron. There would be no motion. Our universe would be dead and lifeless. The aether would have no character relating to time and the exercise of exploring its properties would be meaningless.

However, by assuming that the lattice particles of the aether would form in a structure which involves the least possible electrical interaction energy consistent with it being everywhere positive, then, Eureka, everything fell into place. The aether lattice structure had to be simple cubic in form. There had to be displacement of the particles from the centres to which they were drawn by electrostatic action and, to keep that displacement, they had to move in orbit in synchronism with one another and so the aether became a clock which keeps perfect time, even though it ticks at the very high frequency we associate with electron creation.

It has been shown in chapter 6 that the charge displacement distance is 2r, where r is the radius of the orbits involved, and that the angular speed  $\Omega$  in orbit is c/2r. Presenting again the electrostatic force expression (6.1) of that chapter and equating it to  $m_o(\Omega)^2 r$ , we have:

| $m_{o}(\Omega)^{2}r = (4\pi\sigma q)D$ (7.5)  | ) |
|---|---|
| where D is 2r, which gives us an energy term: |   |

 $m_o c^2 = 32\pi\sigma q r^2$ .....(7.6)

Since the space medium is electrically neutral:

This brings us very close to obtaining a value of the quon mass in terms of r/d and the unitary charge e of the electron, presuming that q is equal to e, and so the onward task now is to determine the value of r/d.

## The Aether's r/d Factor

This ratio r/d, as the orbital radius r of the rhythmic quantum jitter motion of the aether in terms of the aether lattice cell dimension d, is determined as being very slightly greater than the r/d value at which the charge q interacts with the continuum charge density  $\sigma$  to have zero electric interaction potential.

Accordingly, the governing equation is:

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$$E = \sum \sum (q^{2}/2x) - \sum \int (q\sigma/x) dV + \int \int (\sigma^{2}/2x) dV dV$$
.....(7.8)

The factors 2 in the denominators are introduced because each interaction if counted twice in the double summation and double integration. The summations and integrations extend over the whole volume of space but as we shall see it suffices to limit the range to just a few lattice spacings d. To simplify the presentation we regard d as unity in the stages of integration and summation. Boundary conditions are of little consequence. Electric interaction energies, when reduced to local energy density terms, can in no way depend upon remote boundary conditions. The lattice condition assumed need not hold as a rigid perfect lattice throughout space. It can be distorted, but we do not expect the synchronous character of the lattice particle motion to hold beyond the range of the boundaries of vast space domains of the aether, domain size being a matter of analysis in chapter 8.

The next step in our analysis is to differentiate E of this equation (7.8) with respect to  $\sigma$ , after recognizing that  $\sum \int (q\sigma/x) dV$  incorporates an offset term  $2\pi\sigma q(2r)^2$  to allow for the 2r displacement. The object of this is to eliminate the  $\sigma$ - $\sigma$  interaction by determining the minimal energy condition by equating the result to zero. Then we shall know that distance 2r.

Differentiating (7.8) with respect to  $\sigma$ , equating to zero and then multiplying by  $\sigma$ , we obtain:

$$\sum \int (q\sigma/x) dV = \iint (\sigma^2/x) dV dV \dots (7.9)$$

From (7.8) and (7.9) we then find that:

E = 
$$\sum \sum (q^2/2x) - \sum \int (q\sigma/2x) dV$$
 .....(7.10)

Since E is zero the factor 2 is not important as we now evaluate the relevant terms in five stages and consolidate the results in a sixth stage.

# Stage 1: $\sum (q^2/x)$ between one quon and surrounding quons

Still regarding d as unit distance, the coordinates of all surrounding quons in a cubic lattice are given by l, m, n, where l, m, n may have any value in the series 0, and plus or minus 1, 2, 3, etc. with the co-ordinate 0,0,0 excluded. Consider concentric cubic shells of surrounding quons. The first shell has  $3^3$ -1 particles, the second  $5^3$ - $3^3$ , the third  $7^3$ - $5^3$ , etc. Any shell is formed by a combination of quons such that, if z is the order of one shell, at least one of the co-ordinates 1, m, n is equal to z and this value is equal to or greater than either of the other two co-ordinates. On this basis it is straightforward arithmetic to verify the following evaluations of this sequence of summations. S, denotes the summation as applied to the z shell.

 $\begin{array}{l} S_1 \ = \ 19.10408 \\ S_2 \ = \ 38.08313 \\ S_3 \ = \ 57.12236 \\ S_4 \ = \ 76.16268 \\ S_5 \ = \ 95.20320 \end{array}$ 

By way of example,  $S_2$  is the sum of the six terms: 6% + 24/% + 24/% + 12/% + 24/% + 8/% 2and here 6+24+24+12+24+8 is equal to  $5^3-3^3$ .

# Stage 2: The evaluation of $\int (q\sigma/x) dV$ in relation to $S_z$

The limits of a range of integration corresponding with the z shell lie between plus or minus coordinates (z -1/2) and plus or minus coordinates (z+1/2). An integral of  $q\sigma/x$  over these limits is denoted  $q\sigma d^2 I_z$  where:

$$I_z = 24z \int_0^1 (\sinh^{-1}[1+y^2]^{-1/2}) dy$$

which, upon integration, is:

 $I_z = 24z(\cosh^{-1}2 - \pi/6)$ 

and which, upon evaluation, is:

 $I_0 = 2.380077382 \dots (7.12)$ 

# **Stage 3:** $\int (q\sigma/x) dV$ for quon 2r displacement

As already indicated this component of the integral is given by:  $2\pi\sigma q(2r)^2$ and this expression, in units of  $q^2/d$ , with  $\sigma$  as  $q/d^3$  is, simply:  $8\pi(r/d)^2$  ......(7.13) and so, once we merge the results of stage 1 and stage 2, we are close to determining the value of r/d from their difference.

## Stage 4: Correction for quon charge volume

The stage 2 calculation did not allow for the physical displacement of  $\sigma$  charge owing to the finite size of the quon, which has a charge radius b. This correction term is the integral from 0 to b of  $\sigma q/x$  as it applies within a spherical shell of area  $4\pi x^2$  and thickness  $\delta x$ . This is:

| $2\pi(b/d)^2(q^2/d)$   | '.14) |
|--|-------|
| from $(7.4)$ and $(7.6)$ , we know that:                         |       |
| $b/d = (d/r)^2/96\pi$  | '.15) |
| pat in units of $a^2/d$ the correction found by combining (7.14) | and   |

so that, in units of  $q^2/d$ , the correction found by combining (7.14) and (7.15), is:

## **Stage 5: Combination of terms.**

and,

One very minor term is still needed to complete the analysis. This is because the quons, along with any particles of matter that sits in the E frame, will be moving relative to the charge continuum  $\sigma$  at the relative speed c and this must drive the  $\sigma$  charge out of their way

and so compress  $\sigma$  to a moderate extent. It would seem appropriate to accept that the mutual repulsion within the  $\sigma$  charge owing to this compression will spread the effect over a relatively large region so as to minimize the energy needed, energy which will add in some measure to the  $\sigma$ - $\sigma$  interaction.

Because the volume of continuum charge displaced by the presence of a quon is very much greater than that displaced by protons and electrons, this consideration is a factor needing consideration only in respect of the quons.

We proceed by estimating its significance in relative terms as referenced on the quantity defined by (7.16) as just derived. The charge displaced by the quon is  $4\pi b^3 \sigma/3$  and its displacement is to a mean distance kb, where kb can have a value approaching d/2 if the displaced charge is spread over much of the aether cell, would imply an energy term given by:

 $4\pi q\sigma b^3/3kb$ 

which is:

## **Stage 6: Consolidation of results**

We now need to find the difference between the summation of the S terms and the summation of the I terms. Their convergence is self-evident. Ignoring  $I_0$  for the moment, the successive terms differ by a summation of the terms:

 $0.06346 + 0.00189 + 0.00050 + 0.00020 + 0.00010 \dots$ and, to sum the series, we match it to:

 $0.01350[1/3^3 + 1/4^3 + 1/5^3 + 1/6^3 \dots]$ 

or:

$$0.00050 + 0.00021 + 0.00011 + 0.00006 \dots$$

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for terms from z = 3 onwards. This yields the summation 0.00105, which upon adding 0.06346 and 0.00189, gives 0.0664 to subtract from the I<sub>0</sub> quantity of (7.12) to obtain 2.31368.

This value is the number of units of energy  $q^2/d$  that we derive per quon from the first two stages of this analysis. The third, fourth and fifth stage components are now combined to give the net zero energy quantity and leave us with the equation:

 $8\pi(r/d)^2 = 2.31368 - (1 - 2/3k)(d/r)^4/4608\pi$ ......(7.18) This is the equation we seek, because it allows us to obtain a very close estimate of the value of r/d. Ignoring the term involving k, r/d is found to be 0.302873.

Now, before considering that k term, it is appropriate here to mention that I am indebted to certain independent initiatives taken by three individuals, including one in particular, who have put in a great deal of effort to verify the analysis I have presented here. The first such initiative was that of Peter N. McNeall, an Englishman living in USA, who drew my attention to a small numerical error in a version of this analysis presented in the 1966 edition of my book: 'The Theory of Gravitation'. The second and most important contribution was that of another Englishman, Dr. D. M. Eagles, who, having seen my 1969 book: 'Physics without Einstein', met me to discuss what it claimed, whilst in U.K. between a relocation of his research employment in USA to the National Standards Laboratory in Australia. I mentioned him in chapter 2, when I referred to a table in a book by B. W. Petley where Petley had drawn attention to a paper which Dr. Eagles and I had jointly authored. This paper was the result of Dr. Eagles checking my manual efforts at analysis to compute r/d in the days when powerful computers were available only to scientists in major research With Dr. C. H. Burton's assistance at that Australian facilities. laboratory he produced the definitive result of such a calculation by using such facilities and duly advised me that r/d obtained by such analysis was 0.302874.

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Precision here was very important owing to the implications this had for determining, with a high degree of confidence, a numerical quantity which seemed, by coincidence, to be close to the protonelectron mass ratio but yet was somewhat higher. I refer here to the number N that was introduced earlier.

As to the third independent initiative, which has greatly impressed me, it is that of Bill Buick, of an address in Scotland, who went to the trouble of providing a computer program which anyone can run on a home computer to give the results of the calculations involved in deriving r/d.

In summary, therefore, since the whole of this aether theory hinges on the calculation of this quantity, I am able to assure readers that the analysis is sound and meaningful. We can, therefore, now proceed to the more interesting features of this work by deriving that quantity N that is key to the three constants of Mother Nature that we are decoding.

### **Evaluating N**

We define N as the ratio of the charge volume of the quon to that of the electron. We shall examine the proposition that N must be an odd integer, simply because the quon is not only the ultimate decay product of an electron but is, as we have seen in chapter 4, the seat of birth of the proton, which implies input of sufficient energy to create a number of electrons and positrons that can coalesce to form the proton by shedding a little energy. We can, therefore, expect N to be of the same order as, but higher than, the proton-electron mass ratio.

If we focus attention now on the photon unit we described in chapter 6 and take note of a topic discussed separately in Appendix II, the picture before us is that of a 3x3x3 cubic section of aether lattice being able to spin within enveloping aether lattice. Here we have a kind of spinning crystal formed by 27 quons of which 24 account for the quantum of angular momentum.

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Referring now to Fig. 7.1 it will be seen that a circle is drawn to depict a sphere which encloses those 27 quons seated at the lattice sites in the cubic array there depicted. The radius of that circle is  $2\pi r$ . Why is this? Well, we have just seen that r/d has a value of 0.302874, so  $2\pi$  times r will be 1.903d, which is the basis on which the figure is drawn.

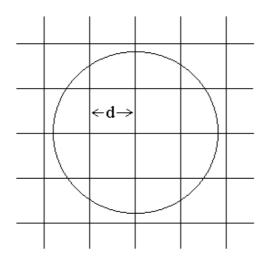


Fig. 7.1

From chapter 6, reproducing equation (6.20):  $I = 2h/\pi\Omega \dots (7.19)$ we know, because  $\Omega$  is c/2r, that this term I, now representing a moment of inertia, is: 

The moment of inertia of the 3x3x3 lattice, as we see from inspection for spin about a 3-quon axis, is  $36m_0d^2$ , because there are twelve quons distant d from the spin axis and 12 quons whose square of distance from that axis is  $2d^2$ . Equating this result to I then gives:  $36m_0d^2 = 4hr/c\pi$  .....(7.21)

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Now, having regard to equations (7.6) and (7.7), we see that these combine to give:

$$m_0 c^2 = 32\pi (q^2/d)(r/d)^2$$
.....(7.22)

and we can here once again restate equation (6.15):

to give us three equations which, in combination, can, by a little algebra be seen to yield two further equations:

$$hc/2\pi e^2 = 144\pi (r/d)$$
 .....(7.24)

and:

$$m_o/m_e = (4/9)(r/d)^2$$
.....(7.25)

Note that e, the unitary charge of the electron, now replaces q, as the two are identical.

We are now ready to determine N because the ratio of the two masses in (7.25), as multiplied by 2, is the inverse ratio of the charge radii of the electron and quon. This factor 2 arises because the effective mass of the muon in its aether E frame orbits is half that determined from the Thomson energy equation.

We then establish that N, as the ratio of the quon charge volume to that of the electron, is given, from (7.25), by:

$$N = (9/8)^3 (d/r)^6 \dots (7.26)$$

which, with r/d as 0.302874, gives N as approximately 1844.53.

This, however, is not allowing for that stage 6 correction mentioned above, nor are we taking into account that requirement that N is an odd integer, integer because the quon has to be able to transform by energy addition into a group of electrons and positrons and odd because charge parity has to be conserved.

From equation (7.18) we see that the effect of that term involving k is to increase r/d slightly. This will decrease N. We seem therefore to be looking at a definitive value of N that is 1843, but let us just explore this by working (7.18) backwards to see how large k must be to ensure that we do not slip below this 1843 threshold as an integer value. This is when r/d has the value 0.302916 and k is 8.34.

We can now proceed by first noting that equation (7.24) represents one of the numbers we set out to decipher, namely the fine structure constant. You can then check that an approximate value of r/d of 0.302916 will give the constant as quite close to the measured value of 137.0359895(61). Then note that the value of b/d is known from equation (7.15) as:

$$b/d = (d/r)^2/96\pi$$

which allows us to estimate the significance of that factor k. We find from the above value of r/d that b/d is 0.035 and so the distance kb, with k as large as 8.34, tells us that the charge displaced by the quon must move away from the quon centre by a mean distance of more than 0.29d in order for the energy conditions to be consistent with the 1843 value of N rather than a lower value of 1841. This seems an ideal requirement, given that the  $\sigma$  charge displaced in the continuum will try to spread itself owing to its self-repulsion, but yet must be confined within the boundaries of a cubic cell of side dimension d.

Accordingly, we have now arrived at the conclusion that N is 1843 and, this being a key factor in this theory by which we decipher Nature's coded messages, we have accomplished the main task of this work. The fine-structure constant, as expressed in reciprocal form by equation (2.10) in chapter 2, has been derived, as can be seen by combining equations (7.24) and (7.26) to eliminate the ratio r/d. One remaining task, before we embark on the quest to explain how stars are created, is to justify the value of the energy  $E_o$  of a unit cell of space, this being the energy quantum we have assigned to the two virtual muons which live within each such cell.

### The Unit Energy Quantum of the Aether

The relevant equation is that presented in the early paragraphs of this chapter, namely equation (7.3), which is:

 $E_o = (1/2\pi)q^2d^3/b^4$ This, plus the equation (7.15) just quoted above, combine to give:  $E_o = (1/2\pi)(96\pi)^3(r/d)^6q^2/b$  .....(7.27)

From (7.26) this becomes:

 $E_o = (3/4\pi)(108\pi)^3(1/N)(2q^2/3b)$  .....(7.28) which presents this energy quantum in units of the quon mass-energy according to the Thomson formula. The latter is the electron rest-mass energy divided by the cube root of N and so we obtain:

 $E_o = (3/4\pi)(108\pi)^3(1/N)^{4/3} m_e c^2$ .....(7.29) from which we find, with N as 1843, that this energy quantum becomes:

## 412.6658

electron rest-mass energy units. Here, then, is the energy quantum that is regarded as the virtual muon pair, the occupants of each cubic cell of aether.

# A Supplementary Note

My object in this chapter 7 has been to present the analysis by which I did, during a period in the latter part of the 1950s, work out what had to be the necessary structure of the space medium, the aether, in order for it to determine the processes we refer to as quantum theory and gravitation. I did not in those early years have an adequate insight into the details underlying the creation of the proton or the graviton, but their basis of existence was clear and the picture came fully into focus with the passage of time, the g-graviton emerging first, in the mid 1960s and the proton by the mid 1970s.

Admittedly, however, there remain unanswered questions, questions that may elude us for many generations to come, some forever. There is scope for others to address these problems and add to our enlightenment.

A typical question is: "How can it be that a fundamental particle having an electric charge e confined within a sphere does not expand indefinitely owing to the self-repulsion of its electrostatic charge?" Can the answer lie in the rhetorical question: "Well, owing to its spherical symmetry, it has a centre and, since that is also its centre of mass, if it were to expand and shed energy, meaning what can only be

kinetic energy, then what would determine the direction in which that centre of mass would move?" Should we beg the question, as it were, by arguing that the charge is stable because it cannot move of its own accord and allow its energy to become kinetic energy?

Another such question is: "What is it in Nature that tells an electric charge it is positive or negative?" Here, the answer could be in our awareness that electric charge forms tend to be created in pairs and with two fundamental particles of opposite charge one can visualise one expanding as the other contracts so that energy is exchanged between them without having to convert into kinetic energy. This is a picture of mutual stability enhancing particle lifetime, and suggesting a well-known saying that there is 'safety in numbers'. The idea thus seeded is the notion that all electric charged particles are oscillating in their charge radius at a common very high frequency, probably that of the quantum motion of the E and G frames of the aether, and that whether a charge is positive or negative really depends solely on its phase of oscillation. To accept that you must accept that time, as set by the rhythm of the quantum underworld, is universal and governed by motion that is synchronized as if there is no retardation in the action. That may seem a debatable proposition, but it makes sense for conditions where there is no need for long range energy transfer.

Before concluding this supplementary note to chapter 7, I will now raise and seek to answer three questions which mayalready have occurred to astute readers. Why is it that it is so important for the electrostatic interaction energy of the aether not to fall below zero, given that when two electric charges of opposite polarity do interact there has to be a negative energy component offsetting the self-energy of each charge? The answer lies, I believe, in the lack of reciprocity in the charge interaction combined with the fact that no vector direction is defined that can give scope for kinetic energy. If two charges of different electrical polarity but identical form interact then energy exchange can occur and even if of different form there is a line

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between their charge centres along which the charges can move apart as any surplus energy is shed to become kinetic energy. This is not the case for those quons sitting in a charge continuum  $\sigma$ . It is just as well, because if the quons were to move to sites of minimum electrostatic interaction energy, meaning a negative energy density as offset by the self-energy of the quons, then the aether would be a solid devoid of any motion and we would not exist.

The second question arises when we note how precise the aether analysis has been in defining numerical relationships but see an approximation in taking  $E_o$  as the total energy of a cubic cell of the aether, as if the quon is part of the virtual muon pair when it comes to using  $E_o$  as in the calculation of the proton-electron mass ratio in chapter 4. I answer this by saying, or rather hoping, that the ongoing creation and decay of those muons as they deploy from position to position in the aether will occur as if they have just such a spacing as to account for a negative interaction energy that exactly matches the positive energy of the quon and its equal measure of associated graviton energy. However, there may well be another answer, one bearing upon the inseparability of the quon charge from its counterpart continuum charge of opposite polarity.

The quon with its matching unit of continuum charge is the most degenerate state that electric charge can adopt. Hence the quon, unlike the electron, may find that its electric field energy is somehow merged with and perhaps accounts for energy that represents the presence of that continuum. Note that the theory assumes the continuum proper has zero energy. We should not therefore expect the inertial properties of the quon to be the same as those of the electron, as implied by use of the Thomson mass-energy formulation  $E = 2e^2/3a$ . Now here I have in mind what I wrote at pages 104-105 of my 1969 book: *Physics Unified*. I argued by reference to Appendix I of that book that the pressure in the medium enveloping the quons would be equal to that set up within the body of charge e, which I calculated as being given by the formula  $e^2/4\pi a^4$ . From this, by

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multiplying by the volume of a sphere of radius a, one can obtain a measure of the energy as  $e^{2}/3a$ , which is half that given by the Thomson formula.

A little intuition then leads to the appealing suggestion that the continuum counterpart to such a quantity as applied to the quon might then account for an equal amount of energy, so bringing their combination to the energy quantum that would apply to the quon by use of the Thomson formula.

The latter concern may point to a weakness in the theory but only in the sense that one surely cannot expect the universe to yield all its secrets and be self-explanatory in every detail to fit within the pattern of this one sweeping account of Creation. One can but probe the aether step by step and I must admit that I have no idea how to explain or justify the existence of the continuum of charge density  $\sigma$ . nor can I say what electric charge actually is other than by describing its action and effect on other charge. This gives rise to the third question. What happens if, instead of the charge continuum yielding to compression owing to the motion through it of quons and matter at a relative speed c, it resists compression and stays uniform, but the quons are compressed to match exactly the volume of space taken up locally by the particles of matter? This would eliminate the need for that factor k in stage 5 above and ensure that the presence of matter does not distort the continuum charge distribution as a function of the volume of matter particles involved, meaning that gravitational interaction is exclusively that of the related graviton presence.

The results of our analysis speak for themselves, but I do not have the slightest notion of how electric charge can spread itself to fill space in a uniform way, short of imagining that in its microcosmic form it is like a gas which somehow disperses uniformly in its pressure balance.

We can, however, build on what has been discovered concerning the aether and this takes us into chapter 8 where we will see how stars are created.

## CHAPTER 8

# Creation: Stars and Planets

## Introduction

There is something that cosmologists who theorize about what we see in outer space have yet to learn. There are two very basic errors in the scientific foundations on which they build their understanding of stars.

Firstly, they ignore completely the fact that hydrogen as the gas from which stars are formed will, upon compression to a mass density of the order of 1.4 gm/cc as shown in Appendix IV, experience overlap of the electron shells, the K-shells of the atomic structure of hydrogen. This means that the star will be partially ionized, which means that many protons and electrons will roam free. In turn this means that, since the mutual rate of gravitational acceleration by two interacting protons is 1836 times that of two interacting electrons, the star must adopt a uniform mass density throughout its core and have a positive electric core charge density enclosed in a surface shell of negative charge density. The electrostatic repulsion of the core charge will balance exactly the internal gravitational attraction of the star as a whole. That electrical core charge density will be  $G^{1/2}$  times that mass density 1.4 gm/cc. This happens to be the mass density of our Sun but this fact is surely not a matter of coincidence!

Secondly, there is the quite ludicrous assumption that starlight in its passage through the aether for billions of years as it traverses vast distances is not subject to frequency attenuation. Because cosmologists know that light waves of different frequency travel at different speeds through a material medium they see 'dispersion' as the telltale property of a medium in space and assume, incorrectly, that no frequency dispersion in the vacuum means no frequency attenuation and so no aether medium. One can but deplore the cosmological blunder that has ensued and bequeathed us with the nightmare syndrome of the Big Bang, an expanding universe and, in respect of that first error, 'Black Holes'.

Moreover, by ignoring that positive electric core charge possessed by a star one has not seen how Mother Nature, in interacting with a quantum aether, will develop a state of spin importing energy from that aether and so cosmologists have missed something of vital importance to our understanding of Creation.

It does not need a genius to see the obvious and one can but wonder if the cosmological fraternity is composed of the blind leading the blind, which means that I address what I now have to say to the general reader rather than seeking to 'enlighten' those who see themselves as specialists in cosmology. Such is my strength of feeling on this matter, especially as my earlier published work on this theme has not been heeded.

This is my introduction to this chapter 8. Apart from the discussion concerning 'space domains', a subject addressed in my books 'Modern Aether Science' (1972) and 'Physics Unified' (1980) I base much of this chapter on a lecture I delivered to the Physics Department of Cardiff University in Wales in 1977 and an extended revision of the subject of a peer-reviewed paper of mine published by the Italian Institute of Physics in 1984. The latter paper was entitled: 'The Steady-State Free Electron Population of Free Space', Lettere Al Nuovo Cimento, **41**, 252-256 (1984). The Cardiff lecture was the subject of a paper entitled 'Space, Energy and Creation'. Also, added to this chapter since the first draft edition of this work was published on my website, is a very important development pertaining to what are referred to as 'neutron stars'. The recent announcement of the first-ever measurement of the magnetic field of such a star has provided data allowing my theory to be tested in a quite remarkable way.

### **Deriving the Hubble Constant**

I believe that what astronomers see as the basis of the Hubble constant, the shift of the frequency of starlight towards the red end of the spectrum as a function of distance from a star, is a phenomenon associated with proton creation. Nature's ongoing attempts to create protons everywhere in space must fail if there is inadequate energy available for a proton to materialize in a permanent form. In lending energy momentarily to test the water, as it were, and see if proton creation is possible, the aether is constantly experiencing failure, given that almost all of its surplus energy has already been deployed in the creation of matter. The aether is vast and those attempts at proton creation are occurring in a very small proportion of its unit cells at any instant and so its overall transparency is only slightly blemished by this activity. So, you see, in now mentioning those blemishes that arise from proton creation, we are holding firm to the theme of this work 'The Physics of Creation'. In summary, the proton creation activity already discussed in chapter 4 is ongoing everywhere in its failure mode on a universal scale where there is no energy surplus feeding the creation of protons that can survive, but yet is effective in a way that does reveal itself by determining the value of what we refer to as the Hubble constant.

In physics one has the choice of believing that the vacuum is a true void or that it is a real aether medium. There is no halfway house in which one can shelter, as by inventing a geometrical multidimensional fabric and dressing accordingly as one plays a part on an imaginary stage and so pretends that the universe is a mere illusion.

The sensible approach is to say that the aether exists and functions as a kind of workshop that accepts energy shed by matter and recycles it by fabricating protons and electrons which can be drawn back by gravity into the real world. This is the vision of an everlasting universe, a steady-state universe in the overall energy sense, but one which evolves by creation and decay of its component parts. At the very least, however reluctant one might be to accept this proposition, one should explore its implications theoretically before accepting the alternative, a universe in which protons and electrons were created at time zero and which then ceased their manufacture in favour of a slow death. Indeed, ask yourself why would our universe start creating protons and electrons and then stop suddenly or is one to believe that God operated a switch called 'Creation' and, alarmed by hearing the 'Big Bang', immediately opened the switch and adopted a low profile just to watch events from then on?

So I have envisaged an aether which is ongoing and trying all the time to create protons and electrons, succeeding only by using any surplus energy that finds its way into its system. Then, supposing there are vast regions of space where there is no such surplus energy, that aether in those regions would at all times exhibit a kind of haze as it tries, using its own latent energy resource, to create protons and electrons, only to find that they promptly decay, but yet their transient existence provides a permanent but very faint haze throughout space which can obstruct the passage of electromagnetic waves.

We have, in chapter 4, seen how the muon activity of the aether can create a proton. This is, I believe, a process in which nine muons act in concert by attacking a quon in the time interval of one oscillation at the Compton electron frequency or in an immediate succession of such time intervals. The chance of such an event occurring is found as follows.

Quoting from the above-referenced paper in '*Lettere al Nuovo Cimento*':

"We look to the event when four muon pairs plus one muon of charge opposite to q all combine within the volume of q in the same cycle of migration. The muon pairs have a random chance of movement and are not confined to a particular cell. The chance of one muon entering the q volume is  $(1/N)^{1/3}$  (m<sub>e</sub>/2m<sub>µ</sub>). Therefore the chance of nine muons entering this same volume is this factor raised to the power 9. The logic of this supposes that each muon arrives independently and simultaneously and that the chance of four negative muons appearing is the factor raised to the power 4, whereas the chance of five positive muons appearing is the factor raised to the power 5, the total chance being the product of the two. We find that the overall effect is that at any time the chance of a q element converting according to the equation:

$$q = N(e^+, e^-)$$

is  $(1/N)^3 (m_e/2m_{\mu})^9$ . It is supposed that the reverse transition occurs at the end of each cycle when the muons migrate to new positions. In effect, however, the condition just described is ever present and is a steady-state condition."

Here, I interject a comment that qualifies what is said above. Arising from the discovery claimed by Dr. Paul Rowe (see chapter 9), I now believe that the transient state left even by one muon impact upon q, the quon, will hold the energy just long enough to carry the action into the next muon cycle. This means that the numerical factor still applies but to a sequence of successive impacts on the same quon target. The odds of a quon being hit by nine muons in the unit time interval are the same as that of a sequence of single muon hits on the same quon target in a succession of unit time intervals. This reverts the aether model to that for which a muon pair is confined to each unit cell of the aether, given that their combined energy is the mass-energy of a unit cell of the charge continuum.

Note that N, as 1843, the number derived theoretically in our earlier analysis of photon theory in chapter 7, is the charge volume of the quon in terms of the charge volume of the electron.

To complete the quotation from that 1984 paper:

"The formula for d, the lattice dimension of the cubic cell of aether, as  $72\pi e^2/m_ec^2$ , can be used to evaluate d as  $6.37 \times 10^{-11}$  cm, meaning that there are  $3.87 \times 10^{36}$  cells per cubic metre of space. With N as 1843 and  $m_{\mu}/m_e$  as 207 it is evident that one cell in  $2.2 \times 10^{33}$  is subject to the transition just discussed. There are, therefore, approximately 1,760 excited electron cells in each cubic metre of space.

The state of excitation involves a q charge becoming an electron and the nine muons shedding energy and creating 921 electron-positron pairs to leave the residual energy nucleated in a positive charge of larger energy content, but physically very much smaller in size than the electron. The question then is whether 1760 such systems in each cubic metre of free space might be detected owing to the disorder they represent in what is otherwise a transparent and wholly ordered medium.

The electron-positron pairs will not obstruct the passage of electromagnetic waves because they have a mutual inertial balance and are collectively neutral in their response to electric fields. This leaves the electrons, 1760 per cubic metre, as the dominant factor presenting a scattering cross-section to radiation."

Here is the cause of that 'haze' mentioned above. The approach I now take is to assume that the wave must shed some of its energy in passing through this 'haze'. As a self-propagating oscillating wave it will shed energy during both the up and down parts of its lateral displacement cycle. During its ups it will move the distance required to match the amplitude of its electric field, not travelling quite as far as it would were there no loss of energy. However, during its down periods it must traverse the same displacement distance before beginning the next up and down cycle, albeit in the opposite direction, but, ask yourself: "How can it then reveal that it has lost energy?" The answer, given that we are considering a system in which electric field energy is being exchanged by oscillation into kinetic energy, which Clerk Maxwell would say is magnetic energy, is that we must look to a reduction in speed, given the same distance of travel, and so a frequency reduction. By 'speed' is meant the speed of the quon charge oscillations in a direction lateral to the wave propagation direction.

In summary, to the extent that the electron 'haze' absorbs energy from the wave, half of the energy loss will mean amplitude attenuation, even for a plane wave, with the other half of the energy loss producing frequency attenuation. This is why light from distant stars suffers a loss of frequency.

Upon encountering an electron as an obstruction in the path of an electromagnetic wave, the wave sheds some of its energy density W and also suffers a related loss of frequency f. Since, for a given oscillation amplitude of electric field intensity in a medium where charge displacement is subjected to a linear restoring force, W is proportional to frequency squared, the relationship between these two quantities, expressed as a function of distance s travelled, can be formulated thus:

(1/f)df/ds = (1/2W)dW/ds .....(8.1)

However, since the attenuation of frequency occurs only during half of the wave cycle, this equation needs to be further modified to become:

(1/f)df/ds = (1/4W)dW/ds .....(8.2)

Now, when I wrote the 1984 paper from which the above quotations are taken, I proceeded upon deriving this equation (8.2) to show that this implied a value for the Hubble constant determined by estimating the energy dissipation in the aether as if each of those 1760 transiently-created electrons per cubic metre presented the electron scattering cross-section according to the standard Thomson formula.

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Unfortunately, I misquoted the value of this quantity by a factor of  $\pi$  and so derived a Hubble time factor of 11,400 million years, whereas the theory based on such assumption indicates a lower value of the order of 4 billion years. I am now somewhat hesitant about relying on such a formula and would rather simply make the point that an electromagnetic wave travelling through such an field of electrons must suffer a loss of energy and a reduction of frequency.

That frequency attenuation is scaled as a function of frequency exactly as it would be if it were due to the Doppler effect. Inevitably therefore, the notion of an expanding universe is unsound and it becomes of interest here to denote the empirical value of the Hubble constant as N billion years, this being the relevant exponential decay time constant, and deduce from this the scattering cross section of those electrons. 4% energy absorption corresponds to a 1% frequency reduction over 1% of the distance travelled at the speed of light and so 1% of the Hubble time constant.

Suppose the scattering cross section of each electron to be  $\beta$  times  $10^{-25}$  sq. cm. To achieve 4% energy absorption this means that the wave travels a sufficient distance to encounter 4 times  $10^{23}$  times (1/ $\beta$ ) electrons per sq. cm. of wave cross-sectional area. At 1,760 electrons per cubic metre this means that the wave must travel over a distance of (1/ $\beta$ ) times 2.27x10<sup>26</sup> cm to suffer a 1% frequency reduction. Since 1 billion light years is a distance of 9.45x10<sup>26</sup> cm we then find that the 1% frequency reduction occurs in a period of (1/ $\beta$ ) times 0.24N billion years. This gives the relationship between N and  $\beta$  as one for which  $\beta$ N is equal to 24.

On the basis of the electron scattering cross-section according to the J. J. Thomson formula of  $6.65 \times 10^{-25}$  sq. cm, the Hubble time period should be 3.6 billion years, which seems too low. We must remember, however, that this is not a measure of the age of the universe. It is merely the time constant of an exponential frequency reduction curve. It is reasonable to suppose that the process by which we have explained the successful creation of the proton in chapter 4, as attributable to nine muons coming together within the space occupied by quon charge, may, even so far as unsuccessful events are concerned fall short of achieving that 1760 transient electron level per cubic metre. A one in five chance would enhance the Hubble time period by a factor five. Also, one can even question the merit of using the Thomson radiation scattering formula for reasons to be discussed in Appendix II and readers who need to know more about this before delving into the creation of stars should pause here to read through Appendix II.

Had we used instead the cross-sectional area of the electron as based on the Thomson electron form discussed in the early chapters of this work then that Hubble time period would be longer by a factor of 6, meaning that it would be of the order of 20 billion years. Such a step would, however, need theoretical justification as to precisely how the physical interception of an electromagnetic wave extracts energy from that wave. Also, it seems illogical to ignore the physics underlying the derivation and experimental support for the conventional theory of the scattering cross-section of the electron.

Given the Hubble constant the theory which involves the Big Bang notion of creation with the universe expanding from the moment of Creation necessarily involves theoretical assumptions that are difficult to verify but suggest that the age of the universe is somewhat smaller than that measured as the Hubble time period.

Our uncertainty here in our theory concerns the effective crosssectional area of an electron obstructing passage of an electromagnetic wave in outer space populated by a mere 1,760 electrons per cubic metre of mass density  $1.6 \times 10^{-27}$  kg/m<sup>3</sup>. This, incidentally, is of the same order as the mass density of the so-called 'missing matter' that cosmologists say should be present in space to give account of certain features of their theories.

I feel, however, that enough has been said to show that we need not belong to an expanding universe with its Big Bang scenario. It seems far more preferable to accept that the facts of record support the

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case for a steady-state universe, thanks to our understanding based on this work of how protons are created and the ongoing role of our aether in that activity. This is especially the case as we now address the problem of how a star is created, but go on from there to show how the space domains that feature in this star creation role define boundaries which must one day be traversed by the star at a very acute angle. This means that the star will be located astride that boundary and be partially in one domain and partially in an adjacent domain. Since, as we shall see, the force of gravity does not act in an attractive sense between matter in different space domains, there are then conditions which arise that may cause the star to explode and disperse, as by a supernova event. Accordingly the cycle of life and death of a star becomes part of the syndrome of a steady-state universe rather than one exhibiting the one-off Big Bang scenario. It is one thing to accept that the universe exists and for us to try to probe its secrets, but quite another to say when it came into existence and confront the mystery of what was there before that event. We can never know the answers to these questions but the picture we can form has more clarity if founded on the notion of a steady-state universe.

## The Creation of a Star

Why are there so many stars and not just one large star that sits at the centre of the universe? What causes a star to rotate? How is the energy which it radiates sustained? Cosmologists have answers. It all happened in the Big Bang and within a fraction of a second what had appeared blew apart as its numerous fragments interacted one upon the other to impart angular momentum in opposite spin directions and so form stars that rotate in their ever-expanding distribution in space. They supposedly feed on energy, nuclear energy as they transmute their hydrogen into inferior lower forms of matter such as helium and so emit their radiation. The aether is not a part of this picture of Creation.

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The source of their expert knowledge on these matters is their observation of what they see in distant space using high powered telescopes plus laboratory analysis of that pattern of radiation as it reaches Earth. The reason that the energy has to be nuclear is because they can conceive of no other source adequate to sustain the Sun's radiation for billions of years.

So you may ask how it is that I can claim any special insight into these matters. What have I seen in a telescope that others have missed? As to 'insight', is that what is needed to ask the obvious question: "Why cannot the energy radiated by a star come from the collisions of those electrons of its adjacent hydrogen atoms, given that their energy is sustained by interaction with the quantum underworld of the space medium, the energy of the aether itself?" As to that 'telescope', my answer is that I was looking instead at a situation one can see by looking through a microscope, not at a crystal ball but at the surface of a crystal of iron. My experimental Ph.D. research concerned an energy anomaly found in iron and I spent a great deal of time one summer supplementing that effort by trying to develop a theoretical model justifying the ferromagnetic state of iron, as based on electrostatic and electrodynamic interaction of 3d state electrons in iron atoms. Those atoms are arrayed in a body-centred cubic lattice and I was exploring the trade-off between the negative energy potential of the interactions versus the accompanying mechanical strain energy to explore, not only the ferromagnetic condition, but property dependence upon mechanical stresses as I had measured the loss anomaly factor as a function of such stress.

That theoretical research convinced me that a phenomenon known as the 'gyromagnetic ratio' was not attributable to electron spin, as theoretical physicists assumed, but was in fact attributable to the existence of a reaction which halved the strength of an applied magnetic field, a reaction that must also be exhibited by the vacuum medium, the aether.

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I later realized that my ferromagnetic model of an iron crystal, if adapted to the simple cubic structure, had something to tell me about the properties of the aether, because it had a message concerning angular momentum and rotation.

More than this, however, the iron crystal has an intrinsic structure that is characterized by energy deployment and what one could see in a microscope is what are called 'magnetic domains', regions of the crystal bounded by planar separating walls which divide the iron into parts in which the electron orbital motion accounting for ferromagnetism have opposite directions.

It does not take a genius then to imagine that, possibly, the aether itself might have the characteristic feature of incorporating domains on a large scale and that this might have some bearing on the distribution pattern of stars when born, meaning one star or one binary pair of stars per space domain. I had in mind also the great mystery posed by the hope that gravitation might prove to be a phenomenon linked in some way to electromagnetism. So there I was, at Cambridge, having ideas that I dare not express for fear of ridicule, but pursuing in private my hobby of delving into theoretical physics when my formal discipline was connected with electrical engineering.

I was, after all, at the venue where, some two decades earlier Nobel Laureate Paul Dirac had been acclaimed for establishing the case for electron spin by which that gyromagnetic factor of 2 is supposed to come from what I can best describe as pseudo-relativistic mathematical equations. It was a little consolation to think that Dirac had graduated in engineering in his first university, Bristol, and a comfort to think that he saw space as a 'sea' of states from which a missing electron would appear as a positive 'hole', the positron, but the aether was still a 'taboo' subject and I had a living to earn upon leaving academia. I had already spent three years at Manchester University obtaining my first degree and had two years of graduate apprenticeship before entering Cambridge. At least, being at Trinity College, the venue of Isaac Newton and J. J. Thomson, whose portraits

overlooked one's dining habits in Hall for some three years, I could hope that that might engender some creative inspiration and, indeed, courage as I quietly pursued my hobby of exploring the aether in the years ahead.

As to the creation of a star, I saw that as an event resulting from the aether 'cooling' from a chaotic state into an ordered state, just as magnetic domains form in iron as its crystalline form sheds extra energy in cooling through its Curie temperature. In the aether, however, that energy is released as gravitational potential of the star or binary star pair so formed within each domain. In other words, we are looking at the situation in which gravity as a phenomenon is switched on by domain formation just as the state of ferromagnetism comes into being only when those domains form.

Creation as applied to a star then involves the coalescence of dispersed matter, protons and electrons, which means, once the gravity switch is thrown, that many of the protons rush in ahead of the electrons because their mutual rate of acceleration is 1836 times that of the electron-electron interaction. Here is the trigger causing a star to spin, the initial state of it having a positive electric core charge, and this brings us to the point of primary importance in this work. It is a factor that can explain the spin of a photon as well as the spin of a star and may even explain something I shall reveal in the last section of chapter 9, something having technological implications for the alternative energy field.

I did, at the end of 1959, document this aspect of the theory in printed form [*'The Theory of Gravitation'*, (1960)], but at that time I had not seen the link to any technological implications, as otherwise I might well have changed course much earlier in my career pursuit. The book just mentioned was privately published at that time only to make a break as I changed from a professional role with a major engineering company, English Electric, to a higher management role with IBM in their Patent Operations.

I was sure that a star forms owing to it acquiring a positive core charge density at its creation, a charge which is later sustained by virtue of its hydrogen atoms being crushed together by gravity so as to be close enough for their electron shells to overlap and so develop the ionized state which leaves enough protons free to move inwards under gravity and so sustain that core charge. The charge density would be the square root of G times the mass density of hydrogen corresponding to that overlap of their electron shells. The result is the mean mass density of our Sun, a little over 1.4 gm/cc as I show in Appendix IV.

So now let us see how the aether coextensive with the Sun reacts to the presence of this charge. Being a little impatient here I rush to say that it shares the spin of the Sun at the time the Sun comes into being, simply because aether spin means electric charge induction, displacement of charge from its core body to its spherical aether boundary. You might then say that such a proposition would mean that the Sun along with other stars would then have a magnetic moment and so a magnetic field should be in evidence. You could even suspect that body Earth, if also having a coextensive aether sphere spinning with it, would be subject to an internal electric strain and also possess a magnetic moment giving rise to a magnetic field.

All very well, you might then say, but how does theory yield quantitative results that we can check with observation and measurement? As I now show, the solar system can be obliging in this endeavour but we need to be cautious. We will proceed in stages and I am sure you will find the commentary interesting and convincing.

# The Schuster-Wilson Hypothesis

That comment above that the sun should exhibit an electric charge density in its core equal to the square root of G times the sun's mean mass density should remind any well-read cosmologist of what came to be known as 'the Schuster-Wilson hypothesis'. A. Schuster [Proc. Roy. Soc., **24**, 121-137 (1912)] and H. A. Wilson have shown

that the magnetic moments and angular momenta of the Sun and Earth are approximately related in a common ratio. This led to the hypothesis, the speculation that a moving element of mass as measured in gravitational units might have the same magnetic effect as an electric charge measured in electrostatic units.

It seems not to have occurred to those interested in this hypothesis that rotation of an astronomical body might entrain rotation of aether, which could involve the induction of an electric field and so electric charge displacement duly cancelled by charge displacement in that astronomical body. If the latter and not the former gives rise to magnetic action one has here a situation where one can explain the presence of a magnetic moment with no commensurate evident presence of an electric charge.

Wilson sought to prove the hypothesis by experiment based on seeking to detect the magnetic action of a swinging iron bar [Proc. Roy. Soc. A., **104**, pp. 415-455 (1923)]. The null result of the experiment is hardly surprising. I would not expect the aether to respond to the oscillations of an iron bar though I could contemplate a response if a rotor spinning at the same speed for a prolonged period was used and there were some effect akin to the presence of an electric charge within that rotor. However, one must keep in mind that in 1923 the aether was not surviving as a popular notion in the vocabulary of science. Nor, indeed, could one expect that hypothesis to survive, given the boldness of what it claimed.

However, interest in the Schuster-Wilson hypothesis revived in 1947 when W. W. Babcock [Publ. Astr. Soc. Pacif., **59**, 112-124 (1947)] succeeded in measuring the magnetic field of the star 78 Virginis. The hypothesis was verified as being fully applicable to three bodies instead of two, the range of angular momenta then being 10<sup>10</sup>:1. Nobel Laureate P. M. S. Blackett [Nature, **159**, 658-666 (1947)] then became very interested and wrote an extensive article on the subject. He began by presenting the hypothesis in the form:

(Magnetic moment)/(angular momentum) =  $\sqrt{G} (\beta/c)$ 

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where  $\beta$  is a constant of the order of unity, c is the ratio of electrostatic to electromagnetic units and G is the constant of gravitation.

This was followed by a Table I in which he presented numerical data in support of the above formulation before then enlarging on the whole theme by reference to the research findings of several authors. What is however perplexing for a serious reader of his account is the data he provides in that table for the magnetic moments and angular momenta of the Sun and the Earth. The ratios of magnetic moment to angular momentum for Earth and Sun are shown to be  $1.11 \times 10^{-15}$  and  $0.79 \times 10^{-15}$ , respectively, whereas my calculation of  $\sqrt{G}$  ( $\beta$ /c) gives the value  $\beta$  times  $0.86 \times 10^{-14}$ .

There is a factor of 10 discrepancy if  $\beta$  is to be 'of the order of unity' and I can but suspect that there has been a numerical miscalculation on Blackett's part which is quite misleading even if an error factor of 10 was seen 'as of the order of unity' in the context of a number 10 raised to the fifteenth power. In the event, however, Blackett himself was sufficiently intrigued by the Schuster-Wilson hypothesis to mount a further experiment [Phil. Trans. Roy. Soc., 245A, 309-370 (1952/53)]. He contrived to acquire a quite large object of pure gold just for the period of the experiment and placed this in a wooden shed in a rural location remote from any metal objects or external power supply equipment, his purpose being to use an extremely sensitive magnetometer to see if the concentration of mass by the high density of gold allowed that object to reveal a magnetic property attributable to its rotation with body Earth. Again, not surprisingly, there was a null result, because surely, if we are really looking at a property of the aether, one cannot expect the aether itself to increase its action merely because of a mass seated in very dense matter.

So here was an astronomical observation of major importance but, owing to it not complying with one's hopes on the laboratory front and in spite of the related efforts of many authors, it was merely a hypothesis that had somehow to be buried and forgotten. The aether had not been seen as a factor involved owing to it also having been buried and forgotten for not itself complying with an assumed property that it did not possess and yet the basis of the Schuster-Wilson hypothesis was a pointer to the existence of the aether. Such is the arena of scientific endeavour, at least where cosmology is concerned.

If the aether spins with an astronomical body and such spin can induce electric charge displacement, then one might still expect that hypothesis to hold true at least in a limited sense as applied to hydrogen in a star, and all the more so, given the opening comments of this chapter, my observation that ionization in the Sun must endow it with a core charge that has the density implied by that Schuster-Wilson hypothesis.

It could well be that there is something fortuitous about the way in which the Schuster-Wilson hypothesis has crept into physics. The problem with the numerical data might well arise because it is so difficult to be sure what magnetic properties a star has. There are Sun spots on the Sun which signify regions of ionized gas spinning independently of the general spin of the Sun itself. The magnetic fields in evidence from spectral line shifts in radiation from the hydrogen atom fluctuate over time and make estimates of magnetic moment unreliable. Accordingly, whilst accepting that the  $\sqrt{G}$  ( $\beta/c$ ) factor has a role in cosmology by linking gravitational action on ionized gas with an astronomical body having a core electrical charge density and core mass density that are uniform and related, we will not ponder further on the specific values of magnetic moments of such ionized bodies. Instead, we shall look to the aether to reveal something of relevance to this curious factor.

We are converging onto the proposition that aether spin involves induction of a charge density within the spinning aether sphere, owing to charge being displaced to or from its spherical boundary. This charge density is neutralized in its electrostatic effects by virtue of a corresponding charge deployment of opposite polarity

within the astronomical body seated within that aether sphere. Accordingly, one can only sense the magnetic effects associated with one of those charge components, namely the action of the charge displaced within matter. This is further supported by my contention that the ionization of hydrogen in a star will, owing to collisions between K shell electrons in gravitationally compacted hydrogen atoms, free just enough protons to set up the precise density of positive core charge that the hypothesis requires.

I can provide some further insight into the reasons why aether charge itself, absent a reaction in coextensive matter, does not set up a primary magnetic field action. Reason (a) is that we found in chapter 7 that all the right results emerged from analysis of aether structure without our incorporating any magnetic interaction in the aether model considered. Reason (b) will emerge from chapter 9 where we derive the Neumann potential and see that we need to retain the Fechner hypothesis to explain the phenomenon of electromagnetic interaction. The Fechner hypothesis requires quantum electrodynamic charge pair creation and annihilation of the kind we associate with moving electrons, but electrons are not part of the basic aether medium. Reason (c), also to be discussed in chapter 9, is that the aether charge that has freedom of movement is governed by statistical factors by which the energy involved optimizes its deployment. The aether can set up a magnetic effect by the reaction which accounts for that gyromagnetic factor of 2 being halved, but this is a reaction and not a primary action unless, as applies where we have stored field energy in an inductance, we deliberately terminate current flow in matter with the result that the aether induces the back-EMF that feeds the return flow of the induction energy. Reason (d) is the fact that, contrary to general expectation, one can explain gravity and derive the value of G as an aether property without associating gravitation with an electrodynamic action.

Enough has now been said to show that the aether figures prominently in the process of star creation. In contrast with my earlier

accounts of the theory involved, where I discussed first how the setting up of an electric charge density in a body of astronomical proportions accounted for the creation of our Sun and the planets, I will, before delving into the mathematics of space domains, start here by introducing space domain theory.

## **Space Domains**

Although cosmologists like to think that the action of gravity knows no bounds and that matter, however separated by distance, will be subject to the unabated action of gravity as defined by the value of G that we measure here on Earth, I think otherwise. Gravity has a limited range of action. It only operates between matter seated in the same space domain or between matter and quons of the aether lattice seated in the same space domain.

The latter can be verified in the following way. Consider a region of aether in the near vicinity of Earth and the effect of the gravitational potential of Earth and Sun on quons located in that region. Those quons, which define the E frame of the aether, move in circular orbits in which they are dynamically balanced by the gravitons in the G frame. Each has a mass  $m_o$  which, subject to gravitational potential  $\Phi$ , imports an amount of energy  $\Phi m_o$  which is held at the seat of that quon as the thermal vibration energy of that quon. This is an energy quantum kT, owing to the quon having only two degrees of freedom, imposed by the constraint of keeping in synchronism with the orbital motion of other quons, this constraint precluding the third degree of freedom. T is the temperature in Kelvin and k is Boltzmann's constant,  $1.38 \times 10^{-16}$  ergs/K. This gives us the equation:

$$\Phi m_0 = kT \dots (8.3)$$

Now, in chapter 7, we were able to show that the mass of the quon was 0.0408 times the mass of the electron, as one can see from equation (7.25) by substituting the value we derived for r/d. Since we then know that the electron has a mass of  $9.109 \times 10^{-28}$  gm, the

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temperature of the quon system, which we can refer to as the 'aether temperature' or 'cosmic background temperature', if it can be measured, will give us the value of  $\Phi$ , the gravitational potential in the near vicinity of Earth.

Now, of course, we can only be referring here to the 2.7 K temperature exhibited by any rarefied form of matter that interacts with the aether at high altitudes above the Earth. It appears that radiometers carried by U-2 aircraft flying at altitudes of 20 km detected a 390 km/s component of Earth motion through space by interpreting the observed local anisotropy of the 2.7 K temperature by reference to an assumed isotropic distribution. This was reported in October 1977 [Phys. Rev. Lett., **39**, 898] and again, on November 3<sup>rd</sup> 1977, under the title: *'Aether Drift Detected at Last'* at page 9 of the journal 'Nature', followed in May 1978 by an article '*The Cosmic Background Radiation and the New Aether Drift'* in 'Scientific American'.

With T as 2.7 K, equation (8.3) tells us that  $\Phi$  is  $1.002 \times 10^{13}$  erg/gm. So here we have an approximate measure of the local gravitational effect of all the matter in the universe that lies within the range of gravitational action. I say 'approximate' because one cannot rule out a small contribution to temperature from another source and because the assumption concerning the two degrees of freedom may be too rigid an assertion. However, since G is  $6.67 \times 10^{-8}$  cgs units, body Earth of mass  $5.977 \times 10^{27}$  gm and radius  $6.378 \times 10^{8}$  cm contributes about 6.2% of this value of  $\Phi$ . Also, the Sun of mass  $1.989 \times 10^{33}$  gm at a distance of  $1.496 \times 10^{13}$  cm contributes 88% of this value of  $\Phi$  and so, even if the other planets plus the rest of the universe within gravitational range contribute nothing to this potential, we can account for 2.6 K of that temperature. This is close enough to justify my assertion that gravitation has a limited range.

As I show in Appendix II, the inertial property of a particle vests in its electric charge responding to the influence of an accelerating electric field in just such a way as to conserve its energy and avoid radiation of its intrinsic electric field energy. This is not to say that the accelerated electron is inactive in the role of radiating energy, because a group of electrons accelerated together can operate collectively in developing such radiation and one has to look also at the kinetic energy (magnetic energy) associated with electromagnetic wave propagation. This key to understanding the nature of inertia is of vital importance to cosmological theory.

Ernst Mach (1893) regarded the background of very distant stars as a firm base of reference for the determination of inertial action. Quoting from p. 169 of the book: *'The Structure of the Universe'* by J. Narlikar (Oxford University Press; 1977):

"Mach concluded that inertia owes its origin to the background of distant stars. Remove the background and the body will cease to have any inertia! This reasoning is known as 'Mach's Principle'."

Then on p. 170 of that book one reads:

"In the early 1950s the Cambridge physicist Dennis Sciama suggested an interesting interpretation of Mach's principle. He argued that, when a non-inertial coordinate frame is used, the inertial forces arose because of gravitational forces exerted by distant matter. Imagine a body like the Earth which is being attracted by the Sun's gravitational field. In the frame of reference in which the Earth is at rest, we can argue that it is acted on by two equal and opposite forces: (1) the Sun's gravitational force of attraction and (2) the force exerted by the rest of the Universe. The latter is expected to depend on the density of distant matter and its distance from the Earth. Starting with this idea Sciama deduced from general arguments the relation:

$$\rho GT^2 = 1$$

In this relation,  $\rho$  is the mean density of matter in the Universe and T is the time scale associated with the expansion of the Universe. If we use Hubble's constant H, we may write T = 1/H."

Sciama's ideas on this theme are typical of the reasoning used by cosmologists who cannot contemplate gravity having a limited range of action, and look to find answers to the problem of inertia in the far distance of space, whereas the phenomenon of inertia is something they can research on a laboratory bench. All they have to do is to look into the physics of the electron and avoid the a priori assumption that a single accelerated electron must radiate energy by saying instead that it seeks to conserve the energy it acquires from its interaction with the electric field that produces that acceleration [see Appendix II].

In mentioning Sciama, I am reminded that I received my Cambridge Ph.D. in 1954 as did Sciama, and that a few years later I met with Sciama to discuss my ideas and the aether theory I present in this work. He was polite and attentive but showed little interest other than saying: "We all believe in the aether, but we call it 'space-time'." The message was clear; relativity rules in the mind of the cosmologist and unification of field theory means building on Einstein's foundations to discover the ultimate link.

I maintain that the 2.7 K cosmic background temperature, coupled with the theoretical derivation of the quon mass, in the aether which I have explored in deciphering Nature's coded messages, provides the evidence that gravitation has a restricted range of action.

I would have liked in this section on space domains to be able to explain what, on an ab initio basis, determines the size of such a space domain. That is a problem I have not solved and one which I can but bequeath to future researchers. In the analogous situation, that of the magnetic domains which form in the crystals of a ferromagnetic material, domain size is determined, as ever, by an energy optimization process. The domain walls which divide adjacent domains have an energy density per unit area owing to the field reversal that occurs in traversing the wall. The volume of domain enclosed by the domain walls determines an energy which scales in proportion to domain size, the energy density being partially strain energy (positive potential) and magnetic field energy (negative potential). Combining these energies, optimum (minimum) energy criteria determine the domain size, of the order of 100 microns or so in iron.

It is not so easy to see a way forward along these lines when considering the space domain, bearing in mind we are dealing with distances measured in light years. However, before moving on from this chapter section, we will approach the problem by imagining the initial creation of our Sun in a space domain and looking to see if, in acquiring its initial angular momentum, it did that by drawing on the resource of the space domain in which it was born. We shall assume one single space domain devoted to the creation of the Sun and see if we can deduce the physical size of that domain, using the data we have derived for the photon in chapter 6 and for aether structure in chapter 7.

In deriving equation (6.17) we saw that an energy E fed into the aether involves the addition of an angular momentum of  $E/\Omega$  and, from equation (6.16), half of this energy goes into kinetic energy. Conversely, if the aether sheds an energy E as gravitational energy it loses angular momentum  $E/\Omega$  and kinetic energy E/2. This angular momentum, as shed by an entire space domain, is assumed to go to the star.

On this basis each quon in the domain will shed energy given by the equation:

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electron wavelength  $2.426 \times 10^{-10}$  cm divided by  $4\pi$ , and so can determine d. From this, given that each cubic cell of the aether has a volume d<sup>3</sup> and that electron mass is  $9.109 \times 10^{-28}$  gm, the mass density of the quon lattice is approximately 144 gm/cc.

When we double this to add the equal mass density of the graviton system, the total mass density of what might be referred to as the 'structured space medium' is 288 gm/cc. It is high compared with the mass density of Earth or Sun but low in comparison with the massenergy density that applies to the virtual muon population of the aether. Yet we do not sense any resistance in moving through this aether, thanks to the inherent inertial balance of the aether medium. We shall see presently in this chapter how such a mass density can be confirmed by the evidence available.

Meanwhile we denote this 288 gm/cc mass density as  $\rho_o$  and formulate an equation for the total angular momentum (AM) shed by a domain to form a star. Although space domains must have planar boundaries as with magnetic domains and so are likely to be cubic in form, it eases calculation to assume a spherical form of radius D, merely to estimate the scale involved.

From (8.4), bearing in mind that only half of  $\rho_0$  is effective in interacting with the gravitational potential  $\Omega$ , the total angular moment shed in forming the star is:

(AM) = 
$$\int_{0}^{D} (GM/R)(\rho_{o}/2)(4\pi R^{2})(1/\Omega)dR$$
 .....(8.5)

The result is:

$$(AM) = \pi GMD^2 \rho_0 / \Omega \dots (8.6)$$

and so D is given by:

where S is the parameter angular momentum /mass of the star.

We can now calculate D as it applies to the creation of the Sun. At creation, prior to the Sun shedding its planets, its angular momentum, as evaluated in Appendix V, was some  $3.2 \times 10^{50}$  cgs units

and its mass  $2x10^{33}$  gm. With  $\rho_o$  as 288, G as  $6.67x10^{-8}$  and  $\Omega$  as  $7.8x10^{20}$  also in cgs units, we then find that D is  $4.6x10^{20}$  cm or 480 light years.

If the Sun was created within a cubic space domain one would expect its cube dimension to be of the order of 760 light years on this basis, a figure that might seem to be a useless piece of information, were it not for certain geological evidence. Given that our solar system is travelling through the aether at some 390 km/s subject to an uncertainty of 60 km/s, as detected from the U-2 aircraft radiometer experiments measuring anisotropy of the 2.7 K cosmic background radiation, the Earth would surely traverse a domain boundary more than once in every period of one million years. Such an event must be quite traumatic if the range of gravitational action is confined within a space domain. One would need to pray for a fast crossing in a direction normal to the planar boundary of the domain, as a crossing at a very acute angle would prolong the lapse of gravity and involve enormous upheaval and earthquake activity.

So, you see, understanding more about Creation even in a steady-state universe can bring with it the threat, one day, of impending doom. Geological history must have its own messages of record and such history will inevitably repeat itself one way or the other.

We will end this chapter by digressing into this subject and also into the theme of neutron stars, but first we must complete our analysis of the aether properties by considering the theory of aether spin by reference to Fig. 8.1 and the one bright hope that it brings for the prospect of our tapping energy from the aether itself.

# **Aether Spin**

We have seen how the photon is explained as a tiny unit of aether structure spinning about a central axis. It was implied that the presence of an electron might suffice to nucleate such a spin on the basis that its electric field acting on the group of quons and from the

#### THE PHYSICS OF CREATION

centre of that group might induce that state of spin. Now we shall look at this picture to see what happens on an astronomical scale.

Referring to Fig. 8.1, a quon, denoted q, describes an orbit of radius r at the angular frequency  $\Omega$  of our quantum underworld and we will now assume that, for some reason, there is a superimposed rotation of the centre of that orbit owing to motion at angular velocity  $\omega R$  about a central axis at a distance R. We suppose these two circular motions are coplanar, meaning their axes of spin are mutually parallel.

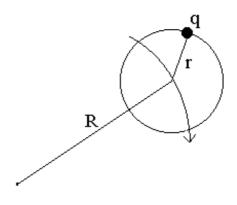


Fig. 8.1

Now, the overriding constraint that governs our aether and accounts for so much of what is fundamental to the physics of our universe is the synchrony of time keeping that ensures there is no departure from conformity with the  $\Omega$  angular frequency. One then sees from Fig. 8.1 that, when the two motions are compounded, the radius of the quon orbit is affected and must vary between  $r(1+\omega R/\Omega r)$  and  $r(1-\omega R/\Omega r)$  for the condition of synchronous motion to apply. In effect, the quon moves at a steady speed in orbit about a new centre radially displaced from the remote axis through a distance  $\omega R/\Omega$ . This means that, if a spherical body of aether with its quon lattice spins at the angular frequency  $\omega$ , there will be an accompanying

induction of charge density  $\sigma_s$  given by incrementing the radius R of a disc of charge density  $\sigma$  by this amount  $\omega R/\Omega$ . We then have:

 $\pi(\sigma_s)R^2 = \pi\sigma[(R + \omega R/\Omega)^2 - R^2]$  ..... (8.8)

Which gives:

 $\sigma_{\rm s} = 2\sigma\omega/\Omega \dots (8.9)$ 

This is a formula for aether spin by which a charge density of  $\sigma_s$  is induced in the aether when it spins bodily at the angular frequency  $\omega$  and, conversely, a formula giving the rate of spin produced by the presence of a charge of density  $\sigma_s$ . Here we have something that has eluded the efforts of generations of physicists who seek to understand the mechanics of the universe, whether as believers in the existence of an aether or not.

The value of  $\sigma$  as the charge density of the continuum is known from the theory, but it is charge which is neutralized by the presence of the quon population. This means that the only charge density which is in evidence is the induced charge density  $\sigma_s$ . However, even this, when present owing to aether spin, can induce charge displacement in matter, and vice versa, in a way which, in certain circumstances, reveals itself by setting up a magnetic moment without exhibiting a measurable electric field.

Having now regard to equation (6.8) in chapter 6, since we proved that x is 2r, we can write:

 $8\pi\sigma qr = m_0 \Omega^2 r \dots (8.10)$ 

which, by writing  $\rho_0$  as  $2m_0(\sigma/q)$ , tells us that;

Then, having in mind the Schuster-Wilson hypothesis and the charge induction in a star by virtue of the K-shell atomic electrons of hydrogen colliding to set protons free and so develop a positive core charge density of  $G^{1/2}$  times the mass density  $\rho_m$  of the star, we can now formulate:

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The equation (8.13) is important because it tells us how fast the aether of a star spins owing to its positively charged electrical core, assuming our theory is correct. This spin is sustained by the presence of that distributed charge set up by gravitational forces being balanced by proton charge repulsion to cause the core mass density to be uniform at the value 1.4 gm/cc set by the K-shell electron collisions in the close contact between the star's hydrogen atoms.

Now, although we are progressing in our quest to understand the processes involved in Creation, the formation of our universe, there is an element of speculation involved, once our analysis involves us in looking too far beyond our own solar system. You may regard the space domain as a mere notion but you will see the evidence before we end this chapter. Meanwhile, however, I shall concentrate on giving my account of how our Sun was created and how it evolved to form the planets.

## The Creation of the Sun

The aether was in a chaotic state having no structure and no order. Then it found order just as iron does when it cools from its molten state to form crystals and then, at a lower temperature, the Curie temperature, form magnetic domains and bring ferromagnetism into being. However, the aether analogy is the formation of the quon lattice structure with its space domains and with gravitation as the emerging phenomenon, rather than ferromagnetism.

So somewhere in this sea of aether there was the space domain in which our sun was born. That space domain had a certain physical size which our theory suggests was a cube of the order of 760 light years in its side dimensions. With order and a surplus of free energy came the creation of protons and electrons to keep electrical charge in balance, but gravity was now in control and those protons came together faster than the electrons and so set up a stellar body, our sun, with a positively charged core. The relatively few electrons that came in late converged on the Sun at its boundary spherical surface but were held there because by then the aether coextensive with the body of the Sun was spinning at the speed determined by equation (8.13) above.

Independently from this, however, the matter which constituted our sun was also spinning because it had acquired the angular momentum shed by the aether owing to its gravitational potential. That angular momentum was the quantity defined by equation (8.6) above, which was the value  $3.2 \times 10^{50}$  cgs units that we have already related to the space domain size.

As one can work out from these data, given the mass of the sun together with that of the planets and its radius, the Sun at creation was spinning at an angular velocity of  $8.3 \times 10^{-5}$  rad/sec or about once every 21 hours [See Appendix V]. Is it not then interesting to find, from equation (8.13) that our aether theory tells us that the Sun's aether, even now, spins at  $7.5 \times 10^{-5}$  rad/sec or about once per day, like the Earth today? Is this a message that says, working backwards, that the size of a space domain is determined over eons of time by stars being created and then suffering annihilation in a cycle of events which are governed by an overall process of equilibrium in energy and angular momentum deployment?

I leave that thought here on record and move on in my more immediate quest.

How did the planets form as our Sun somehow shed its angular momentum? Well, I can but assume that, once formed at the centre of its space domain, the sun was left in limbo for quite a while before it drifted into a boundary wall of that domain. Here it would, being so slow in traversing that first boundary, be subject to enormous gravitational upheaval as its surface material would tend to break away. Once released, of course, by being thrown off, the inertial reaction would impart momentum through the centre of the Sun and it would then travel much faster through cosmic space and many a domain boundary from then on without suffering much loss of matter.

I remind you that I cannot claim to know all the answers and at this stage I can but rely on something I referred to on page 158 of my book: *'Physics Unified'*. I there stated:

"R. A. Lyttleton in his book '*Mysteries of the Solar System*', (Clarendon press, Oxford, p.34; 1968), has explained how magnetic forces exerted within a system of charge by its rotation and self-gravitation will force angular momentum outwards. Thus the transfer of angular momentum X to a concentrated surface zone is understandable. In a sense this can be thought of as a phenomenon similar to the gyromagnetic reaction already discussed. The reaction angular momentum of the field absorbs angular momentum from the centre of the body and the primary balance of angular momentum is driven to the outer periphery of the rotating system, all as a result of the diamagnetic screening effects within the electrical core."

Here that reference to gyromagnetic reaction will be seen as a topic we discuss in chapter 9, and that quantity X as belonging to the matter shed by the sun to form the planets is here introduced in the following equation:

This equation merely says that a positive electrical charge Q sitting inside a charged sphere of radius R and interacting with a negative charge Q at the surface of that sphere will develop a force that can be balanced by matter of mass m having an angular momentum X. The factor k is merely a coefficient introduced to help the onward discussion.

## The Creation of the Planets

The argument is that when the sun traversed its domain boundary the normal gravitational pull on mass m was eliminated for much of the transit period. Also the result the electrical attraction would be affected because one can see space domains as defining regions of space and anti-space in which electric polarities are reversed. By this I mean that, whereas here in our own space domain of the present era, we have protons that are electrically positive and electrons that are electrically negative, one could find the situation reversed in an adjacent space domain. On this basis it is plausible to suggest that the mass m with its angular momentum X could break away from the Sun when the domain boundary is crossed or, perhaps, there might be a sequence of such eruptions and separations as successive domain boundary crossings occur in the early life of the sun.

The overall consequence has to be what we see today, which is a system in which the total planetary mass m in relation to the Sun's mass M can be formulated as:

Consider what this equation (8.15) means. It tells us that, if we know the total mass and angular momentum of the solar system and accept that this was all seated in the Sun when it was created then we know  $\omega$ . With  $\rho_m$  then known to be 1.4 gm/cc from our hydrogen ionization theme, as discussed in Appendix IV, or as is evident by dividing the Sun's mass by its volume, we are in a position to deduce the value of m/M theoretically.

Surely, then, if this were to be even reasonably close to the value we derive from astronomical measurement of our solar system, we would be justified in crying out: 'Eureka'. After all, we are discussing Creation and the birth of our planets, including Earth, and

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it is indeed a challenge for physics to give a justified foundation for such a claim.

Well, Appendix V, shows the value of m/M based on observation. The total mass of the planets as divided by the mass of the Sun is 1/745. So what does equation (8.15) tell us? Remember that G is  $6.67 \times 10^{-8}$  cgs and we have just shown that  $\omega$  is  $8.3 \times 10^{-5}$  rad/sec, so with  $\rho_m$  as 1.4 gm/cc we find that m/M is 1/355k. Now you see why that factor k was included. If only it were to have the value 2, then the m/M ratio of 1/710 would be close enough to 1/745 for the cry: 'Eureka'!

We can but move on now to consider how the Earth itself was created.

## The Creation of the Earth

The Earth has a  $\rho_m$  value of 5.5 gm/cc and  $\omega$  of the initial Earth before the Moon was ejected was, according Lyttleton (Science Journal, 5, 53; 1969), 5.5 hours per revolution or  $3.2 \times 10^{-5}$  rad/sec. This is easily verified by adding the Moon's angular momentum in its lunar orbit to that now possessed by the Earth's spin, given the assumption that angular momentum is conserved.

In this case we find that for k = 1 the Moon/Earth mass ratio given by equation (8.15) is 1/83. Here we can shout: 'Eureka' because the mass is known from astronomical measurement data to be 1/81 and that surely is close enough for us to see merit in our theory. We do seem to have a viable theory of Creation as applicable to planetary formation, but must somehow explain how k as pertaining to the sun can have the value 2.

What is the difference between the Earth in its state of crossing a space domain boundary and the sun in crossing such a boundary? In this primeval state the Earth can hardly have consolidated as a solid body. It must have condensed from an ionized gas and the core charge induction of  $G^{1/2}$  times that mass would hold for atoms that have shed an electron as it is not restricted to protons. The problem, however, is

why our Earth formed from a spread of atoms of many forms given its source in the hydrogen atmosphere of the Sun. If there were such heavy atoms in the Sun, how is they were the one's expelled to form Earth along with its partner of similar form Venus? Maybe Jupiter and Saturn were created in the first domain boundary crossing by the Sun, and Uranus and Neptune in the next boundary crossing, then Earth and Venus, followed by Pluto and Mars, with Mercury and a body that broke up to form the asteroids as the final traversal that created any satellites. Maybe atomic transmutations to form heavy atoms can occur in profusion at times of traversal of space domain boundaries, particularly in smaller bodies. Whatever the answers are, one at least can see a reason for physics to operate in an unusual way during the transitions at those domain boundaries.

One possibility that I have in mind is the thought that Venus and Earth were expelled in opposite directions when the Sun traversed a domain boundary at an oblique angle. The surface segment of the solar sphere that penetrates into the adjacent domain will then lie to one side of the Sun's spin axis and the ionized matter that is shed will tend to be thrown off in a plane at right angles to that spin axis. Inevitably, therefore, if the matter which formed Venus went off into the forward direction and so moved faster into the new domain, the matter forming our Earth would be thrown backwards and, being still in ionized gaseous form, it could experience its own excursion back across the domain boundary and so back into the domain it had just left as part of the Sun. In that case it too would be subject to break up on the basis of equation (8.14). The moon would then emerge as the Earth's satellite in virtually the same creation stage as the Earth itself. This would be long before the Earth solidified and so implies the creation of the moon independently of the notion that its creation might account for the Pacific Ocean being so large. As to the Earth solidifying, that would begin to occur as the gaseous matter rapidly deionized and as the Earth cooled upon moving well away from the As to the processes regulating those atomic transmutations sun.

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necessary to build the heavy atoms of the Earth's composition, that has to remain a matter of speculation, though such processes could well be activated during the many successive crossings of space domain boundaries over eons of time, possibly hundreds of millions of years, before the Earth assumed its present form. Meanwhile the Sun itself would remain immune from such transmutation activity, because its tremendous physical size would, by its strong gravitational pull, keep its hydrogen atoms in close enough contact to remain ionized. Note that the ionization condition, if in accordance with what is outlined in Appendix IV, will preclude direct contact of the protons of adjacent atoms and so make atomic transmutation into heavier atoms less likely.

Moving on, we come now to our next 'Eureka' exclamation as we find the answer to that k=1 or k=2 dilemma. The answer, it seems, depends on whether the astronomical body in question has a spinning aether of larger or smaller radius than the body itself.

## The Ionospheric Aether

Upon crossing a domain boundary there is a transition between space and 'anti-space', analogous to the transition between matter and antimatter, meaning a reversal of charge polarity in the aether itself. So our Sun with its proton charged positive core, as compensated by a negative charge induced by aether spin and charge displacement to the spherical surface, will, in crossing a domain boundary, suddenly find that the core charge polarity induced by aether spin is reversed. There will then, according to whether the aether spin radius lies outside the Sun or inside the Sun, be an effect as defined by equation (8.14), where k is 1 or 2. This action is depicted in Fig. 8.2 where the red circles represent the bounding contour of the astronomical body and the blue circles the bounding contour of the associated spinning aether.

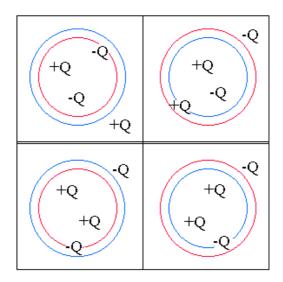


Fig. 8.2

The two alternatives are illustrated in the upper part of Fig. 8.2 and one can see that the electric field effects of the core charge plus aether spin charge cancel in both cases to leave a charge Q, negative in one case and positive in the other, sitting within the outer charge Q of opposite polarity. Remember that we are discussing circumstances that apply in the very early stages of Creation.

When the space domain boundary is crossed the lower part of Fig. 8.2 represents the charge deployment. The core charge Q of the body remains as before, but the aether spin, being sustained in direction by angular momentum conservation, involves quons and charge continuum the polarities of which have reversed and so we have a charge 2Q sitting within a negative charge Q at the body surface in one case but 2Q as offset by a negative aether surface charge Q sitting within a negative charge Q at the body surface in the other case. Here is the explanation of how k can be 2 or 1. We can conclude that the Sun has, or at least had during the planetary creation phase, an aether spin that was of larger radius than the Sun itself,

whereas Earth, for which k is 1, had an aether spin bounded within what was effectively its physical surface.

The story unfolding from this is that our Sun was created by an onset of gravity accompanied by an inflow of protons ahead of electrons and by an inflow of aether angular momentum. This was a one-off event occasioned by aether structure crystallization which introduced the synchronous dynamic state and allowed gravitons to form and so introduce the action of gravity. Since Creation, our sun has shed much of its initial angular momentum to form planets, but its inherent core charge is maintained by gravity acting on its ionized atoms in a preferential sense focussed on free protons. In its turn, this core charge sustains aether spin at a rate of spin that is unrelated to the actual spin of the matter comprising the sun, but an aether spin which, over time, must reverse in direction to adapt to the normal state where core charge is compensated by a neutralizing charge displacement.

The conditions prevailing for a short period during and after crossing a space domain boundary are therefore exceptional and are in no way representative of what we observe today as our Sun moves through space well within the confines of the local space domain.

As to our Earth, during this initial creation phase it must have been gaseous in form and so of much larger physical size that it is today. As its ionization vanished and heavier matter evolved so that it became consolidated in the form we see today its aether spin would be sustained, not by gravitationally induced core charge, but by its residual aether angular momentum. Aether spin would become the primary factor resulting in electric charge displacement and the Earth would respond by deploying electrons in its metallic and semiconductor composition and ionic displacement in its oceans along with deployment of free charge in the aether itself. The spin of the quon lattice system sets up radial charge displacement from the spin axis and so a charge system that shares that spin but the counterflow of non-spinning aether charge, as needed to balance linear momentum owing to the cosmic motion of our Earth with its spinning aether

provides the action which neutralizes the induced charge electrostatically but not its magnetic effects.

We therefore have the situation where, after the moon had been shed by the Earth, it could, for a short period, induce the charge effect which produced aether spin and imported angular momentum and, thereafter, as it lost its charge induction capability when no longer ionized, leaving the aether already spinning to hold on to whatever angular spin momentum it had acquired. This would keep the Earth's aether spinning in the same direction as the Earth traverses successive domain boundaries in its onward cosmic motion with the solar system, but owing to the charge polarity reversals of the aether as each new space domain is entered, there then needs to be a reversal of the Earth's magnetic moment at each domain boundary crossing. Such a reversal would take effect over a period governed by eddy-current reaction as the currents induced in the Earth retarded the transition, but our expectation then has to be that our space domain theory is open to test by our search for the geological fingerprints left by such reversals. This brings us to the final topic of this chapter, geomagnetism.

## Geomagnetism

Before we delve too deeply into this question of the Earth's magnetic field, it is appropriate to note that two compensating charge effects are involved in an electrostatic sense, one seated in the Earth's body form and the other seated in the aether spinning within body Earth. Additionally, there is the factor that the aether spin is about an axis that does not share the precession of the Earth's spin. Here may lie the reason why the geomagnetic poles are at latitudes offset from the geographic poles by as much as 17° and why those geomagnetic poles move around the Earth at the 73° latitude in cycles of 960 years duration. In 1659 the magnetic declination at London, England was zero. By 1820 this declination had reached its maximum westerly of 24.5° and it reduced to 11° 52' W by 1933, the expectation being that it will be zero again in the year 2139.

So here you can see that something involved in setting up the Earth's magnetic field is moving within body Earth and changing its spin axis very slowly, a sure sign of something having a very large amount of angular momentum subjected to forces that cause the kind of precession one sees in a spinning top. This has to be a message which says the aether is there spinning within body Earth!

A great deal of effort has been expended by physicists in trying to prove or disprove claims concerning the source of the Earth's magnetic field. Some decry the idea of a magnet sitting in the Earth's core. The reason is that the shape of the Earth's magnetic field does not fit the dipole pattern. Some have argued also that the field cannot arise from an electric charge sharing the Earth's rotation, even allowing for some factor neutralizing its electrostatic action. Their reason is the same, the shape of the field as measured at the Earth's surface and in comparison with measurements at depths a few miles below the Earth's surface. None, however, seem to have factored into their analysis the simple fact that a distributed core charge of one polarity accompanied by a compensating surface charge of opposite polarity would combine to determine a magnetic field pattern that fits what is observed.

As to the magnitude of the field, we can calculate the geomagnetic moment involved, noting that whatever the component for the distributed core charge, the surface charge will set up double that in the reverse sense. The net magnetic moment in theory is, therefore, 1/2c times the electric charge velocity moment, or:

Here, R is the radius enclosing the charge of density  $\sigma_s$  and  $\omega$  is the angular velocity of its rate of spin.

Since the charge here is induced by aether spin we need to use the equation (8.9) to eliminate the charge density term and give a result dependent only on R and  $\omega$  plus two constant parameters of the aether. We then obtain:

which, since  $\sigma$  is e/d<sup>3</sup> and  $\Omega$  is c/2r, gives us our final formula for the magnetic moment induced by aether spin as:

Applying this to our Earth's aether, if deemed to spin at the same angular velocity as Earth itself, namely  $7.27 \times 10^{-5}$  rad/s, and if R is  $6.45 \times 10^8$  cm, we obtain a magnetic moment of  $7.86 \times 10^{25}$  in cgs emu. Now the corresponding value of the geomagnetic moment as estimated from measurement of the Earth's magnetic field is  $8.06 \times 10^{25}$  which is close to our theoretical value. If R were  $6.50 \times 10^8$  cm then the magnetic moment in these units would be  $8.17 \times 10^{25}$ .

I conclude from this that the Earth's magnetic field is generated by aether spin and that the aether sphere spinning with body Earth, albeit with its spin axis tilted with respect to that of Earth and there being precession causing the geomagnetic poles to move around the Earth's geographic poles. The Earth's radius is 6.38x10<sup>8</sup> cm and so its aether sphere extends a little way above the Earth's surface and this may have a role in accounting for the outer ionosphere layer of our upper atmosphere. As to the magnetic action involved, I see the primary induction as that of charge displacement in the aether which is matched by a balancing charge displacement in the matter constituting body Earth, but the latter charge providing the magnetic field and the aether charge having a passive role in that respect.

Such is my theory of geomagnetism, a theory which convinces me that the subject of 'aether spin', whether by entrainment with a rotating material body to so induce an electrically charged condition or by a spin action arising from the prior existence of a charged state, has a potential role in future energy technology.

Note that, whereas we needed to argue that the Earth's aether spin was bounded within the Earth's material radius in its primordial

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creation state, as evident from the k = 1 factor, we find that, upon consolidation and contraction to its ultimate form, it has come within the aether spin boundary. This seems a consistent picture and so, our final task in this chapter 8, is now to show how geomagnetism can tell us something about the space domain pattern on a universal scale.

For the record I can say that discovering the basis of aether spin and obtaining this result for the geomagnetic moment were very early achievements in my theoretical efforts. They date from the second half of the 1950s as one can verify by referring to my work entitled: *'The Theory of Gravitation'*, the preface of which is dated 22<sup>nd</sup> November, 1959. On page 32 of that work, under the heading 'The Calculation of the Geomagnetic Moment', one can see how the same numbers emerge from the same formulae as those introduced above. As there noted the results obtained suggested:

"... that the Earth's aether terminates at a mean height of about 140 miles above the Earth's surface. This suggests that the ionosphere may be a phenomenon arising at the aether boundary. It should be noted that it could be that the aether boundary is graded and occurs in stages , corresponding to different ionosphere levels. These levels are at mean altitudes of 45, 75, 105 and 155 miles respectively."

There was, in fact, one difference which affected the resulting numerical derivation, in that my analysis in that early work took account of the 23.5 degree tilt between the Earth's spin axis and the axis in space about which it precesses. Charge induction by aether spin is subject to a reducing factor, according to the cosine of any such angle of tilt, because the quon orbits of radius r are about an independent axis in space, which I assume is closer to that about which the planets orbit the sun than to the Earth's spin axis. This was factored into that earlier treatment of the subject, but is omitted here

to keep the presentation simple and avoid digression along tracks that are open to debate but do not affect the primary case presented.

The derivation of the geomagnetic moment by such a theory was, of course, enough for me to cry 'Eureka' at the time, nearly 50 years ago, but, as ever, the doctrine of the aether was the bugbear. When opportunity presented itself some ten and more years later, I was able to draw my theory to the attention of Sir Edward Bullard, who was a key contributor to the physics of geomagnetism. He had published papers on the theory of the origin of the Earth's magnetic field in terms of differential rotation of parts of the Earth's core and the theory of hydromagnetism that was of interest in the middle of the 20<sup>th</sup> century [E. C. Bullard et al., Phil. Trans. Roy. Soc., **243A**, 67-92 (1950)]. The only reaction I drew from that contact was his comment that my theory did not explain the magnetic moment of planet Mars.

Inevitably, you see, such contacts lead to one being side-tracked and diverted, with really no scope for recovery that addresses the main issue. Another such example was after my 1969 book: *'Physics without Einstein'* was published and led to a published reviewed by a scientist of the National Physical Laboratory in U.K. My theoretical derivation of the fine structure constant on page 115 of that work had given the result:

## $hc/2\pi e^2 = 137.038$

in agreement with what was previously of record as its measured value, whereas the latest consensus as to its experimental value had become a figure of 137.036. The tone of the review, though guarded, made me feel that it was thought my way of deriving this number was contrived to give a fit, rather than being good physics. Yet I had on page 111 introduced a section entitled: *Space Polarization Energy*', which was evidently a little speculative as to a term which enhanced r/d from its formal 'zero energy' aether structure value of 0.30289 to 0.30292 and a fine structure value of 137.036 requires, according to the formula given by the theory, equation (7.24), that r/d should be 0.302916, which might excuse my 'error' in relying on the

approximate value 0.30292. Happily, thanks to the intervention of Dr. D. M. Eagles and his employment at the National Standard Laboratory in Australia Measurement, the necessary fine-tuning of my theory owing to discovering a resonance that governed that space polarization energy duly emerged. It led to evaluation of that factor governing N in the decoding exercise introduced in this work and gave the required result for the fine structure constant. As to our final 'Eureka' of this pursuit to fathom the secrets of Creation, it concerns a theme I first wrote about in 1977 by a paper published in a little known periodical named 'Catastrophist Geology'. It appears in volume 2 at p. 42 and describes space domains and their correlation with geomagnetic field reversals and geological disturbances. Then, in 1980, I discussed the subject again at pp. 168-174 of my book: 'Physics Unified'. The following text is, for the most part, a replica of the account there presented. The 'Eureka' cry is warranted because, not only does the historical pattern of geomagnetic field reversals tell us that there is a cubic pattern in space dividing domain regions of interchanged charge polarities as between electrons and protons and aether continuum and quons, but it also gives us a measure the dimensions of those domains and the latter matches what we have deduced from the dynamics of the sun's creation.

I hope the reader will agree that, given evidence which shows the Earth's magnetic field has reversed, albeit over a period of a few thousand years owing to retardation as by induction of eddy currents in the Earth's core, and then retained its direction of polarization for a few hundred thousand years before flipping direction again, it is a very difficult proposition to justify by physical theory. One may then begin to think the unimaginable, namely that, for some reason, with the Earth maintaining its direction of rotation owing to its very high inertia, that positive electricity has become negative and negative electricity has become positive. Yet, even then, there will be those who argue that if source of an electrical action reverses polarity and so field direction the sensors indicating that field direction, being

electrical themselves, must reverse polarity too and so detect no change at all. Either way, however, there is another circumstance that can result in a reversal that would be sensed. This applies if, in moving from one space domain to the next, the quons and gravitons in keeping to the precise rhythm of their dynamic balance, happen to orbit clockwise in one domain and anticlockwise in the adjacent domain. This has the merit of explaining how, on a universal scale, the angular momentum overall can be in balance, as seems likely given that the domain structure condenses from a chaotic state that would have no overall rotary motion.

On this latter basis, the key factor governing geomagnetic field reversal is the sustained direction of spin of the Earth and its entrapped aether, regardless of domain boundary transit. Then, since charge polarity induced by aether spin reverses with the change direction of  $\Omega$ , we would surely have a geomagnetic field reversal at each domain boundary crossing.

Although it is convenient to assume that the space domains all have the same size so as to fit together well in a cubic pattern, this may not be the case but we will make the assumption nevertheless. If each domain gives birth at Creation to a single star or a binary star pair, then the size of stars ought really to be more uniform than appears. However, much depends upon the energy in surplus in each domain and so available to create matter, those protons and electrons that form hydrogen. More critical, so far as uniformity of domain size is concerned, is the resulting angular momentum acquired by a star at birth.

The key parameter here is that factor S in equation (8.7), the ratio of the angular momentum of a star to its mass. Constant space domain size means that this quantity must be constant, which in turn, for a star which has not shed any planets, means, from equation (8.13), a fixed ratio of mass/radius. However, a likely scenario affecting most distant stars is that there will be planets, in spite of our difficulty in detecting their existence. Accordingly, there is little point in trying to

compare such data but, for what it is worth, let us take an extreme example of a red giant star. Betelgeuse is said by Jeans ['*The Stars in their Courses*', Cambridge University Press, p. 92 (1931)] to be about 40 times as massive as the Sun and to occupy 25,000,000 times as much volume. The mass/radius parameter is 0.137 compared with the sun and the value of D given by (8.7), the radius dimension of the space domain in which Betelgeuse was created, would on this basis be 0.37 of that applicable to our Sun at creation. However, a red giant is believed to be the decaying form of a star, rather than the form it may have had upon initial creation. Since the majority of stars are similar to the Sun, we can, therefore, expect a reasonablyrepresentative pattern of geomagnetic field reversals to emerge from the choice of a simple cubic structured simple domain system.

As the reader can see, those who theorize about stars and their creation, the cosmologists, have plenty of scope for research without imagining the Big Bang scenario, but they do need to get a better grasp of the physics which underlies the phenomena we observe here on Earth and within our solar system. Deciphering the secrets which determine the numerical parameters that physicists measure, often with incredible precision, is a pursuit which surely cannot be ignored, given that it can lead us along paths such as we are exploring here in relation to geomagnetic field reversals.

If the domain cube dimension were to be such that its volume is that of a sphere having the radius of 480 light years estimated from the Sun's data, or 780 light years as that of a cube matched to the volume of the assumed domain sphere in the earlier calculation, then, at its cosmic speed of the order of 390 km/s, our Earth would cross a domain boundary every 600,000 years or so if moving parallel with a cube side. That U-2 speed measurement was, however, subject to an uncertainty factor of 60 km/s and so a reversal period of the order of 700,000 years is consistent with the Sun's data. In general, however, the motion will be inclined to such an axis and the planes separating domain boundaries will be crossed more frequently than this.

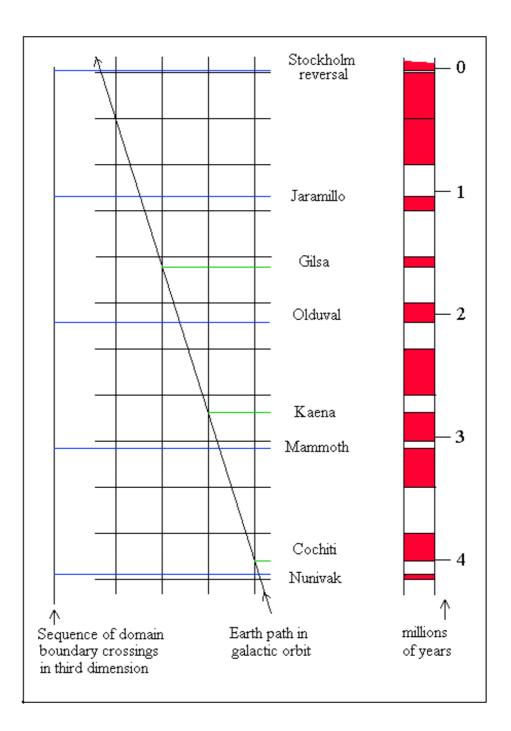
In Fig. 8.3 the hypothetical pattern of reversals due to motion through cubic domain space is shown in a time scale measured in millions of years before the present time. The solar system is imagined to move in a straight line through the domain space over this period of time, though it does move in a slight arc owing to its galactic motion. The inclination of the line with the domain cube axes is chosen deliberately to give results which resemble the observed reversal sequence and the time scale has been matched accordingly. The names assigned to the reversals are those used conventionally to designate these events. There is a reasonably close correlation. The interesting result, however, is that such an erratic pattern of events lends itself to decoding in this way. I believe that this is affirmative support for the domain theory suggested, especially as the size of the domains derived from the empirical data fit is in close accord with that calculated for the Sun.

A textbook showing the Earth's magnetic field reversal pattern over the past four million years is one by D. H. Tarling and M. P. Tarling ['*Continental Drift*', Bell, London, pp. 52 and 66 (1971)]. They also comment on the rather perplexing evidence which shows that fossil species have disappeared at times of reversal and new species have appeared shortly thereafter. This implies that the geomagnetic field reversal was accompanied by a rather more traumatic event.

Reporting on documentary evidence gleaned from the deepsea floor of the Indian Ocean, the Science Correspondent of the U.K. newspaper 'The Times' wrote in 1972:

".... tiny metallic and glass beads that originated from outer space were fragments from some great cosmic catastrophe that caused molten particles to splash into the upper atmosphere some 700,000 years ago. The shower

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# Fig. 8.3

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of debris coincided with the last reversal of the Earth's magnetic field."

The reader will notice that Fig. 8.3 shows a recent reversal of the geomagnetic field. The above report and the Tarling book both suggest that the last reversal was 700,000 years ago. If this were true then another reversal would be imminent on the time scale used in Fig. 8.3. However, since these reports were written, evidence of a reversal about 12,000 years ago, a very short-lived reversal, has emerged. This fits very well with the empirical evidence in Fig. 8.3, which shows a near crossing of a cube domain edge, meaning two reversals in rapid succession. I was unaware of the latest discovery when outlining this domain theory at the end of my book *'Modern Aether Science'*, published early in 1972. The fact that we have had a magnetic reversal in relatively recent times is reassuring if such events are accompanied by cosmic upheavals. One may well wonder whether catastrophic geological events can be traced to this recent period.

On a longer time scale it is interesting to consider the circuital motion of the solar system in its galactic cycle and contemplate the fact that the Earth would cross the domain boundaries at different angles of incidence with a four-fold periodicity per galactic cycle. If, as my theory indicates, the gravitational field between matter in the Earth is disturbed when the domain boundaries are traversed, the faster the crossing, the less this disturbance. The crossing will be most rapid when the Earth approaches the boundary in the normal direction. If it approaches a boundary at a low angle it will take much longer to traverse it. Indeed, it seems statistically possible for an approach to be at such a low angle that the Earth could disintegrate on reaching the domain boundary. The probability is very small but it is a consequence of this theory and one might wonder whether the asteroids really originated in a planet broken up in this way.

These ideas are rather speculative but they take encouragement from the researches of J. Steiner [Jour. Geol. Soc. Australia, **14**, 99 (1967)], who did, in fact, visit me in England to discuss my theory

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several years ago after becoming aware of my book: 'Modern Aether Science'. He has made an extensive study of the possible correlation between geological events and the galactic motion and concluded that the constant of gravitation G may, in some way, depend upon the period in the galactic cycle. The theoretical interpretation of such data is difficult in view of the uncertainty in the present state of cosmological theory, particularly so far as concerns variation of G. The problem is further confused by the expanding Earth hypothesis which is dependent upon a slowly varying G. Yet Einstein's theory hardly permits G to vary and my theory as presented in this work requires G to be as constant as the charge-mass ratio of the electron. One feels that if the latter were to change then all other parameters, such as speed of light and the dimensions of the aether quon lattice structure, would change as well. I therefore favour the supposition that G is constant but only acts between matter within the confines of a common space domain. This renders G effectively dependent upon the close proximity of a domain boundary as far as geological events are concerned and seems to offer scope for relating geological events and galactic motion. Reverting, therefore, to the statement above that there would be a four-fold periodicity of gravitational upset in the galactic cycle, given the space domain picture, I draw attention to another of Steiner's papers [Geology, p.89 (1973)] in which he writes:

"If Phanerozoic geological history incorporates any periodicities, they are of the order of 60 or perhaps 70 million years .... The galactic periodicity of the solar system is, however, approximately 274 million years, representing the length of the cosmic year, or one revolution around the galactic centre."

I see this as a message which says that space itself has a cubic structure and have in mind a circular orbit traversed by the solar system which cuts across space domain boundaries almost tangentially four times per revolution and so results in tremendous gravitational upheavals in body Earth. A crossing normal to the space domain

boundary would be about a half a minute in duration, certainly enough to leave a trace in geological history, but the crossings that occur at very acute angles some four times per galactic cycle could be of several minutes duration and the loss of gravity between matter temporarily astride the boundary would be devastating at such times.

Can you wonder, therefore, if I am slightly amused when those knowledgeable on such matters declare with confidence that dinosaurs became extinct some 70 or so million years ago owing to our Earth suffering impact from a large asteroid at about that time? Doomsday, or rather the next doomsday, at least for mankind, may be a game of chance encounter with an asteroid but if we want to predict how far away we are from certain extinction then future generations of cosmologists need to map those space domains and chart our motion to predict when and at what angle we are due to cross those boundaries as we progress along our collision course. My guess, from Fig. 8.3, is that we are safe for about 300,000 years, but only if there was, in fact, a boundary crossing some 12,000 years ago.

That said, one could speculate concerning the long-term future of our Earth as it is transported through the vastness of space, riding, as it were, on the back of our Sun, a star that itself will surely have an eventual encounter ending in its demise, possibly as an event we call a 'supernova'. To be sure, when our Sun explodes in such a way, our Earth will become nothing other than a multitude of energetic particles dissolved into and then swallowed by the all-pervading aether.

Our speculation, however, has purpose because astrophysicists do witness such rare events from a very far distance and ponder over the data that they collect, looking for inspiration to guide their curiosity into the creative and destructive forces that prevail in our universe.

Such data includes evidence which points to the debris of stellar destruction by creating what they believe are 'neutron stars', stars that are minute in size, when compared with a normal star, yet having an enormous mass density. So we shall now engage in a brief journey of

exploration as we probe the structure of such stars and seek to understand how they are created.

## Neutrons, Neutron Stars and the Aether

Physicists in general are indoctrinated into the belief that neutrons exist in atoms in order to account for the imbalance of charge and mass of the atomic nucleus, the Z and A parameters. For the basic hydrogen atom, which has a proton as its nucleus, Z = A = 1. For all other atoms A is greater than Z and so these atoms are deemed to contain A-Z neutrons. Yet one surely must wonder why such higher order atoms cannot be conceived as having a charge of Z units nucleated by a core of small mass but centred within a system of A neutrons, the latter being protons or anti-protons that are rendered neutral by displacing charges normally occupying sites in the aether.

However, as atomic theory developed with the discovery of the neutron, physicists were led to believe that the aether is a pre-20th century notion that became unnecessary once Einstein introduced his four-dimensional mathematical portrayal of 'space-time'. This was even though the curvature of 'space-time' was deemed to account for gravity but yet could not bring the long-sought unification as between gravitation and electrodynamics, nor account for the quantitative value of G, the constant of gravitation, in terms of, for example, the charge/mass ratio of the electron or proton.

Now, sitting between these two problems, that of the neutron and that of the aether, there is, as it were, neutral ground, which might offer a decisive insight into this author's completely opposite perception that neutrons, as distinct from protons or anti-protons, do not exist within atoms, but that the aether does exist and is needed to explain gravitation and provide field unification as between electrical interaction and gravitation.

Here I am assuming that some physicists, and particularly astrophysicists, who have glanced through the preceding chapters of this work, will have the neutron in mind and be reluctant to accept that I can jettison the notion of a neutron as something having a real existence in atoms, given also their insight into the discovery of what they term 'neutron stars'.

Accordingly, the issue now to be addressed is the question: "Do neutron stars really exist and if so what form does the so-called neutron assume in such a star?"

This is a truly fascinating question, given the mounting evidence from astrophysics that stars do exist which have enormous mass densities as if the mass of a normal star is squeezed into a very small volume of space.

I persist in contending that neutrons, as particles distinct from protons, do not exist in atomic structure and my reason, simply, is that what atomic physicists presume to be neutrons are really anti-protons that have unseated and replaced quons in a region of aether occupied by the atomic nucleus. The hydrogen atom is special. It comprises, in A = 1 form a proton having a satellite electron. In A = 2 and A =3 forms it comprises a deuteron or triton, respectively, along with a satellite electron, the deuteron and triton being rather special particles comprising protons bonded by an electron-positron accompaniment, as discussed elsewhere. See the paper entitled: 'The Theoretical Nature of the Neutron and the Deuteron', Hadronic Journal, v. 9, pp. 129-136 (1986), also reproduced as Paper No. 1 in the Appendix of my book: 'Aether Science Papers', published in 1996. See also my Energy Science Report No. 5, 'Power from Water: Cold Fusion: Part I', 26 April 1994, which discusses the creation of the triton. These items are all of record on my website www.aspden.org.

For atoms other than hydrogen, the physics of their creation has involved transit across a space domain boundary, owing to the motion of a star through space by which it leaves the domain of its birth and so moves into an adjacent space domain in which the charge polarities of the aether components are reversed. In adapting to this new domain environment, a small proportion of the protons that have been created to form the star can become seated in aether sites normally occupied by the quons. Owing to the electrically-neutralizing effect of the aether charge continuum they then exhibit the properties that we

ascribe to the neutron as an atomic constituent. The charged nucleus central to such groups of neutrons is formed from the merger of electrons, made possible during the space domain transit phase owing to the charge polarity inversion that features in the transition between what is, in effect, a region of matter and anti-matter or aether and anti-aether, a process by which they are converted into a merged positron form of charge Z times the unitary charge e.

The message here is that atoms of higher order than hydrogen are probably created over time as a star traverses space domain boundaries every few hundred thousand years or so, a subject discussed in the previous section of this chapter. Certainly also such atoms of higher order than hydrogen do not contain protons that are free from aether structure. The protons, or rather their anti-particle form, the anti-protons, that exist in such atomic nuclei are locked into the aether structure and indeed nucleate a unit of aether that can move through enveloping aether, each such proton contributing in effect to the atomic weight of the atom in proportion to the quantity A of nucleons that are deemed to be present with a quite small mass contribution from the charged composite positron charge of Z units.

This argument as to atomic structure is well supported by the author's analysis dating from 1974 and published under the title 'The Chain Structure of the Nucleus', also of record on my website: <u>www.aspden.org</u>. However, it is mentioned here solely because we are considering what is meant by a 'neutron' and are about to engage in a discussion of the composition of what is termed a 'neutron star'.

So, by way of summary, I have, in earlier chapters of this work, introduced the notion that the aether is composed of charged particles which I have called 'quons', these being set in a cubic structured array, owing to their mutual electrostatic repulsion, within a uniform continuum of opposite charge polarity, whereby the aether is electrically neutral overall. This is the defining structure of the aether, but there are other particles, particle-antiparticle pairs of charges, present, the gravitons, the taons and the muons, which make the aether an omnipresent sea of activity, seething with energy, but yet

somehow preserving an internal equilibrium and contriving to avoid detection, except by indirect, but very important intrusion into the physical world as we know it.

So how do I approach the problem posed by the 'neutron star'? Well, one can see that those quons defining the structure of the aether itself are, so far as we are aware, hiding as electrically neutral entities in that neutralizing background continuum and their mass effect in a gravitational sense is absorbed by the equilibrium of the aether so far as concerns its interaction with the mass of any matter present. However, the point I am coming to, be it a wild suggestion or not, but it surely being one worth exploring, given evidence that stars having enormous mass densities seem to have a real existence, is the suggestion that maybe a normal star, in contending with an excess of spin energy, can collapse into a form nucleated by a region of aether in which protons unseat and replace all the quons, so creating a very dense star in mass terms.

At least this possibility warrants consideration, first in quantitative terms to see if the results fit with what is observed, and then in qualitative terms to see if we can provide a physical account of how this rare event in stellar evolution might occur. As we shall see, we encounter a quite extraordinary situation, because the factors governing gravity as we know it are severely affected. Yet, here again, thanks to the author's independent research on a theme not directly related to astrophysics but what is primarily a technological issue, there is insight which guides our enquiry.

Here I refer to the subject of high temperature superconductivity as a pointer to the existence of the 'supergraviton' as needed to provide dynamic balance for atomic molecules that are of high mass or even certain atoms at the upper end of the atomic mass scale. This has been the subject of work published elsewhere: 'The Supergraviton and its Technological Connection', Speculations in Science and Technology, v. 12, pp. 179-186 (1989). This paper is also of record on my website <u>www.aspden.org</u>. The key point is that the gravitons present in association with a highly concentrated mass in matter form

must themselves have high enough mass and be close enough to provide that dynamic balance by a close direct coupling with matter. The optimum state is one where these gravitons, though present in equal numbers in positive and negative electrical charge form, are not so prevalent or are such as to distort the aether from its normal state of equilibrium, that form in which it determines the values of the fundamental dimensionless physical constants on a universal scale. However, where exceptional conditions prevail and matter finds itself compacted to very high mass densities, then the aether is subject to some distortion but it will strive to adapt and must keep that dynamic balance that is the basis of gravitational action.

Under such circumstances where matter is present in very highly concentrated mass form, the optimum energy equilibrium conditions favour the creation of a form of graviton that has a much higher gravitational effect than provided by the g-graviton or the  $\tau$ graviton. It follows therefore that we must expect to encounter a gravitational anomaly if we seek to understand the state of a star which, from the evidence of astronomical observation, exhibits a very high mass density.

It is appropriate here to note that the theory by which we have in this work explained the creation of our Sun and Earth, is based on an aether that has been shown to have a mass density that is some 200 times that of the Sun, half being in the quon constituent of the quantum underworld and half being in its graviton constituent. We are about to embark on a discussion of the 'neutron star' for which the evidence of observation is said to indicate a mass density that is so enormous that it dwarfs the mass density of the aether we are considering.

Indeed, in seeking here to discuss the 'neutron star' we entering a realm of orthodox physics that loses sight of reality and introduces notions that are manifestly absurd. Any clear-headed reader will surely see that the following statement quoted from a news item on p. 3 of the July 2003 issue of *Physics World*, the monthly journal issued to members of the U.K. Institute of Physics, contains a message that cannot possibly be valid:

"Isolated neutron stars are highly magnetized, rapidly rotating objects that are formed by the collapse of massive stars. Although they are typically only about 10 km across, neutron stars are at least 40% heavier than the Sun and their core density is higher than that of an atomic nucleus."

One is tempted to ask in expletive form: "How on Earth can the core density be higher than that of an atomic nucleus?", but know the answer will be: "We are not talking about anything experienced on Earth!" Instead, one must surely ask: "Without an understanding of the true nature of the force of gravity what justification can there be for assuming that G is the same regardless of the mass density of the interacting matter involved?" If the answer to that is: "Isaac Newton proved that G is a universal constant and so it must apply to neutron stars" then I say it is time to wake up and think again.

Surely, once we begin to think that the evidence from a gravitational effect points to a source that is of higher mass density than the atomic nucleus, we ought to suspect that G, as a factor governing gravitational interaction, has itself increased in value and misled us by giving far too high a v alue for the measure of the mass density.

## Can G be Greater in a Neutron Star?

Since this work offers an insight into what governs G, the force of gravity, let us ask how the aether might react (a) if it has to balance a system of protons taking up a full occupancy of the quon sites and (b) if, instead of the heavy leptons serving the graviton role, we substitute the very prevalent muon as the only alternative available.

Now, before proceeding any further, I must make the point that, for a neutron star to have a mass of the same order as that of our Sun, whilst having a radius that is of the order of 10 km, it would need to

have a mass density that is greater than that of the Sun by a factor in excess of  $3x10^{14}$  and a mass density close to  $5x10^{14}$  gm/cc. Then, in adhering to my belief in the aether theory presented in this work, I need to compare this with the mass density of the aether corresponding to its total energy density and almost wholly seated in the pair of virtual muons that populate each cubic cell of aether, this mass density having the limiting value which is less than  $4x10^{6}$  gm/cc. Note that these virtual muon pairs already exist in the aether and so, in adopting the role of the graviton, any distortion will be minimal especially in terms of energy adjustment.

Going further and presuming that the creation of the neutron star will involve decay of numerous protons which revert to the muon form from which they were created, one can see that there could well be enough muons available to fill the needed super-gravitational role posed by very dense matter. However, here we confront the limiting mass density imposed by that proton occupancy of the quon sites in the aether and this mass density is the proton-electron mass ratio 1836 times 24.52 times the graviton-coupled quon mass density of 144 gm/cc. The factor 24.52 is the mass of the electron in terms of the effective dynamic mass of the quon, the latter being half of the cube root of that fundamental factor N of 1843 discussed earlier in this work, it being the volume of a sphere of charge constituting the quon as divided by the charge volume of the electron. This mass density is therefore some  $6.48 \times 10^6$  gm/cc, a value in no way comparable with the astrophysicist's standard assumption concerning the mass density of the neutron star.

You will see from this that my vision of the aether can in no way support the belief that the neutron star has the very high mass density that is claimed on the basis of observation. By 'observation' here I mean the inferences drawn from observation as based on that unproven assumption that G, the constant of gravitation, is a universal constant that applies within the very dense matter of a neutron star.

I would rather be prepared for G to be different under such circumstances and contend that those virtual muons can replace

gravitons and that the mass density of a neutron star is no more than that value of  $6.48 \times 10^6$  gm/cc just derived. Note that this is  $4.6 \times 10^6$ times the mass density of our Sun, a typical star composed of hydrogen gas nucleated by protons that can move freely in the aether.

Now, as to G and the possibility that it can become greatly enhanced in value by those virtual muons assuming the graviton role, we are here looking at a lepton form that has a charge volume some 14,769 times greater than the g-graviton and a mass that is 0.0407 times that of the g-graviton. To check this, keep in mind the derivation of g as 5062.3 from equation (2.6) in chapter 2 and the derivation of the energy quantum 412.6658 as that of a virtual muon pair from equation (7.29) in chapter 7. Then cube the mass-ratio 5062.3/206.33 and evaluate 206.33/5062.3. The ratio is  $3.62 \times 10^5$  but is subject to a one third factor (corresponding to the factors involved in deriving equation (2.3) in chapter 2), modifying it to  $1.21 \times 10^5$  and this has to be squared to derive the scaling factor for G itself. So you see, G within the neutron star will be greater than the normal value here on Earth by a factor of some  $1.46 \times 10^{10}$ .

The new combination of G and the star's mass density  $\rho$  come into play when a normal star such as the Sun traverses a space domain boundary at an extremely acute angle, a very rare event which means that the stellar body sits astride the boundary for a period long enough to create the mayhem in which the protons of the normal star displace aether quons and so form the nucleus we call a neutron star. During this process the energy of the star is conserved, which means preservation of the magnitude of the quantity:

3GM<sup>2</sup>/5R .....(8.19)

or:

 $(4\pi\rho)^2 GR^5/15$  .....(8.20)

as both  $\rho$  and G adjust to the new values.

Evidently R changes in this process and even M changes but our primary consideration is the conservation of the energy that characterizes the creation of the original star, inasmuch as during this period of violent activity as the star sits astride the boundary between two space domains, a boundary across which charge polarity reverses, particles of matter, even protons, have independent existence and can conserve mass-energy by being transmuted into other forms, reverting to the virtual muon state from which they were created.

Expression (8.20) simply tells us that R has reduced by a factor that is the fifth root of the amount by which  $G\rho^2$  has increased, the inverse of the fifth root of  $(4.6 \times 10^6)^2 (1.46 \times 10^{10})$  so that R is reduced from its parent star radius by a factor of  $4.99 \times 10^4$ . Taking the Sun as typical of the star which undergoes this transmutation into a neutron star, we can now estimate the radius of the neutron star as being of the order of 14 km, the Sun having a radius close to 700,000 km.

Our theory therefore does provide a way of estimating the size of a neutron star that conforms with observational data.

## A Comparison with Standard Theory

According to standard theory neutron stars are formed when the degenerate core of an aging supergiant star nears the Chandrasekhar limit and collapses. Supposedly, a neutron star of 1.4 solar-mass units, consists of some 10<sup>57</sup> neutrons held together by gravity and supported by 'neutron degeneracy pressure'.

In explaining this, Carroll and Ostlie in their book '*An Introduction to Modern Astrophysics*', published in 1996 (Addison-Wesley), derive a formula for the radius of the neutron star at p. 598, based on theory analogous to that applicable to a white dwarf star, of which they say:

"For a neutron star of 1.4 solar-mass units, this yields a value of  $4.4 \times 10^5$  cm. As was found for white dwarfs, this estimate is too small by a factor of about 3. That is, the actual radius of a 1.4 solar-mass neutron star lies roughly between 10 and 15 km. As will be seen, there are many uncertainties involved in the construction of a model neutron star."

Well, here you see what standard theory has to offer. It lacks the benefit of insight into the true nature of gravitation and imagines that neutrons exist as some kind of gas, without explaining how they emerge by 'degeneration' from the hydrogen of a normal star, and the result is an estimated physical size that is of the order of one thirtieth of the volume of a neutron star actually observed.

My theory has led directly and unambiguously to a 14 km radius that conforms with observation. My theory does not rely on the mere speculation that, given the discovery of the 'free' neutron by James Chadwick in 1932, it was feasible to imagine that such 'free' neutrons could coalesce to form a neutron star. Instead I have explained the true nature of gravitation and derived the correct value of G by pure theory based on an aether sub-structure and, after showing how protons are produced, have explored whether those protons might, under certain circumstances, become seated in the aether and so exhibit the property we regard as that of the neutron.

Accordingly, far from it being a weakness of my theory that I discard the notion of neutrons as being present in atoms having a Z value greater than 1 in spite of the evidence pointing to the existence of a neutron star, I claim a better understanding of the composition and structure of such stars than is available from standard theory presently of record. Conversely, in the light of this account of the 'neutron' star, I see this as strengthening the basis on which I have, in that 1974 reference above, explained the atomic structure of atoms of Z value greater than 1, those purportedly containing neutrons. Indeed, in a sense, I could say that a neutron star is, in effect, an enormous atom, so far as its internal structure is concerned.

I go further in my own speculations by suggesting that any normal hydrogen star can, if it happens to traverse a space domain boundary at a very acute angle, experience the traumatic upheaval of its protons sitting astride a boundary between space and anti-space in the sense of charge polarity inversion, a clear recipe for decay shedding an enormous amount of energy in what surely is a supernova. The geological evidence of recurrence of gravitational upset for a few seconds as body Earth along with the Sun traverse a space domain boundary at a cosmic speed of some 300-400 km/s in a direction at right angles to that boundary is surely enough to point the finger at this scenario of stellar evolution, without delving into theory as to how stars might evolve as they shed their energy slowly over time in the form of thermal radiation powered by nuclear transmutation.

Keep in mind that stars were created, each in its own space domain, rather than at a common point in an event called a 'Big Bang'. They radiate energy but that energy is absorbed into the aether and the aether has a way of regenerating matter from that energy, protons and electrons which inevitably are drawn into the stars by gravity. Therefore, in developing theory as to how stars evolve one should factor into the analysis those space domain crossings which are a matter of life and death where stars are concerned.

## The Magnetic Field of a Neutron Star

It is a curious fact that astrophysicists see no problem in declaring that a neutron star has a very powerful magnetic field but yet is composed of particles that are neutral in electric polarity. Here in this work, however, we have seen why our Sun, owing to its composition of hydrogen atoms squeezed closely together by the action of gravity, has developed a state of ionization by which enough of those atoms shed electrons to leave electrically charged protons in a free state. Their stronger mutual rate of acceleration under gravitational attraction pulls them more closely together than their associated free electrons and so the sun has a positively charged core sitting within a spherical bounding shell of negative charge. This, as we have also seen, is a recipe for inducing aether spin as the whole body of aether bounded within that same shell is caused to rotate to set up a compensating charge displacement.

The mathematical analysis involved revealed that  $G\rho^2$  was a measure of the charge thereby neutralized by aether spin, but,

conversely, should, for some reason, there be already a body of aether that has been set rotating, the matter sitting within it not acting as the primary charge causing that rotation, then aether rotation itself could become the primary action with charge induction in matter becoming the secondary effect.

You will see here that I am picturing a situation just discussed where the protons of the normal star are somehow replaced by neutrons and looking for a basis on which to infer that the neutron star can set up a magnetic field owing to it sharing the spin of the coextensive aether.

If those protons are seen as anti-protons once they enter the new space domain and so can unseat and replace quons in the aether, then they will appear electrically neutral. Although their mass is far greater than the quon mass that need not unduly distort the aether in a dynamic sense so far as affecting the quantum-related aether radius parameter r within that neutron star body, because of the synchronizing constraints asserted by the powerful electrostatic interaction prevailing within the relevant space domain. This assures that aether rotation must develop a magnetic field in a neutron star, just as it does in a normal hydrogen star in which electrons neutralize the action of almost all of the protons present.

Already we have deduced a typical radius value for the neutron star based on application of the aether theory advanced in this work. Also for that typical neutron star we have deduced by theory the amount by which that quantity  $G\rho^2$  exceeds the value normal for a star such as the Sun. This is all we need to derive an estimate of the magnetic field set up by a neutron star in its surface regions, as based on data for the Sun.

However, owing to various factors, including sun spot activity, taking the Sun as a basis of reference for this computation, though possibly sufficient as an approximation, is not as reliable as an estimate based on the data we have for our Earth's geomagnetic properties. So, taking Earth, which has a magnetic field strength of the order of 0.5 gauss at its surface, an aether radius slightly larger

than its actual equatorial radius of 6,378 km, a mean mass density of 5.5 gm/cc and an angular velocity of  $7.27 \times 10^{-5}$  rad/s, as the basis of reference, we should be able to estimate the magnetic field at the surface of a neutron star.

Take note that, in the system of units we are using , the magnetic field of a spherical object can be estimated, given knowledge of its magnetic moment, by dividing that magnetic moment by the volume of the object and multiplying by the factor  $4\pi$ . This assumes that the magnetic field within the sphere is uniform. In fact, as applied to the Earth, the history of physics records that the greatest step forward in terrestrial magnetism was made by Gauss in a memoir entitled *'Allgemeine Theorie des Erdmagntismus'* dated 1839, in which Gauss calculated the positions of the Earth's north and south poles and estimated its magnetic moment as  $0.33R^3$ , where R is Earth radius. This corresponds to a magnetic moment of 0.08 per unit volume and, multiplying this by  $4\pi$  indicates a mean magnetic field within body Earth of about 1 gauss, whereas we know that the field strength over much of the Earth's surface, as directed along lines that dip at an angle with respect to the horizontal, is closer to 0.5 gauss.

Now, remembering the Schuster-Wilson hypothesis introduced earlier in this chapter, the magnetic moment of a spherical astronomical body of radius R spinning about an axis through its centre is proportional to  $G^{1/2}\rho$  times its rate of rotation  $\omega$  times R<sup>5</sup>. This means that the magnetic field of that body is proportional to  $G^{1/2}\rho\omega R^2$ .

So, for the above estimate of the physical size of a neutron star, a 14 km radius based on the assumption that the source star from which it forms is similar to our Sun and in forming the neutron star deploys energy equivalent in magnitude to all of its gravitational potential energy, we can estimate the factor by which R changes. It is 14/6500 or  $2.13 \times 10^{-3}$  based on Earth's aether having a radius estimated as being 6,500 km. We know the factor by which G changes. It is  $1.46 \times 10^{10}$ , as was shown above. As to  $\rho$ , this is the quantity  $6.48 \times 10^{6}$  gm/cc as divided by 5.5 gm/cc, a factor of  $1.18 \times 10^{6}$ ,

and this then leaves us with the task of estimating the factor by which  $\omega$  changes.

Now, unfortunately, I have not, as yet, seen a way of deducing theoretically the rate of spin of the neutron star formed by the collapse of the source star, as otherwise this theory of neutron star formation would have been included in the earlier first draft edition of this work. Fortunately, however, in June 2003 it was reported in the journal *Nature* (v. 423, pp. 725-727) that both the speed of rotation and the magnetic field of a neutron star had been measured. That news item already mentioned as being at p. 3 of the July, 2003 issue of *Physics World* declared that this was the first ever measurement of the magnetic field of a neutron star and, concerning the measured field of  $8 \times 10^{10}$  gauss, the onward report at pages 27 to 30 of the September, 2003 issue of that same periodical declared:

"Although huge by terrestrial standards, this is much lower than expected, and the discrepancy is still not understood."

This being the first reported measurement of the magnetic field of a neutron star, it is therefore very opportune and indeed very gratifying to find that this author's analysis does explain the magnetic field both quantitatively and qualitatively.

The period of the star was stated as being 0.42413076 s, thereby giving  $\omega$  as 14.8 rad/s, whereas the magnetic field strength measured was said to be as high as  $8 \times 10^{10}$  gauss. The neutron star factor by which  $\omega$  scales in relation to that of Earth is, therefore, 14.8 divided by  $7.27 \times 10^{-5}$  or  $2.04 \times 10^{5}$ .

Collecting the various factors together to evaluate the magnetic field of the neutron star using the overall scaling factor  $G^{1/2}\rho\omega R^2$ , we obtain:

 $(1.46 \times 10^{10})^{\frac{1}{2}}(1.18 \times 10^{6})(2.04 \times 10^{5})(2.13 \times 10^{-3})^{2}$  which, upon evaluation, is  $13.2 \times 10^{10}$ . This is the factor by which we estimate the magnetic field of the neutron star to exceed that of body Earth. Now, the  $8 \times 10^{10}$  gauss measurement of the neutron star's

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magnetic field was based on cyclotron resonance of electrons close to its surface and so, if we were to relate this to an Earth measurement of magnetic field strength of 0.6 gauss, we have the truly astonishing result that a neutron star magnetic field some hundred billion times the strength of the field here on Earth has been fully explained by the aether theory of record in the earlier draft edition of this work and elsewhere in the author's other publications before that measurement was reported in the science literature.

So you see, we have here an account of the properties of a neutron star, based on a theory which does not admit the existence of neutrons as having a stable existence in matter, whether that matter be an isolated atom or a stellar body. We are looking instead at the notion that protons or antiprotons exist in such matter but to appear as stable electrically neutral particles such protons or antiprotons have to displace like-polarity charges in the structural underworld of the aether, as evidenced by the so-called 'neutron star'. As to the free but short-lived form of neutron detected in the experiments of high-energy physics, that has already been fully explained by this author elsewhere. See that reference above in this section to the paper entitled: 'The Theoretical Nature of the Neutron and the Deuteron', Hadronic Journal, v. 9, pp. 129-136 (1986), where one has of record the full theoretical derivation of its mass, its magnetic moment and is mean lifetime, all in terms of the aether parameters as derived in this work.

What is particularly satisfying from my point of view, as author, is that the extension of the theory to account for the neutron star has added weight to the argument that indeed there are space domain boundaries built into the underworld space fabric of our universe, as otherwise it would be far too speculative to devise a reason why a normal star might suddenly collapse to form a neutron star. It was intuition that set me on course to the belief that space domains might exist, but intuition born some 50 years before writing these words, a time when I was engaged on researching the magnetic energy properties of iron in relation to anomalous activity in what is a

crystalline substance containing within each crystal a pattern of magnetic domains bounded by planar domain walls.

Apart from one further comment, this completes the main thrust of what I have to say on this subject and on the aether in particular. That comment is the reiteration that, whereas I have suggested that atoms of higher order than hydrogen are created during the traversals of space domain boundaries by normal hydrogen stars shedding protons which take up quon sites in sectors of aether that become locked into the structure of the newly formed atomic nucleus, there is the very rare occasion when the action escalates to the point where what emerges is a truly enormous heavy atom in the form of a neutron star.

What remains now in the next chapter is the need to collect together certain loose ends and, in particular, clarify where electrodynamic action fits into the physics of Creation. Hopefully, however, enough has already been said to satisfy the reader that our decoding exercise is complete, or at least sufficiently complete to meet our set objectives. Whether what has been said will cause cosmologists to alter course in their theory concerning the Big Bang scenario remains to be seen. It will, I am sure, take some time, but at least I have done my best in presenting the case against that belief and the best I can hope for is that those who read this work will begin to understand what is implied by the word 'Creation'.

# **CHAPTER 9**

# General Discussion

### Introduction

Having outlined what I regard as the physics of Creation by concentrating on the essential foundations and features of the theory, there remains much that now needs discussion, particularly as a result of the author having confronted a problem in the theory as originally developed. That problem is at the very heart of the theory of gravitation where it is unified with the physics we associate with electricity and magnetism.

As readers have seen, the theoretical derivation of G, the constant of gravitation, has been based on gravitation being an electrostatic phenomenon arising from the displacement of charge of density  $\sigma$  from space taken up by the gravitons needed to provide the dynamic balance for the mass of matter which thereby experiences gravitational attraction. The self-repulsion of  $\sigma$  means that holes in it will be attracted to one another and, by their coupling with matter, rendering matter self-attractive and so establishing the phenomenon of gravitation.

In the author's earlier theory, the conventional assumption was made that gravitation had to be unified with electromagnetic action, but such assumption must fail for the reason now to be explained in the first part of the following discussion.

Though much of this chapter will be devoted to discussion of several other topics of interest peripheral to the main theme already covered, there is also need to give special attention to an important issue of technological importance. This probably

warrants a book of its own, but it is so diverse in character and is ever evolving, besides lacking in academic recognition, that it seems best to mention it but briefly in this final discussion section rather than give it a chapter or two of its own. I refer here to the prospect of our being able, as it were, to mimic some of the creative forces in Nature by tapping into the energy resource of the aether in an effort to extract energy which we can use to replace our dwindling oil and gas reserves.

This, therefore, is the scope of this chapter 9 and it is hoped the reader will find it of interest, whilst appreciating that it is no easy task to find that my study of electrodynamics, as motivated by the desire to forge the connection with gravitation, though having spin-off pointing to new energy technology, has, in the process, failed on the gravity front. Thankfully, however, the pillars on which the theory stood, meaning the formulae for those 'coded messages' concerning the basic dimensionless physical constants, stand firm. Thankfully, also, the theory as it now exists is much simpler and easier to understand, since the theory of gravitation is now devoid of dependence upon the intricacies of electrodynamics as rooted in the Fechner hypothesis and its quantum electrodynamic equivalent.

# **The Neumann Potential**

The Neumann potential dates from 1845 and is an empirical formulation derived from electrodynamic theory by which the energy potential of two interacting current circuit elements, here denoted QV/c and qv/c, is:

noted that, by applying this Neumann potential to calculate the force of attraction as between two charges moving mutually parallel at the speed of light with respect to the electromagnetic reference frame in which matter is seated, I did in my earlier theory obtain a force of mutual attraction in which the  $(V.v)/c^2$  term reduced to unity. I seized upon this situation to build a theory of gravitation around the electrodynamic formula, assigning charge to gravitons according to volume of continuum charge  $\sigma$  that they displaced and so arrived at the same value of G as that derived above in chapter 2.

The problem that arises is that the Neumann potential applies only to actions which are supported by a quantum electrodynamic process akin to that found for electron currents. That empirical formulation does not have a textbook derivation from first principles but when we really delve into such a first principle derivation it becomes evident why the gravitons as a current source behave differently from electrons as a current source.

The analysis is as follows. Considering two charges Q and q spaced apart by that distance R, energy is transferred at speed c between their kinetic energy and the Coulomb interaction energy and, owing to its momentum and mass-equivalence, this results in a force given by:

where:

 $E = T \left[ \delta(Qq/R) / \delta t \right] \dots (9.3)$ 

Here E is the energy in transit between the potential and kinetic forms and T is the time taken for energy to traverse a distance R at speed c.

Equation (9.3) reduces to:

 $E = - (R/c)(Qq/R^2)(\delta R/\delta t) \dots (9.4)$ and so the force term given by (9.2) becomes:  $(Qq/R^2 c^2)[(\delta R/\delta t)^2 - R(\delta^2 R/\delta t^2)] \dots (9.5)$ 

Since  $\delta R/\delta t$  is the velocity component along the line of R and  $(-\delta^2 R/\delta t^2)$  is the acceleration term given by the square of the velocity component at right angles to R as divided by R, then we see that (9.5) reduces to:

where U is the relative velocity between Q and q.

By supposing that there is an electrodynamic frame of reference in which elemental current elements as individual electrons each comprise two charges +e and -e moving with opposite velocities that are each half that of the primary charge, the above force expression has four components. The  $U^2$  term becomes:

which emerges as -2(V.v) and so makes the force term (9.6): 

When this force is integrated with respect to R from R to infinity, we find that it corresponds in magnitude to double the empirical term (9.1) that we refer to as the Neumann potential.

This means that the magnetic field set up by any electron current is really double that we have assigned from our measurements but do note here that we are delving into action at the truly fundamental level and have not accounted for the reaction effects of any charge that might be moving in that field. This introduces us to the problem of the gyromagnetic reaction.

That assumption introduced in making the step between (9.6) and (9.8) dates from classical physics of the  $19^{th}$  century and is known as the Fechner hypothesis. Its modern equivalent is a feature of quantum electrodynamics by which an electron in motion is accompanied by the statistical presence of electronpositron pairs created by quantum fluctuations in measure related to the kinetic energy. This adds mass and explains why the mass of an electron increases according to the formula prescribed by the theory of relativity, but also it explains how an

electron current is conveyed. This involves the progressive creation and mutual annihilation of opposite charges e, allowing an electron to convey current, but by moving towards a positron coming in the opposite direction, sharing that action, then decaying by annihilation with that positron to leave an electron ahead in the field as if the primary electron itself is the sole mover.

### The Gyromagnetic Reaction

Here, as a preliminary, it is appropriate to take note that, in deriving equation (9.6), we need not have presumed that both Q and q were leptonic in the sense that they involved charge pair creation and decay. It suffices to say that q has that property but not Q. It may then be verified that the  $U^2$  term becomes:

Note also that, in saying that energy travels between Q and q, a distance R at the speed c, it may seem that we are ignoring what is normally assumed, namely that the energy possessed by an electric charge is distributed over its field, rather than concentrated in the body of the charge. It is an interesting mathematical exercise to work out the field distribution of the interaction component of the mutual energy of the two charges as a function of distance from either charge. The fascinating result of this exercise is, surprisingly, the fact that there is a zero net interaction energy within the sphere of radius R centred on either charge and that the interaction energy density reduces as the inverse square of distance as the radius of such a notional sphere increases beyond that distance R. This means, quite simply, that, in shedding some of the interaction field energy owing to change of R, the energy so released must traverse that exact distance R regardless of which of the two charges is to receive that energy as added kinetic energy. The reverse also

applies and so T as used in (9.3) above is definitely R/c. The mathematical proof of this is to be found in my paper entitled: *'The Spatial Energy Distribution for Coulomb Interaction'* published in the periodical *'Lettere al Nuovo Cimento'*, **25**, 456-458 (1979).

The question then of interest stems from the fact that the energy can only travel from Q to q or from q to Q at any given instant, and there is the further complication, that we really never ever can have two electric charges in isolation from the rest of the universe, given that the aether is seething with numerous electric charges which sustain the oscillations we associate with the passage of electromagnetic waves. I can envisage, for example, a charge Q with two charges q, one on each side of the charge Q. If energy flows from Q to both of the q charges at the same time, then there need be no reaction force on Q but yet there are forces acting on both of the q charges. Looking purely at each component interaction as between any two charges in an electrodynamic system, we cannot therefore contend that action and reaction must balance. What we can say, given a choice between balance of linear action and reaction and balance of turning action as produced by a force couple, is that the latter must surely balance so far as two-charge interaction is concerned, but the former need not be in balance.

This is a vital factor in the development of electrodynamic theory, where, historically, the wrong assumption was made. Just test your knowledge of physics by considering two electric charges moving in general directions relative to one another, work out the magnetic field that one produces on the other and then apply the Lorentz force law, which you are told is valid because it is consistent with Einstein's theory. You will find that there is an out-of-balance force set up by such a charge system. Action and reaction are not equal. There is balance for the force components acting along a line drawn between Q and

q but there are out–of-balance forces acting on the charges at right angles to that line.

To get answers which fit what is observed the tests have to involve an electron current flow around a closed circuit as part of the interaction. So you see, accepted electrodynamic theory breaks down when applied to the physical underworld and the charges that move as part of the aether. So, how can we proceed? The answer is that we must explore the significance of that factor 2 in expression (9.8).

Let us now consider the action of electron current flowing around a solenoid which has a cylindrical copper core. Textbooks will tell you that each cc. of copper has as many free electrons moving through the metal as there are atoms in that 1 cc. volume. Those electrons experience the magnetic field of the solenoid and so are deflected into reacting orbits which set up a magnetic field in opposition to the applied field. By the accepted electrodynamic laws of physics it is then found that the reaction field must virtually cancel out the effect of the primary field. In theory a magnetic field cannot penetrate a lump of copper, but in reality we know that it can! We then face the problem of 'free electron diamagnetism', a problem which baffled physicists of the early 20<sup>th</sup> century. The problem was never solved. It was ignored, in a sense, by resorting to a vague notions such as one that depended on a governing rule prescribed as a law of statistics and which bears the name of Miss Van Leeuwen's theorem. It is an absurd proposition devised to get the books to balance and one that does not warrant further consideration here but I give the reference as J. de *Physique.* (6) **2**, 361 (1921), particularly pp. 372-374.

The proper approach was to see those reacting electrons as interacting with the primary electrons in the solenoid and exchanging energy as part of an equilibrium process rather than being servile in their response as if energy can only flow one

way. The force which the motion of one electric charge asserts on another such moving charge is not something that is ruled by a mathematical formulation. It depends upon energy equilibrium criteria and may or may not exist if the energy so dictates. With this in mind, therefore, let us, for the moment, replace that factor 2 by a factor k and see where a little analysis can take us.

Let the true applied magnetic field be of strength  $H_o$  and suppose this to be offset by a diamagnetic reaction field  $H_r$  to produce an effective field H given by:

Thus the total reaction current moment per unit volume of the field is given by:

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There is no 'free electron diamagnetism' on this basis and we have found that the anomalous factor of 2 introduced in (9.8) is wholly consistent with what is observed, which means that the Neumann potential is no longer an empirical quantity but rather one derived from and wholly justified by fundamental theory based on Coulomb's law.

The by-product of this, however, is the implication that the aether must exist as a medium that can itself react to halve the action of any primary magnetic field. Here is a case supporting the aether and based on pure theoretical foundation. More than this, however, we have to confront evidence that tells us that a fundamental unit of magnetic moment set up by a reacting charge in motion will be double the strength expected from standard theory. The magnetic moment to angular momentum ratio, otherwise known as the gyromagnetic ratio, will be double that implied by classical theory.

This is a phenomenon that is observed experimentally and been totally misunderstood as being attributable to an anomalous spin property, the so-called 'half-spin' feature of quantum theory. In fact it is evidence which points a finger clearly at the reality of the aether. Furthermore, it is a phenomenon that is further fully supported by the ferromagnetic properties of iron, nickel and cobalt in a truly impressive manner as one can see from my paper '*Crystal Symmetry and Ferromagnetism* in the

periodical: Speculations in Science and Technology, **1**, 281-288 (1978).

# The Law of Electrodynamics

Allowing for aether reaction and the equivalent free electron diamagnetic reaction present in electrically conductive media we have seen why the Neumann potential governs electrodynamic interaction. Also, an astute reader will have noticed that in invoking Fechner's hypothesis to advance from the force expression (9.6) we made it impossible for us to use the Neumann potential as a basis for gravitational force.

The reason is that our graviton system requires the force of gravity to arise from the interaction of gravitons that have a common motion at speed relative to the E frame, a motion that assures that those gravitons move in unison in mutually parallel directions at all times. Therefore, that expression (9.6) says that, since there is no relative motion, there can be no electrodynamic action as between the gravitons and so no electrodynamic contribution to the force of gravity. This may also explain why, in formulating our detailed analysis of aether structure in chapter 7, we avoided completely assigning electrodynamic properties to the aether itself and so avoided magnetic field energy considerations. The latter, it seems, belong only to the province of electrons, namely the material world.

It is in this latter world, our real world, that we make the measurements pertaining to magnetic fields and electrodynamic forces, and having introduced a theoretical derivation of the Neumann potential, it is of interest now to explore how this leads us to the formulation of the proper law of electrodynamics. Here I use the word 'proper' because physicists concerned with electrodynamic action have been too willing to cut corners, as it were, and be satisfied by rules of thumb and contracted versions of electrodynamic law, such as that of Lorentz. The latter only

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applies to actions which arise from steady current flow around a complete closed circuit, current flow that must be that of electrons and cannot be that of charge displaced, as across capacitor plates, where the aether is involved.

The research on this question was motivated by the quest to connect electromagnetism and gravitation but there were also certain anomalies as to the cathode reaction forces exerted in cold cathode discharges in gas at very low pressure. I do not intend here to go through the formal analysis by which I derived the law of electrodynamics. It is of record elsewhere, as in my paper *'The Law of Electrodynamics'* in *Journal of the Franklin Institute*, **287**, 179-183 (1969).

### **Energy from Nowhere?**

At this stage, as we approach the end of this work, I feel I must explain that after many years of developing this theory of Creation by challenging much that is today accepted as correct, particularly Einstein's Theory of Relativity, I have in recent years been drawn into the forum of discussion that concerns what some call 'free energy'. This is energy tapped as if from nowhere, meaning the 'aether'. If, as I claim, the aether is a scene of ongoing creation of matter which eventually decays but which, in the meantime, feeds our energy needs, as by the Sun's radiation, then one can but wonder whether we can get into the act, as it were, and invent a few shortcuts by which to tap energy from the aether directly and so help mankind to face up to the impending energy problems of our future.

As already stated, this energy topic warrants a book of its own, but, owing to age, destined to be a spent force as a pioneer in the research arena, I wish to be remembered for my theory of the aether as outlined in this book and the many papers and earlier work I have authored.

The 'free energy' theme does, however, warrant mention in these closing pages. So, as we continue with this DISCUSSION theme, I pose the following question that could, I feel, have been addressed by researchers back in the 1910-1920 period when that 'free electron diamagnetism' topic was much debated.

"Given that the magnetic deflection of free conduction electrons in a copper core embraced by a magnetizing solenoid will surely cause those electrons to set up a reaction field opposing the field applied by that solenoid, why cannot we draw energy from those electrons and so gain power from whatever it is that sustains the perpetual motion of electrons in atoms?"

Consider the following argument. We switch the current on in that solenoid and it produces a magnetic field H in that core. This field acts on the free electrons in the core and causes them to produce an opposing field. The back EMF induced in the solenoid will be proportional to the switching speed and the difference between H and that field reaction. The energy input will be so determined. Then, opening the switch suddenly to reduce H to zero, the reaction field will become responsible for the primary change of magnetic flux linking that core and will induce an unopposed EMF that adds power to the solenoidal current as it is reduced by the opening of that switch, no doubt by forming an arc discharge, but possibly delivering more output energy than was injected as input.

Wishful thinking you say, because everyone knows that one cannot get something for nothing, particularly energy, given our acceptance of the Law of Conservation of Energy. However, look again at the physical structure under consideration. If the diamagnetic effect were to be so overwhelming that it virtually equalled the strength of the applied magnetic field, a reasonable proposition given that there are so many electrons moving freely in that copper core at very high speeds, then the input energy would be very small. In contrast, given a little inertia in the magnetic moment and related angular momentum reactions of those electrons owing to their reacting orbital motion, we would see the full reaction field active in delivering energy output and that would be far in excess of the energy input.

So, here we see that standard physical doctrine of the early 20<sup>th</sup> century, doctrines we adhere to today, suggest that we can, as it were, get energy from nowhere. You say that is impossible. I say that you then have to face up to the fact that the physics you rely on is faulty. Now, why was this aspect of the subject not explored and resolved long ago?

If one begins by assuming that this is a no-gain situation then logic says that the applied magnetic field is really double the value indicated by standard physics and the reaction field is half the strength of the applied field. Then the difference in field strength during power input is the same as that during power output, given the latter is a sudden switch-off of the applied EMF but the current decay lags owing to the inertia involved. So, here, by use of simple logic one can reason that the applied field really does have to be double that of the reacting field thereby induced. That factor of 2 we deduced above by the mathematical reasoning of theoretical physics has to be correct.

So where is the error in standard physics? It resides in the fact that we formulate our laws of physics and our theories on the basis of experiment in which currents act on individual electric charges in motion, whereas certain hidden factors need consideration when numerous reacting charges are affected by those currents. In the context of the above analysis by which we derived the Neumann potential I can but point my finger at that term T in equation (9.3). The time T is the distance R divided by c. Energy travels at speed c over the distance R in time T, but that energy travels one way and the question is: "Which way?"

It will surely travel in the direction, Q to q or q to Q, according to optimum energy criteria, rather than according to a man-made law that suits certain conditions that do find support by Mother Nature working according to those same energy criteria. Remember that without energy there is no force and, whenever you rely on force equations to tell you something, do be sure there is enough energy at the right place to support what you say.

The case I put is that those free conduction electrons in that copper core are only deflected by a magnetic field to the extent that the kinetic energy of the reaction has reached its maximum level as determined by the strength of the resulting magnetic field. This may seem to be an arbitrary way of overriding the principles of accepted physics, but at least it is a process based on optimization of energy deployment and the alternative seems to be to let physics sink in a sea of confusion, because physicists in general are too stubborn to question what they have been taught and look to others to deal with the anomalous issues that arise, but seldom get a hearing in refereed publications.

As to the scope for tapping aether energy by the method outlined above, I submit that it is not possible, even though standard physics would say it is, but do not lose heart, we will come to a ray of hope on that theme before we conclude this DISCUSSION chapter.

# **Concerning the Michelson-Morley Experiment**

I well know that there will be some readers who wonder how, in advocating the existence of a real aether, I have disposed of the implications drawn from the Michelson-Morley experiment. This was an experiment in which rays of light were reflected back on themselves in one direction of the Earth's motion and compared with corresponding rays reflected back on themselves at right angles to that motion. No consideration was given to the fact that a ray of light encountering the energy of a ray of light coming the other way might have its propagation speed affected by that encounter, but, that aside, the experiment purported to imply that the speed of light is referenced more on the apparatus used in the test than on motion though the aether.

Now, unlike the effects in a solid material medium, where lateral field oscillations occur on the passage of electromagnetic waves, with the atomic structure of the solid absorbing the strain, the aether copes by setting up a reciprocal field oscillation. Remember that we have in the aether the structured system of quons immersed in a sea of muons. If the quons are displaced laterally in setting up an electric field as the wave propagates in a forward direction, so some of the relatively massive muons must be displaced in an opposite sense to provide dynamic balance.

This duality applies also where the quon lattice system is moving steadily along as it shares the motion through space of body Earth itself. This primary action would involve a build up of quons at the forward boundaries of the Earth's aether, were it not for the quons suffering annihilation along with an equal amount of continuum charge, with the energy being merged to create muon pairs which, as a secondary system, migrate through the Earth's aether in the reverse direction to transform back into quons and continuum charge where needed at the boundary where the lattice system separates.

The net inertial effect of this is then zero. One then sees that, by analogy with an optical effect named after Fresnel, we can expect this reverse flow to affect the speed of light through the primary structure. Fresnel's theory explains why the speed of light increases in proportion to  $u(1-1/n^2)$  where u is the velocity of the disturbing medium and n is the applicable refractive index. This can be deduced from electron theory, but it has been verified by experiments in which the speed of light through moving water is measured.

Applying this same theory to the aether itself, and recognizing the counter displacement, it is an easy matter to arrive at the result observed experimentally by the famous Michelson-Morley observations.

Let there be N like charges e per unit volume within an electrical continuum of uniform but opposite charge density  $\sigma$ . Then:

Let  $N_1$  and  $N_2$  denote the population density in the primary structure (the quon system) and secondary structure (the muon counter flow), respectively. Then:

By analogy with the properties of matter we know that the propagation velocity is given by  $(P/\rho)^{\frac{1}{2}}$ , where P is the pressure modulus of the medium and  $\rho$  its mass density and so this guides us to the formula:

Let v denote the velocity of the primary structure (the quon system) and u the velocity of the secondary structure, the reverse flow of muons. The linear momentum of the aether has to be zero unless there is a build up of electric field. Hence:

 $vN_1 + uN_2 = 0$  ......(9.19)

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Now refractive index n is the ratio of light speed in an active medium to that in the undisturbed vacuum state, the latter being denoted c. Hence:

From (9.18) and (9.20),  $n^2$  becomes proportional to  $N_1$ , with P constant, so that, from (9.14),  $n^2$  is  $1-N_2/N$  so that  $1-1/n^2$ is  $-N_2/N_1$ . We then see from (9.19) that  $1-1/n^2$  becomes simply v/u. Thus the Fresnel drag in the vacuum, which is  $u(1-1/n^2)$ , is the velocity v of the primary structure, proving, from simple classical electron theory, that the speed of light will be referenced on the vacuum structure moving with the Earth, as was found by Michelson and Morley. That vacuum structure is the system of lattice charges, the quons, in the aether theory presented in this work.

### The Numbers Game

I have founded this account of Creation on the task of deciphering the significance of the measured numerical values of certain dimensionless physical constants. In discovering the physical formulae by which these constants are determined it is found that there is very close agreement between what the theory indicates and what is actually observed. In this quest, however, it is a cause of very considerable anxiety to find that theory can, for example, bring one within, say, 0.1% of the measured value, when the estimated range of error in that measurement is somewhat less than this. One wonders if there is something that one has missed or whether there is an overriding factor such as a wave resonance that modifies the physical parameter involved.

Interested readers who study my published work and see how the theory evolved will notice many such situations, including the step that determined N as being necessarily an odd integer which was 1843 that value of N introduced in chapter 2, and I can but say that it would make this account of 'The Physics of Creation' far too long had I sought to include them all. One must also keep in mind that the techniques by which physical constants are measured can bring in their own uncertainties, apart from the range of error attributable to merging data from different measurements at different laboratories that are based on the same measurement method.

Furthermore, if one struggles to get the perfect fit between theory and experiment then one may be seen as 'cooking the books', as it were, when one is only exploring tentative hypotheses to see if one can discover the physics that underlie the true reason for the discrepancy.

By way of example, consider the two graviton forms discussed in Chapter 2, the  $\tau$ -graviton and the g-graviton, as well as the quon or aether lattice particle introduced in that chapter by reference to the integer factor N of 1843. When I first discovered the structure of the aether and published this in my 1960 booklet 'The Theory of Gravitation', I pictured the graviton as a minute element of charge occupying a spherical hole and moving in circles around the inner bounding surface of that hole to set up the electrodynamic interaction that accounted for the force of gravity. I had the concept of dynamic balance but had not been bold enough to see the graviton system as one having mass equal to that of its dynamic partners including matter. I was writing at a time when reference works indicated that the measured value of the fine-structure constant ( $\alpha^{-1}$ ) was 137.038 and not 137.0359, as now measured. I struggled a little in that work to make sense of the correction for the finite size of the aether lattice particle which put doubts on my theoretical

quantification in the digits beyond 137.0. Only by the passage of time, six years to 1966, when I published a new edition of *'The Theory of Gravitation'*, was that lattice particle question resolved, but by then also I had the correct picture of the graviton, or rather the g-graviton form, which I saw as having a mass of some 5063 electron units. I derived that value of 5063 by theory (equation 5.19, pp. 76-79) of that work but at that time had no inkling that the tau-lepton would emerge in my later theory as a partner to the g-graviton. Indeed, since the tau-lepton had yet to be discovered at that time, it was bad enough having to predict the existence of an unknown particle, the graviton, of 5063 electron mass units (2.587 Gev), as a feature of my theory of gravitation.

On the question of whether the 2.587 GeV particle has ever revealed itself in high energy particle experiments, I did find reference to a so-called '(2585) bump' listed by the Particle Data Group on p. 314 of '*Physics Letters*', **170B**, published in 1986. It was specified as 2586 +/- 45 MeV. I also found that there had been interest in Japan in the research of Hasegawa who had proposed the existence of a fundamental energy quantum with a rest mass two or three times as high as nucleon rest energy (the H-quantum) which a 1973 paper by Nanjo and Takana ('*Suppl. Prog. Theor. Phys.*) **54**, 120 said had a mass energy between 2.4 and 2.6 GeV.

As my theory of gravitation evolved, with its dependence upon gravitons of mass-energy 2.587 GeV, so I was ahead of the field in this regard, but it came as a massive boost to my theory when I read about the discovery of the tau-particle in 1979 and was able to show how its mass is derived theoretically in my book *'Physics Unified'*, page 121 (1980). Even so it was not until 1988 that I was able to publish papers revealing the role of the tau-particle as a graviton alongside the g-graviton, by virtue of their functional link as described in chapter 2 above.

The perplexing question that I will not attempt to answer is whether that link is a 100 per cent rigorous relationship by which the precise mass of one determines the precise mass of the other. Extraneous influence regulating the precise value of either quantity can affect the evaluation of G at the part per 10,000 level and I feel this is best left for future research consideration. I am mindful also that I have, in my writings (*Hadronic Journal*, 9, 153-157; 1986) given reason for suggesting that the taon has a mass energy related to the proton by a ratio which is the cube root of 3 times the fourth root of 3. This may seem a curious contention but perhaps less so in the light of what has been said about hyperon creation at the end of chapter 4. One finds from this that the taon has a mass-energy of 1.8982 times 1836.152 times 0.511 MeV or 1.781 GeV, which is 3485 electron mass units.

This commentary on graviton mass values will give meaning to the numbers 3485 and 5063 as introduced in the section of text which follows, but I would just add a note here to say that in my published work there is mention of the 'supergraviton' which I suspect is generated in the presence of very concentrated elements of matter, typically a heavy atomic nucleus. The value of G must remain the same but to provide local dynamic balance for a very heavy element of mass the normal gravitons would need to get too close to one another and so, by their combination, I suggest they can cope with this situation in an interesting way. This phenomenon reveals itself in the field of 'warm superconductivity' where it appears that, when integer clusters of super-gravitons provide the dynamic balance for atoms or groups of atoms, the energy of electron flow is sustained by tapping the thermal energy of the atoms. See my paper entitled 'The Supergraviton and its Technological Connection', Speculations in Science and Technology, 12, 179-186 (1989).

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At another extreme, as I have already shown in chapter 8 when discussing the neutron star and as I shall mention below in the next chapter THE EPILOGUE, it is conceivable that the energy activity affecting gravitons can be so intense in some parts of the universe that they cannot form in a quasi-stable form and so the virtual muons themselves have to stand in, as it were, and provide the dynamic balance that is associated with gravity. This can lead to an enormous escalation of the value of G, making stars centred in that activity exhibit an extremely high anomalous mass in no way commensurate with their inertial mass by the standards set within our solar system.

## Hydrogen Creation by Graviton Decay

Here I now wish to engage in a rather speculative digression. It is prompted by having received, when half way through the writing the original version of this work, a rather unusual communication from a scientist named Dr. Paul Rowe. He claims to have found experimental evidence showing that, under certain circumstances, hydrogen can appear as if from nowhere and he sees this as sourced in the aether. He is also able to quote references to the earlier research of other scientists who have discovered the anomalous appearance of gas, presumably hydrogen, in their experiments. The common feature of these experiments is an electrical discharge or an explosive reaction in the presence of metal, aluminium or tungsten.

Now, it has been shown earlier in this work that, though the aether is not a system of rather elusive protons, it can, from its muon activity, create protons. Also we have seen that matter once formed by those protons combining with electrons can take up position in the E-frame of the aether and share its harmonious jitter motion. In so doing it puts the aether out-of-balance dynamically which is why the aether responds to provide the

counterbalancing motion of a system of gravitons created in the G-frame, thereby giving rise to the force of gravity.

Upon consideration of Dr. Rowe's claim in the context of the theory governing proton creation, theory which we verified earlier by deriving the Hubble constant, one finds that it is impossible for protons to be created on demand by explosions or electric discharge, unless there are other factors needing consideration. Note that proton creation according to this author's theory arises only where there is energy present that is surplus to the equilibrium requirements of the aether. One cannot then see how a chemical laboratory bench experiment can involve energy input on a scale that can create hydrogen atoms, meaning creation of matter according to the equation  $E = Mc^2$ .

However, I have engaged in a little speculative enquiry and taken note of the factor posed by the metal flakes of Dr. Rowe's own experiments and the metal electrodes of the other experiments he has in mind. I asked myself how a piece of metal, that is electrically conductive and of higher mass density than its immediate environment, might cope with the cosmic motion through space in requiring the aether to adapt its graviton system to the presence of that metal.

Note that a unit of mass that is part of an element of matter moving through the aether will have an inertia not shared by the corresponding unit of mass in the graviton system. The gravitons are part of a leptonic underworld that governs quantum mechanics and they are created where required from the energy of the aether. The passage through space of a piece of metal will involve the creation of gravitons at its forward surfaces and the corresponding demise of gravitons at its receding surfaces. In short, this poses the interesting question of how gravitons shed their energy in their decay mode. It is a question I have not addressed until now [February 2003] but one which captured my attention when I asked myself how many graviton groups, those

two  $\tau$ -gravitons plus one g-graviton, would be needed to create protons with a negligible energy surplus, given a decay stimulus, namely the impact of a virtual muon upon one of those  $\tau$ gravitons by which it exchanges polarity with the muon and so can engage in pair annihilation with its associate  $\tau$ -graviton.

This becomes a question of how many units of 3485+3485+5063+207 are needed to create an integer number of proton-antiproton pairs. I was then surprised, indeed very surprised, to find that only three such units, totalling 36,720 electron mass units would be needed, as this is exactly 20x1836, 1836 being the proton-electron mass ratio.

Now, do bear in mind that this diversion is a speculative exercise, but consider too the implications in the light of Dr. Rowe's experimental findings. I was intrigued and so I took the analysis further. Dr. Rowe had measured the volume of gas that had appeared anomalously in his discharge experiments. It was only a few cc. at atmospheric pressure and so I wondered how I might account for that.

My thoughts were on the possibility that the creation of protons and anti-protons at the receding metal surface could capture electrons from the metal and so create hydrogen from the protons, whereas the anti-proton might even combine with the nucleus of a metal atom and change its isotopic character. In a sense this is creating matter from the aether by stealth, but one has cause to wonder given the anomalous atomic transmutations that are reported to occur in so-called 'cold-fusion' experiments. I have in mind here the paper by David Moon entitled '*The MODS Theory of Cold Fusion can explain Tungsten Cathode Plasma Electrolysis*' that was published in the Volume 8, Issue 47, 2003 of the periodical '*Infinite Energy*'.

In any event, with the problem of estimating how much hydrogen gas might be created per sq. cm. of metal surface by graviton decay still in mind, I reasoned that we move through space at a cosmic speed of some  $3.5 \times 10^7$  cm/s and I was able to put a rough figure on the lifetime of the gravitons and so could proceed. I quote from my paper '*An Empirical Approach to Meson Energy Correlation*' that was published in '*Hadronic Journal*'**9**, 153-157 (1986):

> "The one direct indication which the author has seen arises from the likely possibility that the decay of the tau and the decay of the g-particle may be associated. The tau has a lifetime of  $4.6 \times 10^{-13}$  s and falls in a class of particles discussed by J. D. Prentice [*Physics Reports*, **83**, 102 (1982)] as "in the  $10^{-13}$  s range". One such reported decay time was  $10.69 \times 10^{-13}$  s for the "longest-lived entry .... giving a fitted mass of  $2583 +/- 26 \text{ MeV/c}^2$ ....." This might be direct evidence of the g(2587) particle."

Multiplying a lifetime of this order by that cosmic speed one finds a range of a few hundredths of a micron. Then taking the mass density of the metal times this as a measure of the mass of hydrogen produced per square cm of metal surface per discharge event we expect hydrogen gas at atmospheric temperature and pressure to be of cubic cm order, as Rowe found.

Accordingly, I do think we need to take Dr. Rowe's claim seriously and see that he has discovered a way of generating hydrogen from the aether. Whether or not this could be developed into a new source of power depends upon the energy involved in setting up those electrical discharges, but at the very least research confirming his findings will surely be research proving that a real aether of the kind envisaged in this work does exist. Such research could include testing the composition of the hydrogen produced to see if it contains the normal percentage of deuterium. Newly created atomic hydrogen should not be contaminated by the presence of the deuterium isotope. Such a finding would confirm Dr. Rowe's claim that hydrogen is being produced ab initio rather than being absorbed somehow from the chemical environment of the test apparatus.

In conclusion, I feel obliged to draw attention to the fact that the generation of hydrogen from the aether, if pursued on a large scale, could, in the long term, be destructive of life on Earth because our oxygen supply is limited and by creating water as we burn up our atmospheric oxygen resource we merely add a few metres to the levels of our oceans to leave us with only nitrogen to breathe. Some other energy resource is needed and that brings me to our next and final topic of discussion.

# Vacuum Spin as a Prospective Energy Technology

The aether was shown in chapter 8 to have properties conducive to what was termed 'vacuum spin', this being the basis on which stars and planets acquired their rotation and much of their kinetic energy. In this final discussion section I now give my reasons for thinking that, by exercising a little ingenuity, we might be able to tap energy from the aether by replicating in laboratory apparatus the conditions which govern the vacuum spin phenomenon.

This account which now follows is the unamended text of a paper I presented in Berlin on June 14th, 2002 to an audience interested in alternative energy techniques. Since it was compiled before this work: *'The Physics of Creation'* was written it will, so far as concerns the vacuum spin theme, be somewhat repetitive, but I thought it best to leave the text of the paper unamended. It now follows as a conclusion to this chapter 9.

# **OUR FUTURE ENERGY SOURCE: THE VACUUM**

## **A Scientific Introduction**

Whilst oil companies scan ocean beds in search of future drilling sites by which to replenish our dwindling energy resources there seems to be little or no interest in looking for energy within the omnipresent vacuum medium which exists everywhere, both here on Earth and in outer space.

The reason, of course, is that scientists do not recognize the vacuum as a source of energy. They tell us that the vacuum is, in simple words, a mere 'nothing', but yet they teach by reference to textbooks which declare that the vacuum has a magnetic permeability expressed as  $\mu_0$  of value  $4\pi 10^{-7}$  henries per metre and a permittivity  $1/\mu_0 c^2$  of 8.854187817x10<sup>-12</sup> farads per metre.

How can the vacuum, as a medium devoid of matter, be said to have such curious properties if it is a mere nothing? Consider what we mean by that word 'permittivity'. It tells us how much energy we can store by setting up a voltage between two metal plates in a vacuum. That energy sits in the vacuum not in those metal plates! The vacuum has a way of releasing that energy when that voltage is reduced and that mysterious quantity we call `permittivity' governs that action.

Note now my point that a magnetic property is also involved owing to that  $\mu_0$  term, as is c, the speed of light. Magnetism is basically a dynamic action arising from electric charge in motion and motion implies energy. The vacuum, that mere 'nothing', also somehow determines the speed of light c, a factor in the famous energy equation  $E = Mc^2$ , and yet scientists ignore the vacuum as a potential source of energy. There is indeed much they have to learn about this aspect of

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Energy Science and I intend here to summarize this in four stages.

In the first and third of these I will point to free energy technology that has been demonstrated. In the second stage I will outline the physical principles involved and in the fourth stage I will conclude my message by reminding you that our universe had to be created from energy that apparently came from nowhere and cast some light on that great mystery.

### I. Capacitor Magic or a Mere Dream?

I want you to imagine that you have discovered an electrical capacitor that you can charge with energy and which, on discharge, gives you double that amount of energy as output. It is as if you can perform magic, though you are merely dreaming.

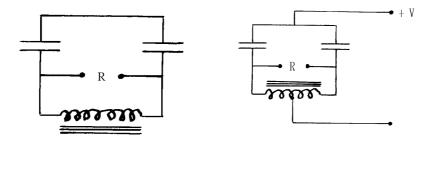


Fig. 1 Fig. 2

How would you turn this into a practical device? The problem you face is that the capacitance is quite small. Let me tell you how I would do it. I would connect two identical capacitors through an inductive circuit to form a resonant system and let the energy oscillate between the two capacitors, as one discharges whilst the other charges. I would draw power off, as,

for example, by incorporating an electrical load denoted R in Fig. 1.

Now, the chances are, that if I built such a device it would not work because of that low capacitance property and the energy loss owing to the resistance of the inductive circuit. So, exercising my ingenuity, I would connect a high d.c. voltage V to the capacitors (see Fig. 2), knowing that this additional source could not deliver energy continuously, once I had switched the device on. The reason is that d.c. does not flow through capacitors.

For a high enough d.c. voltage this would, as I can verify by basic electrical theory, have the quite remarkable effect of making the energy oscillations escalate in strength sufficiently to overcome the resistance loss problem. I would then surely have a working 'free energy' device.

If I did not use that high voltage d.c. polarizing source then there is still the possibility that I could get a self-sustaining oscillation and draw as output a small amount of 'free energy', but only if I made sure that the inductors were quite large and wound from thick gauge wire so as to have a very low resistance.

Can solving our future energy problems really be so simple? It is such a wonderful dream, truly magical, but we have, of course, to live with reality and here we need to face up to the facts of life. Can such a capacitor property ever be a reality? As to facts, I have several examples in mind, three of which I now mention.

Firstly, as long ago as 1871, there was a U.S. patent granted which comprised two cross-coupled inductive components each having two concentric windings separated by insulation and so constituting, in effect, a capacitor which could develop a resonant oscillation with the inductance of the other cross-coupled component. Fig. 3 is a copy of Fig. 2 of that

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patent. The introductory paragraph of the patent specification stated that the invention:

'relates to the combination of two or more simple or compound helices and iron cores or magnets in such a manner as to produce a constant electric current without the aid of a galvanic battery'.

Here then in 1871 was U.S. Patent No. 119,825, as granted to Daniel McFarland Cook of Mansfield, Ohio, telling us how to build a device which somehow generates electricity with no evident power input source. Here I see a device in which electric charge can oscillate between the two components and somehow generate a steady excess of output energy which is supplied by the windings on those two inductive components. Here there was no priming d.c. high voltage input source, but large gauge wire was specified as essential for the inductive windings.

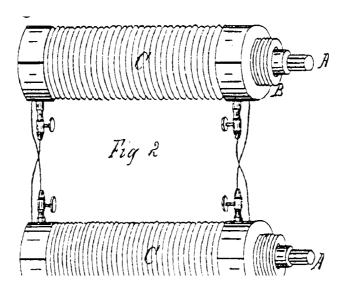


Fig. 3

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These were very early days in the history of the electrical power industry. Thomas Edison was only 24 years old and Nicola Tesla was 15 years of age at the time, so it is no wonder that this very important invention was buried in Patent Office records.

Secondly, there is the almost incredible story of the efforts of Dr. Henry Moray. It was reported that on 21 December 1925, Moray and three others, who went along to witness what was to be demonstrated, took a trip to a canyon in USA which was well removed from any electric power lines. A wire antenna was strung between two points well above the ground and connection made from the antenna to Moray's apparatus, which itself had a ground connection. Electric power was delivered as if from nowhere. It was said to be powered by 'radiant energy', energy somehow delivered via the aether, but in spite of repeated demonstrations, some delivering substantial power measured in kilowatt terms, Moray's discovery, notwithstanding our developing hunger for a new energy source, has not found its way into modern technology. The reason, of course, is incredulity on the part of our learned scientists plus lack of insight as to the true energy source.

A description of the Moray device by T. J. Yates of Cornell University, dated 16 March 1929, says that, in the demonstration he witnessed, two wooden boxes were placed on a table. On one box there was a high-frequency transformer and in the other box there were ten large capacitors and ten small capacitors, these all being connected by wires in a circuit including the antenna. One can see, therefore, that somehow it is possible to set up a resonant inductor-capacitor circuit which can deliver aether energy with the help of an antenna placed well above ground level in open air which delivers that high d.c. input voltage but not the steady input power needed to explain what was observed.

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It is, by the way, experimental fact that atmospheric electricity exists everywhere in the open air and has a vertical voltage gradient of several hundred V/m. It is caused by solar-powered thermal radiation exerting a downward pressure on electrons in the atoms of our atmosphere. Of itself, this is not a useful source of power but, as the Moray apparatus shows, it can serve as a priming agency in setting up the operating charge on those capacitors.

Thirdly, there are the reports on the 'free energy' apparatus of the Methernitha community in Switzerland. They have an electrical generating machine they call Thesta-Distatica. It produces a substantial output of electrical power. Its main features are inductive coils connected to a pair of glass Leyden jars plus an electrostatic generator that we in England call a Wimshurst machine. When the discs of that Wimshurst machine rotate high voltages are generated and the pulsed output somehow activates the energy-generating properties of those two Leyden jars. A Leyden jar is merely a capacitor having concentric cylindrical electrodes, one on the outside and one on the inside of that glass jar. Here also we have two capacitors in an oscillatory circuit and a d.c. source that can supply high voltage but very little energy. Yet, somehow those capacitors can tap aether energy and generate electricity which serves that Swiss community.

I believe we have here a situation where there is skill and knowledge in that community as to how to build this 'free energy' device, but I feel sure that no one there understands the physics that can explain where the energy that is generated really comes from.

An extensive account of both this Swiss discovery and the story of Henry Moray's efforts is provided in a recentlypublished book by Keith Tutt entitled 'The Search for Free Energy', published in 2001 by Simon & Schuster (ISBN 0-684-86660-9).

### II. The Physics of the 'Magic' Capacitor

All physicists have heard of Clerk Maxwell and Werner Heisenberg. Some few may have heard of Alexandre Veronnet. Maxwell's name is associated with electrical displacement within the aether (the medium we refer to as the `vacuum'). Heisenberg's name is linked to quantum mechanics and the Principle of Uncertainty by which matter has an underlying jitter motion as if sharing a universal circular motion in tiny orbits at the very frequency physicists associate with the creation of the electron. As to Veronnet, he has also a place in history. On December 16, 1929 the French Academie des Sciences conferred the Henry Poincare medal on Louis de Broglie for his work on wave mechanics, but on that same occasion Veronnet was presented with the Prix Lalande for his works in astronomy. The point I want to make is that Veronnet saw the aether as having electrical structure and an underlying quantized angular motion akin the that we learn of from Bohr's theory. Veronnet realised that jitter motion in the aether could perhaps explain why electrons in atoms have a quantized angular momentum, that is, why they have specific energy quanta linked to their rotation.

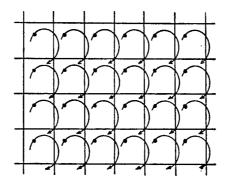


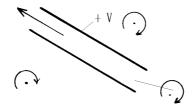
Fig. 4

So, as I see it, it is quite logical that we should be influenced by the perceptions of these three great men of science

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and begin to portray the aether as I do in Fig. 4 which I copy here from page 89 of my 1980 book 'Physics Unified' (ISBN 0-85056-009-8). Here I depict the vacuum as having a cubic structure, a state of order of the kind we see in crystals or in the magnetic domains of a ferromagnetic material. In each notional cubic cell there is an aether particle describing a circular orbit with all such particles keeping in step in a synchronous motion. They all have the same electrical polarity and are immersed in a continuum of uniform charge of opposite polarity and are attracted to their respective centres of those cubic cells, but are displaced from those centres to radii at which their mutual electrostatic energy avoids being negative. Therefore they must move in orbit to assure that their centrifugal force is in balance with the electrostatic force attracting them to the centres of those cubic cells. It all sounds very hypothetical, but I can assure you that this model of the aether holds the key to solving the prevailing mysteries of physics, and it is unquestionably correct.



### Fig. 5

However, here my subject is concerned with capacitors and their 'free energy' potential and I must not digress into other fascinating realms of fundamental physics. So let us now consider a parallel plate capacitor sitting in the aether as just portrayed. I refer now to Fig. 5.

When I asked myself what happens when an electric voltage is applied between those two capacitor plates I could see that the aether charges would all be displaced in unison relative to the centres about which they are in circular orbit. Then I could see that they could not keep strictly in synchronism with their counterparts elsewhere in nearby space unless they were subject to a continuous very high frequency oscillation of energy exchange, something I felt was impossible. Then, and by 'then' I mean nearly 50 years ago, I saw how Mother Nature deals with this problem. If that applied voltage has a two-fold effect, in that it displaces the aether charge in the direction of the electric field to a new equilibrium position but also produces, between the capacitor plates, a continuous motion of that charge at right angles to that direction, then there can be absolute synchrony with external space charge with no high frequency energy exchange problems. In Fig. 5 the centres of the charge orbits are indicated and one can see that charges seated between the capacitor plates have an eccentric orbital motion and so their velocities in orbit need to be compounded with a superimposed velocity in order to keep in synchronism throughout their orbital period. This means the whole structure of aether particles must acquire a linear motion in the space between the capacitor plates, a motion which increases as the voltage between those plates is increased.

In other words, I could see that one unit of electrical energy added to charge the capacitor would be supplemented by a further unit of energy accounting for that linear motion and it would be supplied by the external quantum jitter of the aether, since it was the external aether that was applying the constraint that assures the universal synchrony. Here was the 'free energy' source but the extra energy was locked into that aether motion and, as soon as the capacitor was discharged, that motion would collapse and dissipate the energy within the aether itself as it recovers and sustains its equilibrium.

What I have just described applies to the parallel plate capacitor but even back in the late 1950 era when I was researching on these matters I knew that that aether motion produced by electric field action could import both energy and angular momentum but I saw this as limited to the realm of cosmology and so of no technological significance. I earned my living by dealing with technological issues but still let my thoughts wander into pure physics and that higher plane that is the realm of those who seek to understand our universe on a grand scale and delve into that quest for the Holy Grail that is termed 'Unified Field Theory' and the problem of gravitation. With a Ph.D. in electrical engineering and working in a high technology corporate environment I really had no platform from which to project my scientific contribution, especially as my belief in a real aether medium made me an outcast from the world of theoretical physics.

Nevertheless, 20 years on, in the 1970s I had seen how the aether feeds energy into events on body Earth, as evidenced by the creation of the thunderball and the inflow of energy to power the action of a tornado. This was still far from the 'free energy' technology theme we are discussing today.

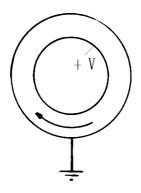


Fig. 6

#### THE PHYSICS OF CREATION

To jump rapidly ahead, now consider Fig. 6. Here I show a section of a concentric capacitor. That aether motion I mentioned is now not linear motion but rotary motion confined between the capacitor electrodes and so, when the capacitor voltage is reduced, that motion will have inertia and not dissipate by collisions which feed energy back into the enveloping aether. Instead, it will try to sustain the electric displacement, meaning that it will deploy its energy into the release of electrical energy which can be drawn from the capacitor. In other words, we have our 'magic capacitor'. It can deliver very nearly twice as much energy on discharge as is supplied during charging!

One, therefore, now has a physical explanation of the energy source that may have been tapped accidentally and in ignorance of the true physics involved, by Cook back in 1871, Henry Moray in the 1920s and the Methernitha community in the 1980s.

That, at least is my personal assumption, and I leave it to others to judge on such matters, whilst I am all too conscious of the implications of what I say here from the point of view of patenting technology in this field.

If we now move ahead to develop technology that taps energy from the aether, guided by the physical principles just outlined, will the U.S. patent granted in 1871 be seen as prior disclosure? Will the work of Henry Moray, which was denied U.S. Patent protection, be seen as prior disclosure? Will the confusing reports we have heard concerning that Methernitha apparatus be seen as prior disclosure, when the only inference is that Leyden jars (concentric capacitors) were used in conjunction with a Wimshurst machine to deliver the `free energy' as they claim?

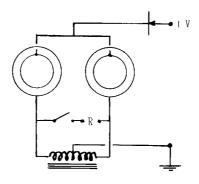
If so, then the patent system offers no incentive to those who pioneer the forthcoming revolution in the 'free energy' field, but we must do our best to take things forward in spite of the inevitable hostility of those who oppose our efforts.

#### III. 'Free Energy': The Way Forward

Fig. 7 shows how one can design a circuit aimed at tapping aether energy. I leave it to those of you who understand electrical circuit theory to work out what may be the practical scale of what is suggested on the basis of this 'magic capacitor' theme.

Nevertheless, 20 years on, in the 1970s I had seen how the aether feeds energy into events on body Earth, as evidenced by the creation of the thunderball and the inflow of energy to power the action of a tornado. This was still far from the 'free energy' technology theme we are discussing today.

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#### Fig. 7

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#### THE PHYSICS OF CREATION

My own calculations assure me that a concentric capacitor system running at a bias of, say, 25,000 volts and oscillating at, say, 100 kHz, can deliver power, whether on a power/size or a power/weight basis, that can more than rival existing power plant technology - all with no chemical pollution and no cost for fuel input. It can even suit the needs we have for powering an automobile when our oil resources dry up.

One can, therefore, dream of what might be possible, but, as ever, one might be deluded and encounter new obstacles, but, at least, one should confront those who ridicule the possibility by getting them to heed the underlying scientific message in the hope that they will wake up and see the sense of joining us, or leading us, in our efforts.

As to those 'obstacles', one might doubt whether aether energy can flow in fast enough to satisfy one's design specification, but I feel assured on that from the performance data reported by those who have witnessed Henry Moray's demonstrations. The one 'obstacle' I would see as warranting special attention is the effect of large current oscillations at a high kHz or even MHz frequency in the large inductors of a future power generating plant. There are those who worry about the adverse EM (electromagnetic wave) radiation effects of using mobile telephones. To allay such concerns I draw attention to the Energy Science Report No. 10 that I published in 1997, 'Cyclotron Resonance in Human body Cells' (ISBN 0-85056-011-X), where I discussed the real danger, which occurs at the much lower power frequencies as used in overhead power lines and in electric blanket heating. High frequency EM power radiation leaking from our future power generating systems need only be an interference problem affecting radio communication that happens to be in the same frequency band.

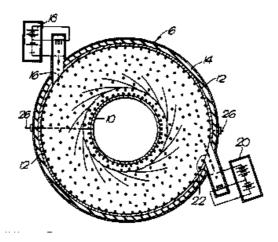
As to the way forward, I can but draw attention to my 1996 publication Energy Science Report No. 8, entitled '*Power* from Space: The Correa Invention' - (ISBN 0-85056-016-0).

That report was essentially directed at highlighting the experimental findings in Canada of Alexandra and Paulo Correa, who have already proved over-unity operation of their PAGD (Pulsed Abnormal Glow Discharge) technology. As that report explains I see there the same physical action for generating excess power that I have just discussed. Also I mention that I was so interested by the recently reported experimental efforts of the Correas on another anomalous energy generating theme ['The Reproducible Thermal Anomaly of the Reich-Einstein Experiment under Limit Conditions', Infinite Energy, 7, 37, pp. 12-21, 2001] that it caused me to write about this energy inflow from the aether topic in a related article published earlier this year ['Gravity and its Thermal Anomaly', *Infinite Energy*, 7, 41, pp. 61-65, 2002].

In that Report No. 8 I also mentioned the apparatus designed by Geoffrey Spence, an inventor based in U.K. This is the subject of his U.S. Patent No. 4,772,816.

I feel, after what I have explained to you about the physical principles of tapping energy from the aether, that, just by looking at Fig. 8, copied from that patent, you will see how this relates to the Spence invention.

Electrons injected into a chamber formed between two concentric electrodes are deflected into the inner electrode by a pair of magnets that provide and magnetic field along the central axis of the concentric electrodes. Of itself, this should add no excess energy, because the energy fed into accelerating the electrons is merely absorbed by electrostatic repulsion in charging the central electrode and so the capacitor. However, if that electron flow pulsates and there are connections to draw electron current from that central electrode then the pulsation implies a recurring sequence of charge and discharge. That 'magic capacitor' function is then harnessed.





The questions then are whether the Spence invention really works and whether it is commercially viable? Well, I wrote that Energy Science Report back in 1996, six years ago, and it is only a few months ago that I heard any more of that project. Geoffrey Spence has developed the prototype product to the stage where he has closed the loop in the sense that a portion of the output power was fed back to impart the energy needed to sustain the electron beams. He has a self-sustaining unit that can deliver kilowatts of useful electrical power with no visible energy input.

In the light of what I have discussed here, there will, no doubt, be those who take note of my message but say: "Well, we have heard it all before; so, when will see 'aether energy' heating our houses and powering our automobiles?" My answer is that it will be only be when the scientific explanation of that potential source of energy is well understood and endorsed by our energy research community. That is the real hurdle that stands in the way of progress, given that inventors in this field who see excess energy are mystified themselves.

I recall Stanley Meyer in 1993 at the International Symposium on New Energy held in Denver, Colorado (April, 1993) describing his so-called 'Water Fuel Cell'. He claimed to be producing a combustible gas mixture of hydrogen and oxygen by the electrical pulsing of a concentric cylindrical capacitor using water as a dielectric. His oral explanation and the paper as published in the conference proceedings were completely incomprehensible, even allowing for his terminology for a resistor as an 'amp consuming device' or as an 'amp inhibitor'. He inferred that some kind of cold fusion process was involved but it was evident he had no idea as to the true source of the excess energy that he was claiming.

So, having explained the energy source, and guided by what others have discovered, I feel vindicated in asserting that a concentric capacitor system can perform as the 'magic capacitor' of our dream world and I just hope that I may live long enough to see the technology applied on the grand scale.

### **IV. The Energy of Creation**

As to the 'grand scale' of things, what can be grander than the creation of stars such as our sun and their satellites such as our Earth? I see a beginning where matter, essentially protons and electrons, is dispersed throughout space, along with the electrical charges that come together to form the aether. Once the aether condenses from a state of chaos into the ordered state of its quantum form, as by shedding a little more of the energy which created that matter, then the phenomenon of gravitation would be born. There is analogy here with the state of ferromagnetism which appears in iron only when it cools into a state of order that we see as magnetic domains in the iron crystals. I simply mention this because it was my Ph.D. research interest in ferromagnetism that caused me to think in depth about the aether.

Once gravity appeared then those protons, being of greater mass than the electrons, would cluster together in each space domain to form a spherical body of matter having a positive

electrical charge, pending the eventual arrival of all the electrons.

That would set up a radial electric field and, as I have explained, that means aether energy inflow and aether spin. The star so formed will acquire angular momentum and, as that builds up, the star will seek to shed much of that angular momentum as matter, and so we have the planets.

My message here is that the prospect of 'free energy' and our future on a non-polluted Earth is related to the very creation of this our Earth and the scientific community that seeks to explain everything as a Big Bang scenario in an expanding universe is wandering astray and neglecting the real issue common with the phenomenon of Creation, our concern with 'aether energy' as a 'free' energy source that can power our future.

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### CHAPTER 10

## The Epilogue

Having concluded this account of 'The Physics of Creation', I can but let the reader judge and form his or her own opinions on the subject. Defining God as the Creator, the better our understanding of the creative forces at work in our universe, the more likely we are to find the ground on which to build a common religion conducive to a peaceful existence.

However, as indicated in the INTRODUCTION on page 1, those who lead in this quest will have to be conversant in the language of physics, as otherwise they will be basing their beliefs on fictional notions, historical hearsay or mere hope and intuition. Awareness of the Science of Creation plus a will to embrace the discipline of a common and universal moral code of behaviour should surely suffice as the intellectual basis for one's religious horizons, without the promise of life after death.

The scientific approach reveals how the universe was created as a system of order developed from chaos and so established an aether in which events governed by statistical factors created the forms of matter we see evolving around us. We are part of that system of matter and though subject to a game of chance we can, as thinking beings, optimise our prospects of survival in a secure and happy environment, albeit having, as do all particles of matter, a limited lifespan. Education founded too heavily on religious indoctrination in ignorance of the physics that rules the universe can but lead to unnecessary strife given that there will always be those who challenge the word of those who say they speak for a God of their own making. Concerning the physics, however, there are lessons from history that we must learn. Though the language of physics is universal, the stories told in that language can be conflicting and the truths of Nature have yet to be presented in their ultimate form. This work on 'The Physics of Creation' is a major step in that direction.

As to history, in recent centuries it has been important for scholars to build their scientific convictions on religious foundations, rather than build their religion on the evidence emerging from scientific discovery. Admission to the scholarly fraternity and the funding of institutions of learning depended upon religious disposition. Rivalry and prejudice combined with dogmatism have been dominant factors amongst scholars and there is no reason to think that what has been presented in this work will emerge unscathed from the debate which it will hopefully foster.

With this in mind, it is interesting to compare the physical picture of the aether as now envisaged with what is implied in the following words, quoted from a book "*NEWTON: The Making of a Genius*' (MacMillan, 2002) by Patricia Fara. On pages 82-89, under the heading 'DISCIPLES', she refers to the physician George Cheyne (1672-1743) concerning Newton's conjectures about gravity, with this as a statement on page 87:

"Cheyne was one of the first of Newton's successors to explore aether models, which became increasingly prevalent from around 1740. Interpretations varied enormously, largely because as the mediators between matter, motion and spirit, aetherial fluids carried huge theological implications. Relying on arguments that ranged from the ineffably vague to the extraordinarily convoluted, natural philosophers described weightless invisible fluids of subtle particles seeping through the pores of solids, forcing gases to expand, and cushioning the sun in a great repellent cloud whose graduating density maintained the planets in their appropriate orbits.

Often authenticated by the adjective 'Newtonian', aethers proliferated and diversified as authors with very different religious commitments summoned them up to explain mysterious phenomena like electric charge, magnetic repulsion, or human memory."

Our modern generation as a result has been brain-washed, as it were, into believing that the aether is non-existent, merely an oldfashioned idea that has been disposed of by scientific evidence. It was seen as a medium which provides an absolute frame of reference in which the speed of light is constant, but experiment based on reflecting light back on itself in different directions in the laboratory on Earth which moves at very high speed relative to the cosmic background, failed to provide a measure of speed through the aether. As the aether did not live up to man's expectations it had to be discarded in favour of a philosophy based on Einstein's doctrines on 'space-time' and 'relativity' which makes the observer the frame of reference.

Yet, surely, we must bear in mind that the existence of the aether is not a question of whether Newton was right or wrong in that belief, or whether, in modern physics, Einstein's authority is the governing factor. The experimental facts in the discipline of physics, if interpreted correctly, tell us what we need to know about the aether and neither Newton nor Einstein has shown us how Mother Nature determines G, the constant of gravitation in terms of a unified theory.

As to scholarly debate and challenge of one's ideas, in a chapter entitled 'ENEMIES', Patricia Fara's study of Newton shows how God features in the aether discussion. On page 113 of her book one reads:

"Protagonists on both sides often used the metaphor of a clock to portray the conflicting accounts presented by Leibniz and Newton of how God superintends the universe. On Newton's model, God is constantly active throughout the cosmos, and intermittently exerts His supreme power to intervene and alter the laws of nature. Leibniz was scathing about this view: 'Nay, the machine of God's making is so imperfect, that he is obliged to clean it now and then .... and even mend it, as a clockmaker mends his work.' Surely, he protested, God is no sloppy mechanic, but a skilled craftsman who could initially wind up His clock to run perfectly throughout eternity. According to Newton, God created independent, individual particles that, as they travelled through empty space, constantly interacted with each other and formed new associations. In contrast, Leibniz maintained that God has established a harmonious universe completely filled by inherently active entities called monads. Although they operated independently, and no longer needed God's direct control, Leibniz's nomads had been in a sense pre-programmed so that they worked together to fulfil His plans."

It is no wonder that, by invoking God, these ideas about the aether should attract comment and, indeed, ridicule by the non-scientifically minded men of religion. National rivalry also contributed to the criticism directed at Newton, as we see from some words on page 139 in Patricia Fara's book in the chapter entitled 'FRANCE'.

"Nor does great NEWTON'S famous system stand, On one compact foundation, simply plann'd Reflect how vainly is that Art employed, Which founds a stately fabrick on a Void Confess the fair result of sober thought,

Who builds on vacuum, merely builds on nought."

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This was attributed as a quotation from a poem '*Anti-Lucretius*' by Cardinal de Polignac (1747), dedicated to promoting 'Religion and Virtue' and said to be 'resolutely Cartesian'.

In presenting an account of the aether in this year 2003 it seems unlikely that the religious opinion will intrude in such a way, given the state of science and technology of our modern day. However, one has to consider the climate of opinion prevailing amongst the scientific community. I therefore introduce what I have to say on this by making one final quotation from Patricia Fara's book which appears on page 254 in a chapter entitled 'INHERITORS':

"Newton may have regarded himself as a giant who stood on other's shoulders, but new contenders for the position of outstanding genius would, in their turn, come to surmount him. During the twentieth century, the main competitors for Newton's place were Einstein and Hawking."

I find this a curious assertion as it is hard to belief that, in the pursuit of scientific truths, one should be 'contending for the position of outstanding genius'. In this modern world of communication with its all pervading 'media' activity one would surely need to have a publicity agent to engage in such a contest and the winner claiming the title could but feel somewhat foolish.

One need not question Einstein's 'genius', as such, given the impact he has had on those who teach physics. However, whereas the physics of Newton will survive in the teaching curriculum it seems improbable that Einstein's 'space-time' notions can survive for long, given that physics students emerging from their school education may have heard of Einstein but know next to nothing about his theories. Already in this work we have seen how aether theory can so easily explain the phenomena on which Einstein has built his claims. Certainly, I see no case for saying that Einstein could ever displace Newton as a figure head in the world of physics.

#### THE PHYSICS OF CREATION

Einstein made his contribution in the earlier years of the twentieth century and the 'contender' for Newton's place at the end of the twentieth century is, according to Patricia Fara, Stephen Hawking, a professor at Cambridge University in England. Hawking bases his claim to fame on 'Black Holes' and their effects on leptons in nearby vacuum, but one must wonder how anything meaningful can emerge from a study of effects in remote space, given that the study is based on insufficient knowledge as to the nature of gravitation. There seem to be some stellar objects in galaxies that exhibit enormous mass compared with our sun, if that estimate of mass is based on the value of G that we associate with Newton's observations of our solar system. However, G depends upon those gravitons discussed in chapter 2 and therefore one could say that a star which finds itself in a region of aether subject to intense energy activity might have its quantum dynamic motion balanced by gravitons that are leptons of the heavy electron variety, muons, rather that tau-leptons that are superheavy electrons. The mass of the stellar object need not be too different from that of the sun, but the volume of the associated graviton system in the vicinity of that object could be greater by tens of thousands, meaning that G as applied to that object could even be many millions of times greater than applies in our solar system.

Stephen Hawking may have been born 300 years after the death of Galileo (1642), as we are told by his books, just as Isaac Newton (1642-1727) was born 100 years after the death of Galileo, but that is hardly a qualification adding authority to their respective contributions. If it were, then I too, being born in 1927, two hundred years after the death of Newton, would hope that this could add a little weight to what I have offered in this work.

It is on this light-hearted note that I now close this account, whilst noting that more information concerning my theory and its onward development can be found by inspecting my website <u>www.aspden.org</u> which I maintain in my retirement as my voluntary contribution to the scientific community.

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### APPENDIX I

# The Exclusion Zone of Interaction Energy

When two particles interact owing to the interaction of their mutual electrostatic or gravitational fields, the fact that field energy density is proportional to field intensity squared means that there is a cross-product component of energy density separate from the selfenergy components of either particle. This cross-product component is what is meant here by 'interaction energy'. Our task now is to prove the following theorem:

Given two particles separated by a distance r and subject to an inverse square of distance law of force, prove that their interaction energy sums to zero within a sphere of radius r centred on either charge.

Why is this important? It is important because in physics we face the problem of working out how fast that energy can transfer from its distribution over the whole of the field enveloping the particles to satisfy the Principle of Conservation of Energy by moving to or from the kinetic energy state which is seated with and shares the motion at the particle location.

For the electrostatic case, consider a charge Q in the figure above as developing a radial electric field  $V_Q$  at radius x. Imagine then a charge q distant r from Q developing a radial electric field  $V_q$ at the radius x from Q. Let y denote the distance from q and a point P under consideration at radius x from Q. Then, with  $\phi$  as the angle between  $V_Q$  and  $V_q$ , we know that the interaction energy density component at P is:

 $(V_0 V_q \cos \phi)/4\pi$ 

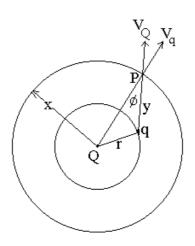


Fig. I.1

Also,  $V_Q$  is  $Q/x^2$  and  $V_q$  is  $q/y^2$ . Now consider the volume of an elemental section of a spherical shell of thickness dx at the radius x, as subtended at P by a small solid angle from q. The elemental volume is  $y^2/\cos\phi$  times this angle per unit thickness of the shell. If this is multiplied by the above expression after replacing  $V_Q$  and  $V_q$  by the above terms in x and y, we find that the  $\cos\phi$  term is eliminated as is the  $y^2$  term, to leave us with an expression for the energy attributable to that elemental section dx of shell is  $Qq(dx)/4\pi x^2$  times the solid angle mentioned. Since this does not depend upon y, we can evaluate the total energy component dE for the full solid angle of  $4\pi$  to obtain:

$$dE = (Qq/x^2)dx$$

Provided x is greater than r, the fields  $V_Q$  and  $V_q$  are in the same direction. With x less than r the two regions of the spherical shell intercepted by the same solid angle have opposite and cancelling interaction energies owing to the change of direction of  $V_Q$  relative to  $V_q$ . Thus within the radius r the interaction field energy sums to zero and so the proposition is proved.

Now we could have replaced Q and q by masses M and m and, by introducing G, the constant of gravitation, as a coefficient, reached exactly the same conclusion, namely that there is no net interaction energy within a sphere centred on M or, by the logic of symmetry, centred on m.

Accordingly, whether we have in mind the electrostatic interaction or the gravitational interaction, the energy transfer for change of separation distance involves energy having to traverse the distance r in going to or from the kinetic energy state in the process of transfer with field energy.

A separate mathematical analysis based on the use of MacClaurin's Theorem can show that the interaction field energy distribution at radii beyond r is inversely proportional to the square of x. From that one concludes that the precise distance energy travels in its transfer between field and kinetic energy is the distance r. The latter analysis is of record in chapter 1 of my book: *'Physics Unified'* and also in a paper of mine published by the U.K. Institute of Physics [*'The Inverse Square Law of Force'*, J. Phys. A: Math Gen., **13**, 3649-3655 (1980)].

The importance of the theorem here presented is evident from the analysis in chapter (9) where we derived the equation (9.6) which led us to a physical foundation for the Neumann potential in terms of the Coulomb interaction. An equally important result, however, is that afforded by the clear analogy with the gravitational interaction, because equation (9.6) has a gravitational counterpart that is the basis of the point made in chapter 5 by reference to the expression (5.1). Physicists whose minds are entrenched in relativistic doctrine would do well to take stock of what has just been stated here, because one can see, from the argument that follows expression (5.1) in chapter 5, that the perihelion motion of planet Mercury can be explained by the simple classical logic of classical field theory, once the theorem presented in this Appendix I is given due attention.

### APPENDIX II

# *Inertia and* $E = Mc^2$

The physical basis of inertia and so of the well-known formula  $E = Mc^2$  resides in the Principle of Conservation of Energy and, contrary to what many physicists believe, the unwillingness of an electron to radiate and so shed the only attribute that accounts for its existence, its electric charge and the energy intrinsic to that charge.

Electron acceleration in company with other electrons accelerated by the same electric field will engender a collective action by which energy can be said to be dispersed by setting up electromagnetic wave propagation. If N electrons are involved then the rate of energy radiation is, by Larmor theory, said to be proportional to  $N^2$ . Physicists who see this as applying to radio transmission from antenna in which numerous electrons are caused to oscillate in synchronism with one another must, however, ask themselves whether the radiation might be proportional, not to  $N^2$  but to ( $N^2 - N$ ), whereby we exclude radiation of the very energy that keeps the electrons alive.

Why, I ask, should physicists just declare that an electron is accelerated without, as they do, factoring into their analysis the external electric field that causes that acceleration?

Now I could write many, many pages in support of my concern, but see no reason for replicating and developing what I have already published elsewhere. My book: *'Physics Unified'* includes a discussion in chapter 4 where I refer to 17 authors who seem to be troubled by this problem. These authors include Dirac and Einstein.

If you think Einstein's theory is rigorous, ask yourself how we measure relativistic mass increase of a fast-moving electron unless it is rapidly accelerated. Then note Einstein's words in a famous paper of his entitled: 'On the Electrodynamics of Moving Bodies':

"As the electron is to be slowly accelerated, and consequently may not give off any energy in the form of radiation, the energy withdrawn from the electrostatic field must be put down as equal to the energy of motion of the electron."

The reference is Annalen der Physik, 17, 891 (1905).

If you respect the work of Nobel Laureate Paul Dirac, just look up the paper in which, in discussing the classical theory of energy radiation by accelerated charge to accommodate relativistic principles, he stated:

"It would appear that we have a contradiction with elementary ideas of causality"

Here the reference is Proc. Roy. Soc., A167, 148 (1938).

So my case is simple. Just go back to see how the formula for electron energy radiation was derived in the first place. I will not repeat the analysis here but will present the mathematical integral on which it is based:

$$2\int_{0}^{\pi} [(1/8\pi)(efsin\Theta/c^{3}t)^{2}2\pi(ct)^{2}sin\Theta cdt] d\Theta = 2e^{2}f^{2}/3c^{3}$$

This is derived at p. 81 in my book: '*Physics Unified*'. There are two important points to notice about this formulation. Firstly, it contains no symbol which represents the intensity of the electric field which must be present in order to set up the acceleration f. Secondly, that factor of 2 before the integral sign is put there because it is assumed that the electric field disturbance that is propagated must, by virtue of our understanding of Maxwell's theory of wave propagation, be matched by the propagation of an equal magnetic field disturbance.

Now I can declare quite categorically that once the accelerating electric field of strength V is included that integral above becomes zero, provided we have:

$$Ve/f = e^2/2c^2(ct)$$

and since  $e^2/2(ct)$  is a measure of the electric field energy outside the radius ct, t being time, that remains to be accelerated as the disturbance progresses at speed c, it is evident that here we have a formula that tells us that an electron will accelerate in just such a way as to avoid shedding its electric energy, the condition being that the inertial mass is the electric field energy involved divided by  $c^2$ . So we have  $E = Mc^2$  derived by classical electron theory and a physical insight into the nature of inertia.

The reason I am delving into this subject here is my concern about the theory of the Hubble constant in relation to the classical formula for the Thomson scattering cross-section of the electron. The theory for this depends upon the above formula for the rate of energy radiation by the electron deemed to be accelerated by the passage of an electromagnetic wave intercepted by the electron. If there can be no radiation of electric field energy by the isolated electron accelerated by such a wave then, in that respect, the scattering crosssection of the electron must be zero. However, I can see the case for the magnetic disturbance, or rather the kinetic energy disturbance implied, to still ripple through as part of the resulting wave propagation. To that extent, and bearing in mind that there is a measure of qualitative evidence supporting the Thomson scattering attributed to electrons. I tend to the opinion that an electromagnetic wave encountering isolated electrons in space does confront an obstructing cross-section that is half that indicated by the classical Thomson formula.

In this case there is logic in looking to the transient creation of electrons by the aether's failed attempts to create protons as a reason accounting for the attenuation of intensity and frequency of waves coming from distant stars. It is just that the theoretical determination

(chapter 8) of the magnitude of the Hubble constant is affected, but surely we do have here a profound insight into some fascinating aspects of the physics that underpin our universe and I just hope that physicists will see enough reason to revise their opinions in the light of these comments.

As to revising one's opinions, readers may find it of interest to read what I have recorded ahead in Appendix VI concerning Einstein's notion of time dilation and also concerning the significance of what I have said in Chapter 9 about Fechner's hypothesis and its bearing upon electrodynamic interaction. Our understanding of the physics of Creation is, to be sure, an evolving theme, but one can be equally sure that what is reported here in this work is closer to the truth than a physics based on Einstein's theory.

### APPENDIX III

## The Electron's Anomalous Magnetic Moment

This Appendix is a slightly edited version of a chapter entitled 'An Excursion in Quantum Electrodynamics' which appears in my book: 'Aether Science Papers' published in 1996.

The starting point in the whole of my research has been the subject of electrodynamics and its energy anomalies, by which I mean the experimental anomalies and not the paradoxical notions that beset the theory of the subject.

I have found repeatedly, from my attempts to write about such matters, that referees of physics journals delight in pointing to the success of quantum electrodynamics in explaining the anomalous magnetic moment of the electron. They claim such precision in their calculations that is so overwhelming that surely only a fool would dare to think that, by contemplating an aether, there may be a better and easier way of going about that task.

So, having discovered the easy alternative, I delved into that wonderful world of QED to see how its magic derived a theoretical value for the g/2 factor of the electron which measurement shows as being 1.001159652193(10). This is the value adopted in consultation with the CODATA Task Group in 1986 and as made available to scientists in U.K. by a pocket chart published by The Royal Society jointly with other learned bodies. The numerical value just quoted is stated to be the magnetic moment of the electron in terms of the Bohr magneton. I saw that a book entitled 'Introduction to Gauge Field Theory' had been authored by Bailin and Love and published in 1986 under the auspices of the Institute of Physics in U.K. and that the promotion literature specifically declared that it provided 'a detailed treatment of quantum electrodynamics'. I bought that book with the express purpose of seeing exactly how those who really understand QED actually obtain the wonderfully precise number that one understands fits so well with the value measured.

In a browsing mood, I first opened the book on page 214 and was pleased to see that chapter 14 began with the words: "The spectacular success of quantum electrodynamics (QED) in calculating the Lamb shift and the anomalous magnetic moment of the electron and the muon ...". Yes, that statement meant that what I was looking for would be found in the earlier chapters of the book. After all, here was a book on that very subject.

I found the relevant section heading on page 140: 'The electron anomalous magnetic moment'. The opening words were: "In this section, we specialise to the case of QED (Abelion gauge theory) and derive the electron anomalous magnetic moment. For convenience we shall work in the Feynman gauge..." I was expecting then to see the analysis develop to the derivation of something very close to that 1.001159652193(10) number recited above, but, to my horror, the derivation ended on page 142 with the words:

"Thus the anomalous magnetic moment of the electron  $\mu_{AMM}$  is:

 $\mu_{\rm AMM} = (\alpha/2\pi)(e/2m)."$ 

Alpha,  $\alpha$ , is a fundamental constant in atomic physics, the fine-structure constant. I knew that this was only the first-order determination, being the reciprocal of  $\alpha/2\pi(137.036)$ , which is 0.0011614. Evidently the 'spectacular success' was not something I could verify by guidance from that book. I was expected to accept that QED was a 'spectacular success' but it was something I had to take on trust without knowing what assumptions were made in the onward iterations of the calculation.

The book was, of course, full of equations, each one following the other and so conveying the impression of being 'a tight logical structure' but when the crunch came and a numerical result should have emerged I had to be satisfied with the above first-order approximation formula.

From my academic background in engineering I had always judged the result of a 'tight logical structure' on the end result, by comparing the numerical value derived with that observed as an actual experimental result.

I am now going to make the outrageous statement that QED is so powerful a technique that it is like taking a power-driven sledgehammer to crack a nut. There just has to be an easier way to explain how Nature determines that anomalous magnetic moment!

A back-of-an-envelope type of calculation can do better than that QED result presented in the book by Bailin and Love. All that is meant by the anomaly of the electron magnetic moment is that the antics of an electron in motion cannot bring to bear the electric energy in the far field zone fast enough to affect its inertia when in orbit having a very restricted radius. There is a cut-off range connected with the electron's Compton wavelength and only the electric field energy within that range contributes to the electron's inertia in its state of minor orbital motion.

This may be an engineer's way of looking at the problem, but it is a realistic approach.

If what I have said above about the moving atom and its problems in collecting energy spread over its electromagnetic field is 'phantasy', then so the world of QED is phantasy of an extreme kind, because that goes even further by involving us in the problems of photon-electron interactions and something called 'normalization' to avoid infinities but which amounts to the 'cut-off' range just

mentioned. So, I sit, in my aging years, watching the world of physics evolve its 'tight logical structure' and wonder if that world will ever look up my paper, '*Fundamental Constants derived from* 

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*Two-Dimensional Harmonic Oscillations in an Electrically-Structured Vacuum', Speculations in Science and Technology, v. 9, 315-323 (1986).* That paper shows, in a few pages, how the electron's g/2-factor, can be explained with at least the same precision that is claimed for QED.

The formula is:

 $g/2 = 1 + \alpha / [2\pi (1 + 3^{1/2}/N) - \alpha]$ 

Here, N is determined as the nearest prime number to the value  $3\pi/2\alpha$ . Since  $\alpha^{-1}$  is just a little above 137, N is 647. The table below is reproduced from that referenced paper to show how g/2 depends upon the value of  $\alpha^{-1}$ .

| (alpha) <sup>-1</sup> | (g/2) factor   |  |
|-----------------------|----------------|--|
| 137.03597             | 1.001159652365 |  |
| 137.03598             | 1.001159652280 |  |
| 137.03599             | 1.001159652195 |  |

Now, that paper of mine was received by the publishing journal in November 1985 and at that time I, the author, was completely unaware of the prospect that the CODATA values to be adopted later in 1986 would establish 1.001159652193(10) as the g/2-factor of the electron. Nor did I imagine that the  $\alpha^{-1}$  value adopted would be 137.0359895(61).

What must then be absolutely clear to anyone reading this is the fact that if QED is a 'spectacularly successful' theory because it provides something very close to this relationship between the fine-structure constant and the anomalous magnetic moment of the electron, then it cannot be any closer than the value derived above using my very simple formula with N as 647.

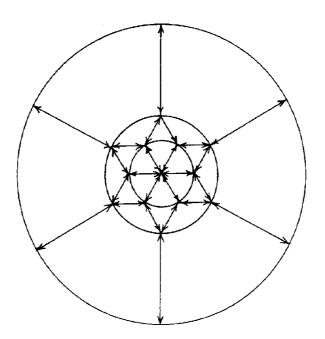
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What I offer, however, is a 'back-of-the-envelope' type of analysis for deducing that formula, whereas the eighth-order calculation based on numerous, indeed thousands of, Feynman diagrams as well as arbitrary hadronic involvements, as needed to get a close QED value, is a task that could well keep the reader fully occupied for several years. That assumes the reader has very advanced skills in the relevant mathematics, skills far in excess of the school-level training which suffices to understand my method.

As is well known, the electron exhibits a characteristic wave frequency,  $v_c$ , which is the Compton electron frequency. This is the frequency of the photon corresponding to the mass-energy of an electron at rest. Now, although Einstein may have said that the idea that something can be at 'rest' is meaningless, I do not accept that. You see, it is a question of deciding whether each electron in the universe is a law unto itself so far as external governing influences are concerned, or whether it is regulated by external influence. I can assure you that that Compton electron frequency is a universal regulating rhythm that beats the time and all electrons have to dance to that time. They are not free to wander, each having its own proper time, much as Einstein might have wished that to be the case! If you have read in books about 'time' that there is no such thing as 'universal time' then you have exposed yourself to a 'brainwashing' exercise conducted by devil authors who preach the Einstein doctrine but contribute nothing to the science which sustains technological progress.

My method involves an energy cut-off range determined by a wave resonance in the near-field zone of the electron as shown in the figure below. The length of the radial lines in the outer cavity is half the Compton wavelength of the electron, because the field oscillations are phase-locked by the charge polarity condition. The length of the radial lines in the inner core of the electron charge is approximately the electron charge radius *a* and represents a standing wave condition of much higher frequency.

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Pattern of electron field cavity wave resonance

Now, the electron itself is a form of energy compressed into a field and we can calculate how that energy is distributed. J. J. Thomson did that calculation in the 19th century to find that, in electrostatic units, the energy  $e^2/2\alpha$  was seated outside the charge radius  $\alpha$ . However, he discovered from the study of how electron mass increased with speed, even tending to become infinite as the speed of light was approached, that the effective rest mass of the electron was  $2e^2/3\alpha c^2$ .

This meant that, if the electron were hollow within the radius a, then we could write the energy E as being  $3Mc^2/4$ . However, even before Einstein came into the picture in 1905, the Cambridge cosmologist, Sir James Jeans had, in his early years before being knighted, explained that mass and energy are equivalent and had

argued that matter could be annihilated to produce radiant energy. He saw this as being the energy source feeding the sun and all other stars.

It is a simple exercise to work out that if the pressure of the electron field at the radius a is the same within the body of the electron, meaning that the charge e has an appropriate distribution conforming with this condition, then the speed of propagation of wave disturbances in the electron charge itself has the value c and that the electric energy inside that radius is  $e^2/6a$ . So, you see, the net result is an electron of energy  $2e^2/3a$  giving a relationship between energy and mass that we can write as  $E=Mc^2$ .

Much of this was accepted physics before Einstein appeared on the scene and was known as 'electron theory', so it is very hard to understand how modern physicists can write that history off as if it never happened!

For our immediate purpose, we have now the basis for studying the coordinated wave interaction as between that external influence at the Compton electron frequency and the wavelengths associated with that radius parameter a of the electron.

Looking now at the figure showing the pattern of the electron's field cavity resonance, ask yourself how the world outside the electron might interface with the world inside the core charge of the electron. If you think of pressure from the viewpoint of a gas then the interface is just a pressure interface and there is not much to say. However, a gas comprises numerous particles all moving in different directions. There are three degrees of freedom. However, inside that electron it may be that there are not numerous component particles behaving as a gas and moving with those three degrees of freedom. There could be an oscillation that has only one degree of freedom, amounting in its overall effect to a radial oscillation within the radius *a*. I emphasize here that I have no special insight into what goes on inside an electron. I can only make tentative assumptions and reason on that basis to see how what develops compares with what we see and measure in our experiments. So, I trust you are following the gist of my argument,

because I am coming to the point that between the sphere of radius *a* and the sphere interfacing with those Compton frequency oscillations there is an adjustment at constant pressure in going from one degree of freedom to three degrees of freedom.

What this amounts to is that the surface area of that intermediate interface will be three times the surface area of the inner interface. In short, the outer interface radius will be  $3^{1/2}a$ , subject, however, to a little 'tuning'.

Now, if this seems a little speculative, there is an alternative approach giving the equivalent result. Look again at the figure and imagine both the radial oscillations within the core charge of the electron and in the cavity excited at the Compton electron frequency as setting up standing wave antinodes needing to balance those of travelling waves progressing by reflection around a circuit within the middle cavity. You will see that the three-wave interface at the charge surface requires a  $120^{\circ}$  angular separation. The geometry of this system also requires the outer radius to be  $3^{1/2}a$ .

A vital consideration is what it is that tells an electron that it is a negative charge or a positive charge. I do not want to dwell too long on this point so I will simply explain that it is all a question of how those the two frequency modes of oscillation beat together. Undoubtedly, as those who may study the history of aether theory may discover, the answer lies in developing the concepts of C. A. Bjerknes of the period 1877 to 1910. Positive and negative are states involving oscillations in antiphase, all positive charges sharing a common phase and all negative charges sharing a common phase, but I leave that research to others. Suffice it here to say that the phase of oscillation is important. The Compton electron wavelength has to blend with the wavelength 2a, as the reader can work out from that pattern shown in the figure.

The ratio of these wavelengths has to be an odd integer that cannot be factorized as that would allow the phase of the electron oscillations to have optional values in relation to the regulating universal rhythm of the Compton frequency oscillations. All positive electron charges have the same phase and all negative electron charges have the same phase but positive and negative charges are different because they are in antiphase.

This is the secret of the meaning of electrical charge polarity. It is just a question of phase, but there is phase-lock ensuring that there are no maverick charges in the electron family. There are only electrons or their positive versions, the positrons.

It is on this basis that there is a constraint on the adoption of the distance parameter *a* as a wavelength. The wavelength ( $\lambda_c$ ) assumed by the resonant oscillation within the electron has to ensure that:

$$(\lambda_c)/2 = Na$$

where N is a prime number.

Now, from what has been said above, it can be seen that, since *a* without this constraint is given by  $2e^2/3hv_c$ ,  $hv_c$  being the rest-mass energy of the electron and the Compton wavelength  $\lambda_c$  being  $c/v_c$ , we can write as an approximation:

$$a = (2\pi e^2/hc)\lambda_c/3\pi$$

From these two equations we find that N becomes the nearest prime integer to  $3\pi(137)/2$ , bearing in mind that  $\alpha$ , which is  $2\pi e^2/hc$ , is approximately 1/137. This gives N, uniquely, as 647.

The formula for g/2 is then easily explained because the field energy of the electron disposed outside the cut-off radius R is simply  $e^2/2R$  and R is simply  $(\lambda_c/2)(1+3^{1/2}/647)$ . Using the formula:  $(g/2)(mc^2 - e^2/2R) = mc^2$ 

where m is the normal rest mass of the electron, and also the fact that  $\lambda_c$  is h/mc, it then needs a little algebra to find the residual electron energy thereby effective in confined orbital states of motion. This allows us to determine its ratio to the normal energy applicable for translational motion but one then arrives at the result presented in table above.

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### APPENDIX IV

# Hydrogen as a Star

Stars are ionized. They comprise hydrogen atoms. They have sufficient mass for the force of gravity to squeeze those atoms close together. Their K-level electrons then crash into the electrons of adjacent atoms and so sustain the ionization. As a result the nucleus of the hydrogen atom, the proton, the seat of most of the mass present, can come free and be pulled inwards towards the centre of the star owing to gravity. The result is equilibrium when the electrostatic repulsion of the many protons involved balances the mutual gravitational attraction, not of those protons, but of the full atomic composition of the star that lies within the pressure threshold set by the critical contact between those electrons in the K-level of the atomic structure.

The radius of the K-level electron orbits in hydrogen is known to be  $5.292 \times 10^{-9}$  cm and so, once the pressure reduces the distance between the nuclei of the adjacent hydrogen atoms to  $1.0584 \times 10^{-9}$  cm, then one can expect the ionization state, as produced by gravitational action and so the dynamic activity of the aether which accounts for that action, to develop in such a way as to give basis for the following formula relating charge density  $\sigma_s$  and mass density  $\rho_m$  in the star:

$$\sigma_{\rm s} = \rho_{\rm m} (G)^{\frac{1}{2}}$$

This is equation (8.12) in chapter 8. Our object here in this Appendix IV is to determine that mass density for hydrogen atoms having contact between their K-level electron orbits. For a simple cubic array of such atoms there is one hydrogen atom in every unit volume defined by the cube of that distance  $1.0584 \times 10^{-9}$  cm and, since a hydrogen atom has a mass of  $1.67 \times 10^{-24}$  gm, this corresponds

to a mass density of 1.41 gm/cc. This happens to be the mean mass density of the Sun.

However, we need to justify that simple cubic structure, because most physicists will suggest that some close packing of the kind known to crystallographers will be more likely. To answer this I draw attention to the fact that our analysis of aether structure has already relied on a simple cubic structure of those quons that form the E frame of the aether. The reason there was that the quons repelled one another and sought to be as far apart as possible. The same could apply to hydrogen atoms squeezed close together, because each of those protons sitting at the atom's centre is screened by a single electron. This means that the protons, though 100% screened electrostatically, on average, will sporadically be exposed in the sense that they will, as it were, see the charge of the adjacent protons. In finding the optimum 'crystal' structure they will, like the quons in the aether, then opt for the simple cubic array.

That is my case in support of the argument that hydrogen stars will have a mean mass density of 1.41 gm/cc and the one star we can be sure about in determining its mass density is our sun, which has exactly that mass density of 1.41 gm/cc.

#### APPENDIX V

# The Angular Momentum of the Solar System

In the following table the parameters from which the angular momenta of the planets can be estimated are listed. To simplify the data the planetary orbits are deemed to be circular. The data are in Earth units, the mass, orbital radius and annual rate of revolution in orbit being taken as reference. The sun, with an estimated angular momentum, is included to facilitate summation. All the angular momenta are in the same direction as all planets rotate on the same sense as the sun rotates about its axis.

| Body    | Mass   | Orbit<br>radius | Years per revolution | Angular<br>momentum |
|---------|--------|-----------------|----------------------|---------------------|
| Sun     | 332800 |                 |                      | 20 approx.          |
| Mercury | 0.05   | 0.387           | 0.24                 | 0.03                |
| Venus   | 0.82   | 0.723           | 0.62                 | 0.69                |
| Earth   | 1.00   | 1.00            | 1.00                 | 1.00                |
| Mars    | 0.11   | 1.52            | 1.88                 | 0.135               |
| Jupiter | 317.8  | 5.20            | 11.86                | 724.6               |
| Saturn  | 95.2   | 9.54            | 29.46                | 294.1               |
| Uranus  | 14.5   | 19.18           | 84.01                | 63.5                |
| Neptune | 17.2   | 30.07           | 165                  | 94.3                |
| Pluto   | 0.11   | 39.44           | 248                  | 0.69                |

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The total angular momentum of the solar system may be estimated by summing the last column. It is found to be about 1200 Earth units. The Earth mass is approximately  $6.0 \times 10^{27}$  gm and the Earth's orbital radius is approximately  $1.5 \times 10^{13}$  cm. The Earth rotates in orbit through  $2\pi$  radians in a year comprising  $3.15 \times 10^7$  seconds. Thus one Earth unit of angular momentum is  $2.7 \times 10^{47}$  gm cm<sup>2</sup>/s. 1200 such units makes the total angular momentum (AM) of the solar system some  $3.2 \times 10^{50}$  gm cm<sup>2</sup>/s.

If  $\omega$  denotes the angular velocity of the sun at creation when its mass M was no doubt very much the same as its present value of  $1.989 \times 10^{33}$  gm and its radius R little different from its present value of  $6.96 \times 10^{10}$  cm, then based on its mass density being uniform, as has been deduced by reference to Appendix IV, then:

and:

$$(AM) = 2MR^2\omega/5$$

$$\omega = 8.3 \times 10^{-5} \text{ rad/s}$$

This is an empirical value based on data found by observation and measurement of our solar system. The fascinating achievement of the theory discussed in this work by reference to aether spin and Appendix IV is the value of  $\omega$  indicated by equation (8.13) in chapter 8:

$$\omega = \rho_{\rm m} \left( 4\pi G / \rho_{\rm o} \right)^{\frac{1}{2}}$$

which, since the term in brackets is known to be  $5.39 \times 10^{-5}$  rad/sec per gm/cc and since the mass density of the sun is 1.41 gm/cc, tells us, by theory alone, that the angular velocity of the sun's aether at creation was  $7.6 \times 10^{-5}$  rad/s. This differs by less than 10% as a comparison between theory as applied to an event billions of years ago when the sun was created and the evidence before us today from the data we have about the solar system. A little speculation might then suggest that, since we have shown in chapter 8 why the sun's aether at creation was locked into sharing the angular spin velocity of the sun itself, but

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this came about before the sun had acquired its full inflow of mass and angular momentum. In then spinning faster than the  $G^{1/2}$  factor times 1.41 gm/cc allowed, the sun ceased to share its aether spin angular velocity and, lost all chance of recovering that spin-lock, once it traversed a space domain boundary and shed its planets. I am, of course, in these final words indulging here in speculation, but my object is to tempt readers to find better answers, all in the onward pursuit for truth in our research into Mother Nature's realm of Creation.

Aspiring students of cosmology might be interested in working out how stars cluster over time so that there can be several sharing a space domain, whereas over large expanses of space between galaxies there will be many space domains unoccupied by stars. One could conceive of two stars created with much the same mass as the sun, but yet are not created as a binary pair, moving under gravity in a common space domain and so being drawn together, either to form a new star of double the sun's mass or settling into a stable dynamic system and forming such a binary star combination. With that and the fact that the above equation for  $\omega$  does not depend upon stellar mass in mind, such a student might have his or her curiosity aroused upon reading the passage I now quote from P. M. S. Blackett's article in *Nature*, **159**, 658-688 (1947):

"From statistical evidence on stars of similar type the probable values of these quantities (stellar mass, radius and angular velocity of rotation) in terms of the values for the sun are found to be:

M = 2.3 R = 2.0  $\omega = 25.$ "

The message I read in that  $\omega$  factor 25 is that most stars have escaped the experience of giving birth to planets. Maybe at creation they acquired more linear motion than did our sun and so they traversed their first and subsequent space boundary encounters at a

much higher speed, so that gravitational upheaval during transit had insufficient effect.

That figure of 25, as referenced on our sun, clearly says that most stars of the same type as our sun exhibit a rotational speed of approximately once per day, given that the sun rotates once every 25 days. Our Earth's once per day rate of rotation corresponds to an angular velocity of  $7.27 \times 10^{-5}$  rad/s.

Is it not then quite fascinating to find that our theory for the creation of a star, as based only on our analysis of aether structure plus what we know about the hydrogen atom, tells us that stars at creation spin at  $7.6 \times 10^{-5}$  rad/s? Such analysis does not depend upon space domain size, though the latter, given that speed of rotation, does determine the mass of the star.

### APPENDIX VI

#### The Hypotheses of Fechner and Einstein

Readers will not be surprised to hear that upon reading through what I have written in this book about Creation, there are a couple of after-thoughts that warrant mention. Those who believe Einstein's theory will, no doubt, assume that my theory cannot explain the evidence of record deemed to support Einstein's hypothesis concerning 'time dilation'. Then there will be those who are a little bewildered by my reliance on Fechner's hypothesis to explain the electrodynamic action of electric current flow as arising from pairs of oppositely charged particles created in spaced relationship and then annihilating one another upon coming together by moving in opposite directions.

Surprising though it may seem, there is scope for challenging Fechner's hypothesis constructively and thereby overcoming a problem that it poses, but in so doing one finds that the experimental evidence relied upon as proving 'time dilation' may become instead proof that supports the theory presented in this work.

There is only one reported type of experiment which purports to support Einstein's 'time dilation' hypothesis. This is that indicating the enhanced lifetime of the muon as a function of its speed. I discount the idea that time dilation is inherent in Einstein's conception of distorted space as a valid means for explaining the null result of the Michelson-Morley experiment as already discussed in chapter 9. Also one can dismiss the evidence arising from an experiment which involves transporting an atomic clock in an aircraft flying around the world to see if it loses time or gains time relative to an atomic clock sitting at the base location. Here the question one faces is whether speed or acceleration or both, being different for the flying clock and that at rest on body Earth, will affect the clock rate. You see, we are not here discussing time as such but are discussing an atom, meaning the change of energy states of electrons in motion around the atomic nucleus and this involves photons, the frequency of which depends upon energy, not time. The atomic clock rate is affected by change of gravitational potential and so altitude. It confuses the issue to imagine atomic clock rates as changing owing to so-called 'time dilation'. See the Section IV, 'Times Rates of Moving Clocks' of my paper: "Synchronous Lattice Electrodynamics as an Alternative to Time Dilation, (Hadronic Journal, **10**, 185-192; 1987). It is included as the fifth paper of the Appendix in my book *Aether Science Papers*.

Now I must digress just a little before coming to the detail of the theory of dilated muon lifetime, as I now perceive it in the light of the derivation of the muon rest-mass lifetime, as presented in chapter 3 of this work.

Imagine a lamp that runs on electricity from an electrically charged cell, a battery. It has a certain illumination lifetime, its light going out once the electric charge from that battery is all shed. Now imagine that the lamp is taken on a long journey accompanied by lots of charged cells. The lamp will glow for a longer period proportional to the number of cells and their total electric charge. Now, if you assembled such a device and observed the enhanced illumination lifetime of that travelling lamp, I believe you would think it a joke if someone said to you: "Ah yes, here is the evidence I have been seeking concerning Einstein's theory. You have proved that Einstein was right when he conceived the notion of 'time dilation'. Time itself really does alter its rhythm and extend itself, the faster the speed of the object under observation."

However, the comment may not seem quite so ridiculous if what you were observing was something rather elusive as seen in the microcosmic world within a high energy particle accelerator at CERN in Geneva, Switzerland. Physicists probing the darkness of the unknown by getting fundamental particles to move at very high speeds are more closely tuned to think in terms of Einstein's theory than theory at the basic electrician level, and so, upon seeing something that lives longer, as its speed approaches that of light, Einstein's time dilation formula comes immediately to mind.

What they saw in that accelerator was a system comprising many muons, a muon being a charged electric particle that, apart from its much greater mass, has features resembling the electron, but those physicists had no idea why those muons had a fleeting existence as, once created, they survive for a brief period only and then all that is left is electrons, albeit moving at high speed owing to the energy shed by the parent muon. It is a great mystery as to how the muon comes into existence and the best reason I can offer is that it already exists everywhere in space and reveals itself as matter only when it (a) takes up position in the dynamic aether lattice and shares the rhythmic motion of that lattice rather than having the random motion in the aether underworld and (b) somehow attracts and becomes attached to two electrons or positrons and adjusts its resonant state in the manner I have described in my paper: The Muon g-Factor by Cavity Resonance Theory, Lettere al Nuovo Cimento, v. 39, 271 (1984). In saying it exists everywhere I am merely echoing the message of chapter 3 entitled 'The Ubiquitous Muon'. However, as to the electron itself, you may wonder how that is created. We have seen in chapter 4 the theory explaining how the proton is created from muons and we know from experiment that muons in matter form can decay into electrons or positrons, but surely that might only mean that the muon has shed its hangers-on. We are left with the puzzle of how, in theory, electrons are created. Well, I cannot answer that, except for noting that our theory in chapter 6 has explained how the photon is created in a space medium that has a characteristic frequency, that universal rhythm of space that leads us to the dynamics of gravitation by connecting the mass of matter with the gravitons. Surely the fact that a photon having that characteristic frequency defines an energy quantum which is precisely that of the electron rest-mass, is the clue

by which to solve the puzzle. One is merely left with a chicken-and egg type of problem, as to whether the electrons are created ab initio and somehow then regulate the oscillations of the underworld of space or whether the universal oscillations and ordered structure of space set in first and so determine the form of the electron.

Here we will confine our attention to the question of the muon and its extended lifetime at speed as determined by those experiments at CERN. Yes, indeed, particle physicists could measure the lifetime of the muon just as an electrician can time the illumination of that lamp mentioned above, and they even found that, the faster the muon travelled, the greater its lifetime in proportion to its overall energy, including its rest-mass energy. Yet somehow they missed seeing how, just as for that lamp, the muon in motion needs an entourage of energy cells which is greater in number, the greater that speed.

They were well aware that Einstein had, some 65 years earlier, supposed that the dimension of time is woven into the fabric of space, a fabric which can be stretched and twisted, with the result that space can be curved (whatever that means in non-mathematical terms) and time can be dilated (whatever that means in non-mathematical terms). So, when the muon at speed was found by experiment to have a longer lifetime, one proportional to its increase in energy, that was said to be 'proof' that Einstein's theory was right. Quoting the very words used at page 62 in the paper by Bailey and Picasso (Progress in Nuclear Physics, v. 12, Part 1, pp. 43-75; 1970):

'To conclude, the CERN Muon Storage Ring group has proved that the "clock paradox" is established as an experimental fact (at the level of approximately 1.2%).'

Well, enough of this, the task here, after some further 33 years from the publication of that paper, is to explain the extension of muon lifetime to those of you who prefer to live in the same three-space dimensional world as those of pre-Einstein times.

Firstly, you must understand what governs the lifetime of the muon at rest. As we saw in the latter part of chapter 3 it was determined by the simultaneous hit of the two electrons or positrons (those hangers-on to the muon in its matter form) by two virtual muons from the aether background medium. Secondly, you must understand that when that muon moves it acquires kinetic energy which takes the form of an accompaniment of muon charge pairs borrowed as needed from that aether background medium. Their presence is transient and regulated by statistical factors subject to the overriding control parameter, the energy momentum of the system. In a sense the muon, being a lepton can be part of a charge system in which pairs of opposite charges are constantly being created in the forward field followed by their decay, but ever subject to the need to preserve energy. Inevitably, however, the ultimate decay event occurs and the muon suffers demise as its energy disperses with the creation of a residual electron or positron.

A point of importance here is that the muon that we see as matter has somehow been conditioned to have a core mass that is an odd integer multiple, 207, times that of the electron, whereas by its coupling with two electrons or positrons it adds a mass of two electron units as offset by approximately 2.25 such units owing to the negative electrostatic interaction energy of this combination. [See the author's paper: *'The Nature of the Muon'*, Lettere al Nuovo Cimento, v. 37, 210 (1983)]. In contrast the virtual muons that become associated in pairs and add kinetic energy to the muon when it moves at speed have a mass-energy that is 206.3329 units of electron rest-mass energy. So, there are two kinds of core muons present, the primary  $\mu$ -207 form and the virtual  $\mu$  -206.33 form.

The muon lifetime is determined by virtual muon hits arising from the quantum electrodynamic fluctuations of the energy represented by the 'ubiquitous' muon field. A single virtual muon hit of a target electron or positron, which occurs some  $10^7$  more often than a dual muon hit, will merely rupture the composite three-charge muon in a transient sense and cause the electron or positron pair to resettle with a muon. However, there can be charge inversion in this process, by which it is meant that a positive muon and an electron in contact can exchange energy to become a negative muon and a positron. In any event there is an equal chance of the resettling electrons or positrons adopting any one of the residual muons as the core muon, whether it be a muon of the 207 form or one of the 206.33 form.

The result of this is that when the eventual dual hit occurs, if that event is for a composite muon form having the 207 muon as a core then that means muon decay, but, if that dual hit has as target the composite muon with a 206.33 muon core, then that merely frees a virtual muon which can find a partner in the virtual muon field and recycle its existence as part of the quantum-electrodynamic activity. The 207 muon is the misfit and it cannot survive this event and so combines with one of its associated electrons or positrons to decay and shed energy to the aether, the neutrino process, whilst freeing the other electron or positron which takes with it its substantial share of the energy released as the decay product of the muon.

One can then understand why it is that the chance of muon decay in relation to the decay lifetime of its rest-mass state is diminished in inverse proportion to the ratio of overall energy to muon rest-mass energy. This latter ratio is the total statistical number of those muons, virtual plus primary, to the primary muon component. This is why the CERN experiment involving many thousands of muons moving at speeds which increased their mass more than twenty fold did reveal evidence of the so-called time dilation of the muon. All that the experiment proved was that the 'genie in the lamp' was spreading its influence equal amongst all the energy components of the system, thereby sustaining their energy state for a longer period in proportion to the energy present.

The above discussion has concerned the muon and attributed its kinetic energy to its accompaniment in motion by the statistical

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presence of virtual muon pairs. The so-called relativistic mass increase of the muon arises from the mass added by the presence of those virtual muons. The electron, therefore, ought to conform in the same way, by having an induced electron-positron accompaniment and one can assume that it too would have an extended lifetime at high speed, matching its increased energy, if such a lifetime were to be recognized as something we can measure. Apart from the inference to be drawn from electron tunnelling through potential barriers, however, the electron's lifetime is elusive, because the decay does nothing other than recreate the lowest form of matter, the electron.

The question of interest then is whether the electron moving as a carrier of electric current is accompanied solely by other electrons or whether they share the task of conveying current with a flow of positrons moving in the opposite direction. This brings us to that problem posed by Fechner's hypothesis. I know it is easy to say that the electrons will annihilate the positrons but it is equally easy to say that, if the current circuit element they represent is suddenly switched off, so electromagnetic inductance will respond to set up a pulse of EMF which creates another such current element by a quantumelectrodynamic process involving electron-positron creation. Such a debate can lead nowhere, but there is an interesting history pertaining to this problem, albeit going back many years before the electron was discovered by J. J. Thomson.

One may refer to pages 201 to 208 of volume 1 of a book written by Sir Edmund Whittaker entitled: *History of the Theories of aether and Electricity*, published by Thomas Nelson and Son Ltd in 1951. After referring to Fechner (1845) and a similar hypothesis posed by Weber (1846) and then discussing these in some depth, Whittaker on page 206 states:

"It has been shown (reference to H. Lorberg, Journal f. Math. lxxiv, p. 305; 1878), indeed, that the assumption of opposite electricities moving with equal and opposite velocities in a circuit is almost inevitable in any theory of

the type of Weber's, so long as the mutual action of two charges is assumed to depend only upon their relative (as opposed to their absolute) motion."

Now, here I must confess that, even up to the stage where I had written chapter 9 of this book, being well satisfied at having derived the relative velocity formula from first principle analysby starting from time differentiation of energy according to Coulomb's law [equation (9.2)], I was content to move on by relying on the assumption just mentioned (Fechner's hypothesis) to come to the derivation of the Neumann Potential. This was a logical step given my knowledge of what Sir Edmund Whittaker had written. Also I can see that I may have brushed over an important issue by talking about electron-positron pairs or muon pairs having a 'statistical' presence in accounting for kinetic energy. For some reason, however, while relaxing on vacation after having compiled the first draft of this book The Physics of Creation, I began to wonder about the Fechner hypothesis and what the analysis would reveal if those two 'opposite electricities' moved with opposite velocities at different speeds.

To my great surprise, the analysis now to be presented at the end of this Appendix proved that the same result would be obtained whatever the difference in speed magnitude of the two oppositelycharged electric particles. Indeed, one of those particles could be at rest. The essential point, however, is that, for every unit charge of one polarity in motion there has to be another unit charge of opposite polarity at rest, which assures us that the flow of electrons in a conductor can suffice to set up the Neumann Potential, provided there is an atom somewhere in that conductor that is left positively ionized by having shed that electron. Such a result challenges that conclusion above quoted by Whittaker. However, it puts in issue the very basis on which I have just explained the enhanced lifetime of the muon, given the well-known analogy between of the physical properties of muons and electrons. My theory seems to require kinetic energy to be

that of a neutral presence of a statistical population of leptons which share the motion of a particle. Subject to statistical constraint, a moving electron must then have its kinetic energy linked to the presence of electrons and positrons. The electrodynamic action arising from an electron discharge across a gap between an anode and an earthed cathode cannot have kinetic energy solely represented by the rest-mass energy of induced electrons as that would mean kinetic energy itself has electric charge separate from the primary charge. Enlightenment on this issue comes, however, from that derivation of the formula  $E = Mc^2$  in Appendix II. In conserving energy as it is accelerated the primary charge will necessarily contract in radius because the Thomson formula for the electron requires energy to be inversely proportional to charge radius. Collectively with the presence of numerous other such moving electrons this contraction will make space available for occupancy by electron-positron pairs created by absorbing some of that energy. However, when the energy of the electron reaches the threshold value of three times the rest-mass value, the electron can revert to its original form by creation of an electron-positron pair. Such a transition does not involve a major energy fluctuation and the notion of a 'statistical' presence of such charge pairs merely implies that energy is used, as it were, in climbing a staircase, two units at a time with the energy intermediate the steps being stored by contraction of the primary electron. For energy to increase with speed with net electric charge constant, such a scenario apportioning energy as between the contracted state of the primary electron and the transient presence of induced lepton charge pairs, seems essential if the muon analogy is to hold up and muon lifetime enhancement at speed is to conform with the theory already presented. This will, however, pose a question as to whether that lifetime might exhibit a pattern of change in steps corresponding to each stage of charge pair creation or decay. On the other hand one can be confident that electrons carrying current in wire conductors and having kinetic energies far below those needed to trigger electron-positron pair

creation will perform as required by the Neumann Potential but the equal presence of their counterpart opposite charges, albeit nonmoving, is essential.

In any ongoing debate of this subject one needs to keep in mind is that experimental data concerning lepton mass increase at high speed invariably concerns numerous such particles all moving together at the same speed. Under such conditions the lepton-pair created in measure related to kinetic energy can share that function amongst many primary particles, thereby reducing overall energy fluctuation to a minimum.

The essential point I do wish to stress is that, if muon lifetimes exhibit what has been assumed to be 'time dilation' and conform with the mass-increase formula, as by my theory based on the kinetic energy being vested in the existence of muon charges paired by opposite polarity, then the analogy between electrons and muons suggests that electron-positron charge pairs must feature in electron current activity. Accordingly, notwithstanding Fechner's hypothesis having been put in doubt, I see that in exploring that problem I have strengthened my case for the derivation of the Neumann Potential based on Coulomb's Law, not to mention the other consequence, the dismissal of Einstein's notion of 'time dilation' as being irrelevant to the physics governing muon lifetime.

The analysis mentioned above now follows. The Fechner hypothesis requires electrodynamically-interacting charges Q and q moving at velocities V and v, respectively, to be that of charges + Q and - Q, moving at velocities V/2 and - V/2, respectively, interacting with charges + q and - q, moving at velocities v/2 and - v/2, respectively. We now adopt the more general hypothesis that the interaction is between such opposite pairs of charges, moving respectively at +V<sub>1</sub> and - V<sub>2</sub> and at +v<sub>1</sub> and - v<sub>2</sub>, where:

$$\mathbf{V} = \mathbf{V}_1 + \mathbf{V}_2$$
$$\mathbf{v} = \mathbf{v}_1 + \mathbf{v}_2$$

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and:

The four components, based on the energy potential formula (9.6), now have a  $U^2$  term which has the value:

$$(V_1 - v_1)^2 - (V_1 + v_2)^2 - (-V_2 - v_1)^2 + (-V_2 + v_1)^2$$

which reduces, in magnitude, to:

$$2[(V_1.v_1) + (V_1.v_2) + (V_2.v_1) + (V_2.v_1)]$$

which, in turn, contracts to:

$$2(V_1 + V_2).(v_1 + v_2) = 2(V.v)$$

This is precisely the expression obtained by analysis based on the Fechner hypothesis, leading to the force term (9.8):

$$2Qq(V.v)/R^2c^2$$

which, as a negative quantity, becomes a positive energy potential when integrated with respect to R from R to infinity. This energy potential is:

$$2Qq(V.v)/Rc^{2}$$

which, as before, is double the Neumann Potential, again bringing into focus the need to accept that the field medium of the aether reacts diamagnetically to halve magnetic action, thereby giving physical foundation for the gyromagnetic anomaly factor of 2.

# APPENDIX VII

# **Einstein and 100 Years of Wisdom**

Physicists will soon be celebrating the centenary of the birth of Einstein's Special Theory of Relativity and as news of such an event reaches the general public via the media, there may be those who ask what is meant by its underlying 'principle of relativity'.

In Einstein's own words it is:

'A generalisation when we express the tenet thus: If, relative to one Galilean co-ordinate reference system, another Galilean co-ordinate reference system is a uniformly moving co-ordinate system devoid of rotation, then natural phenomena run their course with respect to the second co-ordinate system according to exactly the same general laws as with respect to the first co-ordinate system. This statement is called the principle of relativity.

I think I know what this means but I doubt if there are many, even of the physics community, who really care as to its meaning. After all, it adds up to saying that whatever happens in the scientific and technological arena today will, if we repeat whatever we did to make that happen, have the same result tomorrow, even though we and our Earth have moved on through the cosmic background. However, I know that there will be those of you who question this because our frame of reference, Earth, is itself rotating. So it really is impossible here on Earth to test what Einstein claims as a 'principle' unless we can stop the Earth from rotating. Alternatively, we could go off in a spacecraft equipped with sensors and controls that preclude any

rotation. However, Einstein did not do that, nor could he 100 years ago.

There is also scope for misunderstanding because, in a sense, Einstein's wording is somewhat ambiguous. He refers to two frames of reference and natural phenomena, but there is doubt here as to whether the principle refers to a specific phenomenon or, rather, physical event or whether what is implied is physical phenomena in general. As an example of what I mean, consider the mechanics of a ball bouncing from a surface. The principles of motion governing that bouncing ball are, by one interpretation, the same if studied from the perspective of either reference frame. But if we think of two observers one in each of those two frames are we to understand that from their individual perspectives, looking at the same ball, their assessment of the physics governing the motion will be exactly the same?

On this latter interpretation the principle of relativity would fail because, should the ball bounce from a surface in that second reference frame with a certain velocity relative to that surface and that frame be moving at the same velocity relative to the first reference frame, one observer would see the ball bounce and the other would see it stop on impact.

On the first interpretation Einstein was on safe ground in postulating the so-called 'principle', subject to limiting conditions, because, relying on the teachings of classical mechanics and Isaac Newton, it is a direct consequence of the physical laws governing what happens in the mechanical world. Einstein was aware of this limitation, but claimed his notoriety by venturing beyond that boundary and asking us to accept the 'principle' without such a restriction.

On this he declared, after saying that in regard to classical mechanics 'there was no need to doubt the validity of this principle of relativity',:

'in view of the more recent development of electrodynamics and optics it became more evident that

classical mechanics affords an insufficient foundation for the physical interpretation of all natural phenomena. At this juncture the question of the validity of the principle of relativity became ripe for discussion, and it did not appear impossible that the answer to this question might be in the negative.'

So, you see, here was Einstein himself weighing the validity of his 'principle' as a matter of probability, another word for 'uncertainty', owing to the physical phenomena that we encounter in electrodynamics, the motion and interaction of electric charges, rather than the physical phenomena that pertain to electrically neutral matter. A point of interest here is that electrodynamics and electromagnetic waves (light) require an electromagnetic frame of reference, whereas mechanics requires an inertial frame of reference and there is an implicit distinction between these akin to the distinction between v and dv/dt, velocity and acceleration.

Indeed, one might ask what Einstein had in mind as a basis for that qualifying remark in the last sentence of the above quotation. He does not reveal that. Instead he moves on by declaring that 'there are two general facts which favour the validity of the principle of relativity'. Here that word 'favour' has its implication, given that, in physics, one is expected to prove a proposition rather than judge its merits by speculating on chance.

As to the first of these 'facts', judge for yourself whether what he declares can be regarded as fact:

'The principle of relativity must apply with great accuracy in the domain of mechanics. But that a principle of such broad generality should hold with such exactness in one domain of phenomena, and yet should be invalid for another, is *a priori* not very probable.'

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That is a factual statement in a semantic sense but far from logical in a scientific context.

As to his other 'fact', this is one he develops by reference to observations made from railway carriages moving relative to an embankment, a mechanical scenario, but one he sums up by saying that:

'In virtue of its motion round the sun, our Earth is comparable with a railway carriage travelling with a velocity of about 30 kilometres per second. If the principle of relativity were not valid we should therefore expect that the direction of motion of the Earth at any moment would enter into the laws of nature.'

Even though the theme so far was based essentially on what one could describe as mechanics, Einstein then rests his case by declaring that our observations on body Earth have never 'revealed such anisotropic properties of terrestrial physical space' and that 'This is a very powerful argument in favour of the principle of relativity.'

Now, of course, if aware of the famous experiment performed by Michelson and Morley one cannot fail to see that Einstein invented his 'principle of relativity' expressly as a way of justifying the observation that the speed of light reflected by mirrors is the same as the speed of light incident upon those mirrors, notwithstanding our Earth's motion through space. However, there are amongst us those, including myself, who cannot accept the way in which Einstein brushes aside that reference to electrodynamics. The reason is very simple.

It amounts to saying that we do not belong to a non-rotating world to which that principle enunciated by Einstein applies but recognizing that, as with that space craft or even in an Earth laboratory for the brief period needed for the test, we could create a non-rotating test laboratory in which to prove or disprove Einstein's principle of relativity.

On such a basis, that of electrodynamic interaction between electric charge in motion, one surely needs to challenge Einstein's doctrine. I tried some 50 years ago, half a century after the birth of Einstein's theory, only to be ignored but yet emerge from the fray with the knowledge on which this work is based. The physics community is not open to persuasion on this issue, possibly because no one is willing to pass judgement on a subject that they do not understand but assume is understood by their peers and so they stay aloof in their ignorance.

That said, I will now explain why I have been motivated to write this Appendix to 'The Physics of Creation'. Its first draft edition was completed in April 2003. It was shortly thereafter that I received a letter dated 15 May 2003 from a stranger to me, a person named S. I. Wells having an address in California, who explained that he had referenced a paper of mine in his own paper entitled 'Magnetic Interaction Reconsidered', that he had submitted to the American Journal of Physics for publication. It was rejected but the referee comments had implied that the latter portion of the paper posed a 'puzzle' that warranted publication and so resubmission was encouraged. In the event this latter submission was then rejected without consideration on the grounds that 'we no longer have a Questions & Answers section and thus will not be accepting your manuscript for publication'.

Now, to me, this is, as they say, 'par for the course' - thou shalt not challenge Einstein! So, what was it that Wells had offered for publication? It was brief but concise. After pointing out that special relativity was developed to preserve the equations of electrodynamics in all inertial frames, which makes it imperative that the principle of relativity applies in all possible situations, Wells draws attention to a 'seeming paradox'. He refers to two equal and like polarity electric charges separated by a straight, rigid and insulated rod, when viewed (a) in the rest frame of the rod and (b) in and relative to a laboratory frame which is in uniform relative motion in any direction neither

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parallel nor perpendicular to the rod. Every physicist should be sufficiently familiar with standard theory governing how charge in motion produces a magnetic field and how that field exerts force on another moving charge, which means that he or she can easily verify that an observer in that rest frame will see that rod at rest, whereas an observer in that moving laboratory frame will see the same rod as subject to a torque which will cause it to turn to alter its orientation in space.

So, Einstein says that the rod cannot turn, but standard physics as taught universally says it will turn. Yet the American Journal of Physics, the major U.S. periodical for those who teach physics, decline to publish this observation.

One does not have to be a genius to stumble across this crack in the theory of relativity, a system which some refer to as 'The Einstein Myth', but one must wonder about the integrity of our scientific world, given this situation.

I was well aware of this paradox during my university research years over half a century ago, but my research discipline was the electrodynamics that govern the magnetic properties and energy anomalies found in steel as used in electrical power transformers. Challenging Einstein's philosophy was not on my career agenda as a research student. Philosophy is for those who are already established and secure in their way of life.

Yet I was intrigued in 1965 when I saw and purchased a newly published book by R. A. R. Tricker entitled *'Early Electrodynamics'* (Published by Pergamon Press). A topic similar to that raised by Wells is mentioned in the chapter entitled 'The Critics' by reference to the opinions of H. G. Grassmann (1809-1877). The debate concerned Ampere's electrodynamic force law, a law which is never used today but which, curiously enough would still not survive the test imposed by Einstein's principle of relativity.

Grassmann pointed out that Ampere's law would require the force acting between the two charges to be zero when their motion as

shared by the rod was inclined at a certain angle to the rod but change from an attraction to a repulsion as the rod turns around whilst having the same translational motion in the electromagnetic frame of reference. Concerning this Tricker states:

'For Grassmann this is too improbable to be acceptable. Grassmann can bring no experimental evidence whatever to support his view and there is not the slightest reason to suppose that nature was designed to satisfy the particular tastes of anybody.'

So you see, here is an author who expects proof by experiment, rather than argument based on taste and probability, but somehow Einstein's principle of relativity, which I see as unproven and as a mere philosophical notion, a matter of 'taste' in the sense used above, has governed the progress of energy science (retarding it!) for a century.

How can we emerge from this dilemma? The answer amounts to saying that all verifiable and proven electrodynamic technology as harnessed in our power industry is founded on electrodynamic action by electric charges flowing around closed circuits. The electrodynamic law used involves integration of action around such closed paths. Any differences in assumptions concerning those laws can only be tested by experiments involving interaction of electric charges that exhibit properties characteristic of an isolated state that is not smeared into the action of a uniform current flow around a closed circuit.

The dipole rod experiment implicit in the argument posed by Wells, if performed, would be such a test, but other such tests are those based on plasma discharges where the charge carriers have different charge/mass ratios and opposite charge polarity. This is the realm of energy anomalies that promise to tap energy from the space environment, as touched upon at the end of chapter 9 of this work.

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Einstein's theory has obstructed progress in this field of technology by making it appear that all was well with our understanding of electrodynamics, whereas there are unanswered questions such as that posed by the paradox raised by Wells here in this 21<sup>st</sup> century, by me in the 20<sup>th</sup> century, as chapter 9 has shown, and by Grassmann in the 19<sup>th</sup> century. If only Einstein had conceived his principle in more general physical terms, as opposed to its restricted form! After all, a Galilean system of co-ordinates is an inertial system and one is thereby locked into the physical constraints that accompany inertia. By 'general' here I do not mean the extension adopted by Einstein in moving from his 'Special Theory of Relativity' to his 'General Theory of Relativity'. I will reword Einstein's statement as to the principle of relativity to show you what I mean:

'Space is a co-ordinate reference system having the electrical properties of a fluid medium in which a kind of crystal structure can form to define such a frame of reference. That crystal structure adapts to the presence of material bodies, locking onto atomic structure, and so shares the motion of such bodies but can dissolve as necessary to merge with the fluid before re-emerging as new structure. If, relative to one such co-ordinate reference system, another such co-ordinate reference system is a uniformly moving co-ordinate system devoid of rotation, then natural phenomena run their course with respect to the second co-ordinate system according to exactly the same general laws as with respect to the first co-ordinate system, but such phenomena are governed only by the local co-ordinate system, a constraint particularly evident in electromagnetic action which takes the local co-ordinate system as its sole frame of reference.'

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My message here is that Einstein relied on the Galilean coordinate reference system as an inertial frame of reference but should have based his theory on a system of reference that itself had the necessary physical properties to adapt to the local presence of matter. The notion of a universal aether medium gave a physical foundation but provided only one frame of reference, whereas an aether that provides multiple frames of reference nucleated locally by the presence of matter but not overlapping is what is needed.

After a century of stubborn adherence to Einstein's doctrine it is unlikely that I shall, in my lifetime, see the physics community changing direction. I can but hope that what I now see as an ongoing quest to tap energy from the aether itself will trigger the reversal of opinion. As it is, however, I can but repeat the quotation that I presented on page 1 of my first publication on this subject, 'The Theory Gravitation', 1960. It was from pages 387-388 of a 1913 book by N. R. Campbell entitled: 'Modern Electrical Theory', (Cambridge University Press):

"If we speak of 'aethers' and not 'the aether' all our experiments prove is that the particular aether with which we are concerned in any case is that which is at rest relatively to the source and may be regarded as forming part of it. This is the simple way out of the difficulties posed by the Michelson-Morley experiment. If from the beginning we had used a plural instead of a singular word to denote the (aether) system .... those difficulties would never have appeared. There has never been a better example of the danger of being deceived by an arbitrary choice of terminology. However, physicists, not recognizing the gratuitous assumptions made in the use of the words 'the aether', adopted the second alternative; they introduced new assumptions."

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Having read these words, back in the year 1945, as a young university student, I was in no mood to be persuaded in Einstein's favour and, from then on could but study Einstein's theory with a critical eye and a desire to search for the truth as there to be found in the omnipresent aether. I was lucky to see a picture of the aether emerge as secondary spin-off from my theoretical efforts to understand the ferromagnetic properties of the atomic structure of iron. This book and its forerunners duly emerged and now, save for the point I make below, there is little more I can add. I hope a few readers will share my thoughts as we live through the Einstein centenary.

That 'point' is a reference to Einstein's technique of 'transformation', his theory not being one involving a simple and direct logical interpretation of his so-called 'principle of relativity'. It seems that when looking at physical phenomena occurring in one Galilean co-ordinate frame whilst sitting in another such frame, albeit moving uniformly and without rotation relative to the first, one must put on a pair of spectacles having a special prescription. This is necessary in order to distort what one sees to make it conform by looking the same as it would in that first frame whereas in fact it is actually different. That prescription is expressed in mathematical four-dimensional terms, obliging one to perceive the time dimension as a fourth space dimension, a curious notion and best avoided, given that we seek the truths of the real world and not a fantasy world that is mere illusion. Reverting to that problem posed by Wells, as mentioned above, it could well be that a 'relativist' wearing those spectacles formulated according to the mathematics of the Lorentz transformation might be able to avoid thinking there is any torque effect upon that electric dipole, but after close to 100 years one can but gasp and ask: "Oh Lord, why have we allowed Einstein to distort our vision of the aether of your Creation?'

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