

Chapter 8

CORRECTING AN ERROR

What has come to be known as *The Theory of Everything* is, so far as I understand, the ultimate theory that relates gravitation with quantum theory and so embraces the physics that governs on the grand scale of our universe and the physics that governs the microscopic world of the atom and fundamental particles. Part I introduced the theory of gravity and linked it with the charge to mass ratio of the electron, but it remains to justify the physical properties of the aether relied upon in the theoretical derivation of the value of G , the constant of gravitation.

Now, having based much of Part I of this work on the theme that the gyromagnetic ratio of the electron is really attributable to magnetic fields being subject to a 'half-field' reaction owing to the existence of a real aether medium, I cannot accept Dirac's proposition that the mere formulation of a set of equations aimed at a link with relativity affords a true account of the relevant physical phenomena. Dirac's notion of an aether full of holes occupied by electrons having a negative mass, as mentioned in Chapter 2, is a mere contrivance. What can be implied by 'negative mass'? Mass implies inertia, energy input to cause it to move faster and energy output to slow it down, but negative mass implies that something will go faster and faster the more energy it sheds and that defies all experience. I need to see some physics!

The aether, the medium that controls what we describe when we talk about quantum mechanics or quantum theory, has to be described in physical terms, not by meaningless mathematical equations.

In the next chapter we will address the physics of the aether, but now, here in this chapter, I wish to draw attention to something which is of vital importance to our understanding of atomic theory. I am referring to an error that must be corrected, the mistaken assumption that an accelerated electron radiates energy according to the Larmor formula.

The major function of quantum theory is to explain how electrons in their high speed motion around atomic nuclei avoid radiating their energy as if their motion is a perpetual phenomenon. Atoms as such never seem to decay naturally unless their nuclei are of such high mass that they are unstable and so sit in the radioactive group of atoms in the upper range of the periodic table.

Quantum theory merely declares that the energy of atomic electrons is 'quantized' and so not subject to steady dissipation by radiation. *A Theory of Everything* is not much use if it is merely a collection of such hypotheses, hypotheses worded to fit the facts of what is observed but hypotheses not rooted in a physical explanation. Hence the need to draw attention to the error posed by Larmor's formula for radiation of energy by an accelerated electron.

Sir J. Larmor, of St. John's College, Cambridge, by his paper entitled *Aether and Matter*, in *Philosophical Magazine*, **44**, 503- 512 (1897), presented an equation for the rate at which energy is radiated by an accelerated electron. In deriving this he simply assumed that the electron was accelerated and considered how its electric field would be affected in a way which implied a propagating distortion of its electric field and so energy radiation. Unfortunately, he ignored a possible interaction between that field and whatever external electric field had been applied to produce that acceleration. He said, in effect, "Let there be acceleration" without realizing that the electric field producing that acceleration could then affect his calculation of the rate of energy radiation. He dismissed this thought on the basis that his analysis was focussed on the travelling wave field to distances far removed from the electron and its accelerating source, thereby implicitly assuming that energy is conveyed by an electromagnetic wave. We have only to sit outside on a clear day to sense the heat

energy which we know is generated by radiation from the Sun, but what we do not know is whether each individual electron in every atom at the Sun's surface is contributing its own energy to feed that experience. The Sun is ionized and has numerous free electrons in its surface regions, electrons which can work together collectively in such a way that the energy radiated has its source, not in each of those electrons, but in whatever it is that has freed them from their preferred state in their parent atoms.

Well, I did the necessary calculation correcting for the error, Larmor's omission, and found that, provided I assumed that the electron would exhibit a mass property so as to accelerate at a rate which would conserve energy, meaning no energy radiation whatsoever from the individual electron itself, then, guess what, the electron's mass-energy would have to be that prescribed by the Thomson formula mentioned in Part I. Here, based on the principle of conservation of energy, I had a wonderful explanation of why we can say that $E = Mc^2$. More than this, however, it accounts for the property of inertia.

So here is another step forward in our quest to discover *The Theory of Everything*.

I have presented the formal analysis of this finding in my book *Physics Unified* (1980) at pp. 80-84. So why is this important as we now venture into the realm of quantum theory? Well, do keep in mind that quantum theory tells us that electrons, in their undisturbed motion within atoms, do not radiate energy, but quantum theory does not tell us why those electrons do not radiate energy. *The Theory of Everything* must include an explanation and that I have found by discovering Larmor's error.

However, there is more. Physicists might think they can challenge what I have just asserted basing their case on the fact that the oscillation of electrons in a radio antenna results in propagation of electromagnetic waves and so energy radiation. Yes, I accept that, but I draw attention to the fact that the Larmor formula then applied is not restricted to the single electron. Instead the rate of energy radiation is calculated as if the charge in motion is that of n electrons

as carriers of the current in that radio antenna, the Larmor formula then requiring radiation proportional to n^2 , meaning that the actual radiation of energy is a collective phenomenon owing to electron interplay. All I am saying here is that each individual electron does not shed its own energy and I defy any expert on radio communication to prove that energy radiation is proportional to n^2 , rather than $n(n-1)$, as my theory indicates, bearing in mind that millions, indeed billions of electrons carry those radio antenna currents.

As to the atom, one containing several electrons, why is there not energy radiation in this case? The answer, simply, is that there would be were it not for the fact that only certain states of electron motion are permitted, those for which the electrons do not act in concert, as it were, by playing the same note and directing their action in a common direction. I have presented the formal analysis of this elsewhere (*ENERGY SCIENCE ESSAY No. 6* entitled *The Exclusion Principle*, a 1997 website item now of record at www.aspdn.org) and, surprisingly again, what is found becomes an explanation of the precise sequence of quantum levels and their electron population in the atom that we have come to accept from analysis of atomic spectra.

This is a vital feature in our *Theory of Everything*, one based on physics as such rather than mere mathematical notions and my clear message here is that physicists really erred in not correcting earlier what Larmor had claimed. No doubt the success of radio communication, thanks to Marconi and others, influenced their thoughts, but physics is a fundamental science and, if we are to ponder on the wonders of Creation we must adhere to fundamental principles and build only on a physical basis.

Now, if you are wondering why this Larmor problem is important and, if so, why the problem was not recognized long ago, I draw attention to numbered paragraph **620** on page 558 of the book *The Mathematical Theory of Electricity and Magnetism* by Sir James Jeans. The following quotation is from the fifth edition dated 1925:

“We have found that contradictions exist in connection with the Electromagnetic Theory of Light, the theory of

Specific Heats of metals , and the theory of Electric Conductivity, so long as we treat these questions in terms of ordinary dynamical laws and Maxwell's electromagnetic equations. A large accumulation of evidence, of which our discussion has touched only on a small fringe, suggests a new system of dynamics and a new electron theory is needed. So far as can be seen the special feature of this new theory must be that the interaction between electrons and radiation is of an entirely different nature from that imagined by classical laws. The new theory is in existence and is generally known as Quantum-theory."

So in those early years of the 20th century physicists knew something was wrong but they did not track down the error. They invented a new theory based on hypothesis instead of back-tracking to see where they had omitted something or made the wrong assumptions. It was on page 577 that Jeans presented the Larmor formula for energy radiation of an accelerated electron and then immediately stated:

"It must be added that the new dynamics referred to in paragraph 620 seems to throw doubt on this formula for emission of radiation. Many physicists now question whether any emission of radiation is produced by the acceleration of an electron, except under certain special conditions. Bearing this caution in mind, we may proceed to examine some of the consequences of the formulae just obtained."

This statement on page 577 of a voluminous student textbook having quite small print wholly devoted to the theory of one specific branch of physics can hardly give the student confidence in what he is learning. It tells the truth, which I applaud, especially as it shows the student that there are unsolved problems that he or she might try to solve, but the specific problem of Larmor's error seems not have been resolved owing to the overriding effect of the acceptance of quantum theory. Hence my interest in the subject.

Larmor's theory deriving the rate at which energy is supposedly radiated when the electron is changing speed dates from 1897. This was just a few years before Einstein appeared on the scientific stage in 1905 by publishing, as Professor A. M. Taylor, in his 1966 book *Imagination and the Growth of Science*, states, 'the four great papers of his life's work: on the special theory of relativity, on the equivalence of mass and energy, on Brownian movement and on the photon theory of light'.

This was seen as the beginning of a new era when physics was, as it were, taking off, just as was powered flight. So much was happening but I see Bohr's theory of the atom, dating from 1913, as a real landmark, one that features in our *Theory of Everything* without further comment.

Neils Bohr, a young Danish physicist, had obtained his Ph.D. at the University of Copenhagen and in 1912 was engaged on a one-year fellowship under the aegis of J. J. Thomson at Cambridge. However, arising from a visit by Rutherford from Manchester University who came to see his former teacher Thomson, Bohr was introduced to Rutherford and this led to him spending the rest of his fellowship at Manchester University, Bohr having become quite convinced of the validity of Rutherford's theory of the atom.

The result in 1913 was a brilliant insight into the workings of the atom, with Bohr having four papers on the subject published in *Philosophical Magazine* in that year.

As Brancazio on page 528 of his 1975 book *The Nature of Physics* states:

“Although Bohr accepted Planck's quantum hypothesis, he did not accept Einstein's photon theory. Very few people did in 1912. A belief in photons is not necessary for the success of the Bohr theory; the 'quantum of radiation' emitted or absorbed by an electron can be in the form either of a wave or a particle. Nevertheless, we will use photon terminology from here on, in keeping with the modern day viewpoint.”

I have quoted this passage to highlight that last sentence. It conveys the message that understanding physics is not so much a question of truth based on correct interpretation of what we see in our experiments but is instead something based on fashion and popular belief.

It was Einstein's photon theory that earned him his Nobel Prize, awarded in 1922, but, though *The Theory of Everything* must embrace the photon, I cannot attribute photon theory to Einstein. Indeed, what is a photon? It is said to be a quantum of energy that has no mass. Yet Einstein is famous for telling us that mass and energy are equivalent ($E = Mc^2$), being related in terms of the speed of light. So here is our first problem. It is said that the photon is a kind of particle, a quantum of energy that travels at the speed of light. Yet Einstein's theory tells us that the closer the speed of a particle to the speed of light the nearer it gets to its energy becoming infinite.

Accordingly it is quite obvious that no *Theory of Everything* can succeed if it tolerates notions of such an absurd and contradictory nature. Einstein may have discovered the photon, but he certainly did not understand what it was and it is due time someone said so!

The true answer is that the photon is not something that travels at the speed of light at all. It is, in fact, an event occurring at a point in space when our material world transacts an item of business with the immaterial world, the quantum underworld, the aether. In this business analogy the aether is a kind of international bank dealing in energy as if it were money. A sum of energy is shed by a particle of matter at point A and absorbed into the banking network along with a message, an instruction having a physical meaning (momentum). The amount of energy is numerically coded (frequency) using a currency conversion factor (Planck's constant h) and it can be drawn from the bank account at any of the bank's branches by using that code, the account being active as long as that momentum in the aether persists, but closed at B by a particle using the appropriate code frequency at that branch location and absorbing that momentum along with the associated amount of energy. Such energy withdrawal is another photon event, but the transaction of in-payment and out-

payment does not involve money (energy) being physically transferred from A to B, because, as with any bank, the money (energy) is pooled in a large reservoir, the aether itself having a vast pool of energy, energy from which our universe was created.

Einstein may have introduced us to the photon as a particle of light but he blurred our vision of the aether, an aether filled with energy that we cannot now see, and so left us wandering in the dark.

To really comprehend the nature of the photon we must fathom the mystery of Planck's constant h , since we know the photon signifies a quantum of energy equal to $h\nu$, where ν is the frequency of the electromagnetic wave disturbance imparted to the aether by that photon event. This is the task we confront if we are to have a *Theory of Everything*. Einstein did not solve this mystery. So I say again, the only way it can be solved is by analysing the structure of the aether, which physicists guided by Einstein's wisdom chose to ignore.

Hopefully, therefore, the reader will now be ready to bear with me as I outline in the next chapter the detailed structure of the aether with my mind focussed on energy as such rather than just seeing the aether as a frame of reference regulating the finite speed of propagation of light.

Chapter 9

THE REAL AETHER

In Part I we found that the aether had to comprise a uniform charge continuum of one charge polarity permeated by a crystal-like cubic-structured array of electrical particles (quons) of the opposite charge polarity. The continuum charge density was denoted σ and those quons had a charge equal to that of the electron and were separated from the nearest adjacent quons by a distance d , from which one finds that σ is equal to the charge e of the electron as divided by the cube of d . It was further stated, in presenting the formula for G , the constant of gravitation, that d has the value 108π times the charge radius of the electron and, that radius being known from the research of J. J. Thomson, so, by introducing the graviton, one can calculate the value of G and confirm that it is fully in accord with the measured value.

This aether theory therefore is very well founded, but now we must go further and show how it determines Planck's constant, besides justifying that 108π factor.

We have formed a picture of charges repelling one another but held in place at sites in a cubic array by the electrostatic attraction of the enveloping charge continuum. How do we introduce spin into this picture? The simple answer is to say that a cubic $3 \times 3 \times 3$ array of those charges spins by 24 charges in a cube of side dimension $3d$ spinning about an axis defined by 3 such charges in a row. Though somewhat speculative, this at least has the merit of permitting easy analysis. It is the smallest cubic 3-dimensional symmetrical component of the charge structure of the aether capable of spinning about an axis defined by its own charges. For every revolution the particles at the corner sites nudge, by their mutual electrostatic interaction, the

surrounding charge structure at a frequency of four times the spin frequency and that sets up an electromagnetic wave disturbance in the aether. There is then a corresponding angular momentum of those 24 charges and a related quantum of energy involved, as determined by that frequency, and so this is surely the physical system underlying what we describe as the 'photon'.

If the quon has a mass m the moment of inertia of this photon unit will be $12m$ times d squared plus $12m$ times $(\sqrt{2})d$ squared, summing to $36m(d)^2$. If the electromagnetic wave frequency resulting from its spin is ν then the spin angular velocity is $2\pi(\nu/4)$ and so the angular momentum of the photon will be:

$$18\pi m d^2 \nu$$

Now we know that the well-supported theory of the atom requires us to accept that a quantum unit of angular momentum of $h/2\pi$ is associated with a photon having a specific frequency known as the Compton electron frequency and we also know that h times this frequency is a unit of energy, that of the rest-mass of the electron, h being Planck's constant. That links this picture of the photon phenomenon with the electron according to this aether theory but we have to introduce that mass m of the aether particle, the quon, and cannot just assume it to equal the mass of the electron.

In introducing this subject in my 1969 book *Physics without Einstein* I began by discussing Heisenberg's Principle of Uncertainty and will quote below from page 63 of that work.

“Heisenberg's Principle of Uncertainty has been expressed by Eddington in the words: ‘A particle may have position or it may have velocity but it cannot in any exact sense have both.’ In the sense of our analysis, a particle at rest in the electromagnetic reference frame does have velocity in the inertial frame. In an exact sense it has velocity and position, but we must not think it is at rest when it is always moving and we cannot, nor do we ever need to, say exactly where it is in its motion about the inertial frame because all matter shares the same motion. The basis of the

uncertainty is eliminated by recognizing the separate existence of the electromagnetic reference frame and the inertial frame.”

Before saying this I had explained that, concerning the continuum-cum-quon charge system of the aether, the cubic array of quon charge is not at rest within that charge continuum. If it were their charge interaction would involve a state of negative electrostatic potential energy and, whether by intuition or otherwise, I had decided that such a negative potential had to be ruled out as a possibility at this fundamental aether level. Those quon charges must be displaced relative to the continuum charge just enough to ensure that the interaction energy is at a minimum value consistent with it being positive.

That in turn implied the need for motion in which centrifugal forces active on both continuum charge and quon charge would be in balance with the restoring electrostatic interaction force acting between those charges as a result of their relative displacement. The aether must therefore have motion, a cyclic and circular orbital motion. I reasoned that optimum conditions would require dynamic balance attributable to both charge systems having the same mean mass density. In the case of the charge continuum this requires it to contain something that constitutes the necessary mass, this being those gravitons introduced in Part I. In other words, all components of both the continuum and the quons would move in juxtaposition around the same circular orbit of radius r . Then the thought occurred to me that the system of quons would define the aether's electromagnetic frame of reference, a frame which moved with a cyclic motion around the inertial frame centred on this state of motion. It was a logical assumption then to speculate that this cyclic motion was at the frequency we regard as the Compton electron frequency and that relative speed between the charge continuum and the quon system was the speed of light c .

I had in mind that photons having the frequency we refer to as the Compton electron frequency have the energy quantum needed to create an electron. Since electrons and their antiparticles, positrons,

are created, as if from nowhere, given two energy quanta at this photon frequency, so that 'nowhere' has to be the aether and that frequency has to be a kind of resonant frequency characteristic of the aether.

If its angular velocity is denoted Ω then it is equal to $c/2r$ and, by reference to the inertial frame, any particle of matter sharing the motion of the quon system will have a position that is uncertain by the amount given by the diameter of its circular motion $2r$ and a velocity that is uncertain by the amount plus or minus $c/2$ or c , their product being $2rc$, which is a definite quantity.

Now, Heisenberg had declared that, if the particle is an electron, the product of the uncertainties of momentum and position was certain and had the value $h/2\pi$ so, if Heisenberg was right, this tells us that:

$$r = h/4\pi m_e c$$

where m_e is the mass of the electron.

As you see we are now beginning to build a picture of the aether and evaluate its detailed form.

Now I do not intend here to present a full formal analysis of the structure of the aether. That is of record elsewhere. See my 1980 book *Physics Unified*. I do need to say that, relying on that fact that the aether interaction energy has a minimum but non-negative value, it is a straightforward but somewhat tedious mathematical exercise to calculate the charge displacement distance $2r$ in relation to the quon spacing distance d , and so obtain a value for r/d that is very slightly greater than 0.3029.

Also I need to introduce the equation for the balance of centrifugal force and the charge interaction force:

$$m(c/2)^2/r = 4\pi\sigma e(2r)$$

or:

$$mc^2 = 32\pi e^2 (r/d)^2/d$$

The restoring force rate $4\pi\sigma e$ applicable to the displacement of the quon of charge e is to be found in physics textbooks in the section dealing with electrostatics and action within the dielectric medium

located within a parallel plate capacitor. The fact that use of this expression proves successful in this quest to understand the aether is consistent with the space domain feature discussed in Part I, as characterized by parallel planar charge boundaries.

Note now that the equation just derived can be written in the form:

$$md^2 = 32\pi e^2 r^2 / dc^2$$

and so we can substitute this in the photon angular momentum formula:

$$18\pi md^2 v$$

which then becomes:

$$(18\pi)(32\pi e^2 r^2 / dc^2) v$$

It then follows that a photon having the angular frequency $c/2r$ of the aether, with v then being $c/4\pi r$, the Compton electron frequency, will have the angular momentum:

$$(144\pi)(r/d)(e^2/c)$$

Now this a major step, because the factor r/d can be evaluated with high precision, based as it is on energy optimization criteria, and both e and c have known values. Yet by pure theory we have derived the angular momentum quantity that characterizes the photon having the mass-energy of the electron, that angular momentum being known from atomic theory to be simply $h/2\pi$. In other words we have deduced the value of Planck's constant h .

The result is best expressed in the pure numerical form:

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

or approximately 137, r/d having a value a little greater than 0.3029.

Achieving this result in 1957 was the real stimulus which obliged me, regardless of its intrusion in my career activity, to pursue the subject further. However, earning my living had priority and, realizing two years later that the time had come when I needed a career move from my professional position in the Patent Department of English Electric to become IBM's Patent Manager in U.K., I rushed at the end of 1959 to put something on printed record. It was

a privately published 48 page booklet entitled *The Theory of Gravitation*.

The above equation for that dimensionless physical constant known as the ‘fine-structure constant’, along with its derivation appeared on pages 15-24. On pages 31-33 I derived the formula relating aether rotation with charge density and discussed how this could explain geomagnetism, deriving the Earth’s magnetic moment in terms of aether theory. Page 33 ended with the statement:

“This chapter will have also proved of interest to those familiar with the Schuster-Wilson Hypothesis.”

So I will present here a brief summary of the analysis involved. Given that the quons in the aether describe circular orbits of radius r at a speed $c/2$, if a sphere of aether coextensive with body Earth were to rotate at an angular velocity ω , with the quons keeping their synchrony and without affecting their actual angular velocity, then at radius x from the axis about which Earth with its aether spins, those quons must be displaced radially through a distance of $2\omega xr/c$. This implies induction of charge arising from aether rotation or, conversely, aether rotation given the presence of a charge density such as is induced by gravitation acting on an ionized proton-electron plasma.

Considering a circular disc of radius x , containing a quon charge density σ , as expanding slightly by that fractional amount $2\omega r/c$, within a neutralizing charge continuum that does not expand, this means that a residual charge density of magnitude $4\sigma\omega r/c$ will be induced. Then, having regard to the above equation:

$$m(c/2)^2/r = 4\pi\sigma e(2r)$$

and the fact that the e/m ratio here is the ratio $2\sigma/\rho_0$, because ρ_0 is the combined mass density of the muons and gravitons, we find that:

$$\omega = \rho_m \sqrt{(4\pi G/\rho_0)}$$

if, using the Schuster-Wilson Hypothesis, we equate that induced residual charge density to $\sqrt{(G)\rho_m}$.

It will be recalled that this equation was relied upon in Part I to explain why stars rotate.

Now, reverting back to our theoretical derivation of the value of the fine-structure constant, I note that this is one of the three most basic numerical constants in physics, along with one involving G and also the proton/electron mass ratio. When I first derived the relevant formula and presented it in that 1960 publication entitled *The Theory of Gravitation* its value was known to be approximately 137 and, indeed, I knew that Sir Arthur Eddington had, in 1935, in his book *New Pathways in Science*, tried to unite physical theory by deciphering the message conveyed by such numbers. He would have been happier had 136 rather than 137 proved to be the measured value of this quantity. He sought to explain the logic of 136 by basing his argument on the number 16 and a ‘commune’ of particles that are ‘communists, not believing in private ownership’ who somehow had to share things and then by saying:

“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.”

The reader will understand that he was saying that $(16 \times 15)/2$ is 120 and then adding the 16. But will you, the reader, understand what he said next concerning 136 not proving to be 137? He writes on p. 237 of his book, a book published as a science book by Cambridge University Press:

“But you may say, the fraction $1/137$, is 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’.”

Here you see the thinking of a scientist famous for supporting Einstein’s General Theory of Relativity seeking to understand the mysteries of fundamental physics and trying to forge a unified field theory based on the evolving knowledge of quantum mechanics but failing to see the errors that first needed correction.

My aether theory in 1960 opened the door on the true explanation of the 137 factor but, as you will see from the final chapter in this Part II, I did in 1996 show how far, in terms of very

high precision, my unified theory can go in dealing with a physical phenomenon dependent upon this 137 quantity.

Meanwhile, however, we must now determine the physical dimensions of the microscopic quantum underworld of the aether, namely the value of d , the cubic lattice spacing of the aether charges, the quons, along with a determination of their mass.

This is an easy step because the photon, as a cubic array of aether charges in a state of spin, has the energy $m_e c^2$ equal to $hc/4\pi r$, when spinning at angular velocity of $c/2r$, and we know from J. J. Thomson's formula introduced in Part I that $m_e c^2$ is equal to $2e^2/3a$. Here a is the charge radius of the electron.

So we can then see that:

$$m_e c^2 = (hc/2\pi e^2)(e^2/2r) = (144\pi r/d)(e^2/2r) = 2e^2/3a$$

from which we find that:

$$d = (108\pi)a$$

this, therefore, explaining the 108π term in the formulation of G in Part I.

As stated on page 24 of that 1960 publication *The Theory of Gravitation*, the quon spacing d has the value 6.371×10^{-11} cm, it being there derived from the ratio r/d of 0.3029 and the known value of er , the Bohr magneton. However, the same result emerges if we use the Thomson formula to find that the electron radius a is a little less than 1.88×10^{-13} cm and multiply this by 108π .

So the quon lattice structure has a scale much smaller than the spacing of electrons and the nuclei within atoms generally, but for certain atoms of higher atomic number there can be some phenomena that show how the aether might intrude in the workings of the atom. See particularly my 1987 paper entitled *The Physics of the Missing Atoms: Technetium and Promethium* that was published in *Hadronic Journal*, **10**, pp. 167-162.

I now, before ending this chapter describing the composition of the aether, draw attention to a problem I had in my early development of the theory, one that I could only comment on in my 1960 work.

It concerns the mass of the aether charge, the quon. Having deduced that value of d , I knew the charge density σ of the aether's continuum, and so the dynamic mass m of the quon, but using the Thomson formula to work out its charge radius, I got a figure that, albeit one having minor effect, did not lead to a precise evaluation of the fine structure constant and that 137 factor.

It was only when I realized what I had omitted that I arrived at the breakthrough which emerged in my 1966 edition of *The Theory of Gravitation*.

I knew that the quon would have to have a charge radius substantially higher than that of the electron. Indeed the quon would have to be by far the largest in physical size of all embodiments of the charge e other than its dispersed continuum state. I then wondered how it maintains its stability, it being the one particle form constituting the aether that needed to be truly stable, and I reasoned that its energy per unit volume, internal pressure, might well have to balance a kind of pressure prevalent throughout the aether continuum. In short, might the primary energy per unit volume of the aether be equal to that of the quon? If so, then motion of the quon through the continuum would affect its dynamic mass property much as the teachings of hydrodynamics tell us that motion of a solid sphere through a medium having the same mass density halves its effective mass.

Here, I was on the verge of proving that the aether continuum really must exist because the physical reaction of whatever it was that accounted for the modified mass of the quon, would affect that 137 number evaluation.

The hydrodynamic factor duly made it possible for me to estimate the value of 137.038, which was in good accord with the value observed at the time, but I note here, for the record, that in the era when these tedious calculations were made, engineers were using slide rules and ordinary physicists and mathematicians were using logarithmic tables, and these had their limitations.

To my great surprise, however, this development of my theory delivered a real breakthrough when I calculated the aether energy of

one unit volume d^3 . The above analysis provides the data from which to calculate the quon mass in terms of electron mass and, allowing for the quon's mass-energy density being double mc^2 , the data is also there from which to calculate that primary unit of aether energy.

In terms of an electron's rest mass energy, it is:

$$(3/4\pi)(108\pi)^3(2m/m_e)^4$$

where:

$$2m/m_e = (8/9)(r/d)^2$$

Now, because I had, by pure theoretical analysis, deduced the 0.3029 value of r/d , I had here, also by pure theoretical analysis, with no reliance on measurement data, reached the conclusion that every unit of the aether associated with a quon site had an amount of energy that you can verify from the two equations above as being a little over 412 times that of the electron.

What is so special about this finding? Simply that there has long been a mystery concerning the role which the mu-meson, the muon, plays in the world of particle physics. Muons have been called 'heavy electrons' because they seem to have properties akin to those of the electron and are classed alongside electrons in the lepton family of fundamental particles. In their material form, whether in cosmic rays or otherwise, they have a mass somewhat lower than 207 times the mass of the electron. As with the electron with its antiparticle, the positron, they seem to be created in pairs, as if from nowhere, merely by virtue of an energy fluctuation in the aether, but, though electron or positron creation needs that photon aether resonance action analysed above, it is not clear what mechanism is at work in muon production.

My guess is that the unit of energy we have just calculated, being about double that needed to create a pair of muons, is involved. Indeed, I have speculated that in each unit cell of the aether there is a pair of muons (I call them virtual muons) engaged in an ongoing activity, possibly involving their mutual decay and recreation, but effective as a kind of gas that sustains a pressure throughout the continuum medium. These virtual muons do not share the motion of the continuum as it is their mean position on a statistical basis that

defines the inertial frame of reference. Note that the quon system moves in its quantum orbits in counterbalance with the continuum plus graviton system and so defines an electromagnetic reference frame which has cyclic motion in the inertial frame.

In any event, by 1966, I reported on this discovery in my second edition of *The Theory of Gravitation* and assumed that the fundamental particle we call the muon had by then been embraced within what was developing into my *Theory of Everything*.

Sir Arthur Eddington's 1935 attempt at building such a theory aimed at interpreting four pure numbers. In addition to the fine-structure constant, these were the proton/electron mass ratio M/m_e , the ratio e^2/GMm_e and a rather complicated formulation connecting h , c , M and m_e with a symbol said to represent the wavelength of the 'mean Schrodinger wave', the overall constant being deemed to be the 'ratio of the natural curvature of space-time to the wave-length of that mean Schrodinger wave'. I exclude the latter from my consideration because it is a quantity said to depend upon the rate at which the universe is expanding and my *Theory of Everything* offers a different interpretation of the observed spectral red shift that has falsely led to that expansion hypothesis.

Eddington's derivation of the proton/electron mass ratio is in no way interesting. He talks about a reduction from a double wave function to a single wave function and presents a quadratic equation involving that number 136, which equation has two numerical solutions, the number ratio being 1847.6, which he said at the time 'agreed very well with observational determination of the proton/electron mass ratio'.

We shall see in the next chapter how my onward efforts concerning the proton/electron mass ratio progressed when a fellow scientist took an interest in my theory.

The above equation involving r/d in a formula for the fine-structure constant was then found to be subject to a constraint that required $(2m/m_e)^3$ to be the odd integer 1843 and this results in that primary unit of aether energy being 2(206.3329) times the rest mass-energy of the electron.

Chapter 10

DR EAGLES AND THE PROTON

My onward effort in trying to discover why it is that virtually all the energy shed by the aether in creating the universe went into proton creation led me along a curious path, an account of which I present in pages 139-145 of my 1969 book *Physics without Einstein*. It did seem promising because I found myself formulating the proton/electron mass ratio in terms of that fundamental quantity $hc/2\pi e^2$, the 137 factor discussed in chapter 9. Soon thereafter I abandoned that theory. The onward developments concerning nuclear theory, particularly on page 150, were to prove more relevant in that quest, as I had there contemplated the close association of a meson and a proton based on that Thomson charge formula used extensively in our earlier chapters. The formal theory of the proton only appeared in my later publications.

Meanwhile my book *Physics without Einstein* had found its way onto the bookshelves of some libraries in London and it was there that a research scientist Dr. D. M. Eagles came to browse through its contents. Dr. Eagles, an Englishman, was back in his own country for a short period between his past employment at NASA in USA and his new employment at the then-named National Standards Laboratory of CSIRO in Australia. Apparently he was fascinated by what I had written and so, though I lived in the South of England some 70 miles from London, he telephoned me and suggested a meeting, then visiting me at my home for a quite lengthy discussion.

Once in Australia, after settling in to pursue his own research, he decided to check my calculation of the aether system to see if my estimate of that r/d factor on which the fine-structure constant depends was correct. In this effort he sought the assistance of Dr. C.

H. Burton, an expert in the computer facility at the National Standards Laboratory, to work out that factor with very high precision. Note that it depends upon electric charge interaction ranging over many successive shells of the charge matrix.

After his visit the first I heard from him was then a letter from Australia explaining that my figures were close but incorrect and did not give the result for the fine-structure constant that I had claimed. This, of course, made me explore the scope for adapting my theory, assuming that there was some physical feature that I had failed to take into account. In the event, I did quite seriously opt in favour of imposing a constraint on the theory that required the ratio of the charge volume of the quon to that of the electron to be an odd integer. You see, I was beginning by that time to think that not only energy had to be conserved in particle reactions, but also the net volume of space occupied by electric charge had to be conserved. My reason was connected with the gravity theme. Exchange of energy in particle reactions involving particle creation or decay must conserve the gravitational potential associated with that energy. I found that the optimum odd integer in that quon/electron charge volume relationship had to be 1843. This number is close to the proton-electron mass ratio, closer than the value derived using Eddington's theory, but I did not allow that to side-track my thoughts about the proton creation problem.

Just as I had reached this conclusion another letter arrived from Dr. Eagles. They had reworked the computer program they were using and found they had made an error, so now I was sent new data showing that my earlier calculations were correct as far as they went, but the ultimate precision of their calculation now put things fully into context. The 1843 constraint factor in determining the fine-structure constant gave the better result.

I advised Dr. Eagles accordingly and his reply was quite amazing. Based on what I had said he had written a paper bearing both our names as author and had already got the support of the Director of the Laboratory to submit it for publication. Here was a government research laboratory dedicated to fundamental research of

the kind pursued in the Bureau of Standards in USA, including measurements of fundamental physical constants, willing to support publication of a theory explaining one of the three most basic constants of physics.

Naturally I was delighted. The paper was published in *Physics Letters*, **41A**, pp. 423-424, in 1972 under the title: *Aether Theory and the Fine Structure Constant*. Its abstract reads:

“The results of a recomputation of a previously published theory for the fine structure constant α are presented. A new feature of the theory is then shown to determine the value of α^{-1} as $108\pi(8/1843)^{1/6}$ or 137.035915, a figure in agreement with the observed value of $137.03602 \pm 1\frac{1}{2}$ parts per million.”

13 years later, in 1985, B. W. Petley (National Physical Laboratory in U.K.), in his authoritative work: *The Fundamental Constants and the Frontier of Measurement*, referred to the paper using the words:

“No doubt the theoretical attempts to calculate alpha will continue - possibly with a Nobel prize winning success. Aspden and Eagles obtained:

$$\alpha^{-1} = 108\pi(8/1843)^{1/6}.”$$

Now, although I published another book *Modern Aether Science* in that year 1972, I had not by then developed the theory of the proton that was forming in my mind. I had in the 1969 book introduced my theory of the atomic nucleus of atoms other than hydrogen, pointing out that the nucleons were really separated by that same distance d as applies to the quons in the aether. I cannot accept that the particle we call the neutron, which has a lifetime of only a few minutes, could possibly be a constituent of an atomic nucleus. It could not serve as a binding agent keeping protons together and overcoming the mutual repulsion between protons in close proximity to one another. Nor can I accept the conventional belief based on the 1935 suggestion of Hideki Yukawa that binding energy within a nucleus arises from photon-like exchanges which cause protons and neutrons to change back and forth into one another through emission

and absorption of charged mesons. Why cannot the binding energy be that of electrostatic attraction based on physical contact between charges conforming with the Thomson formula? Why invent peculiar notions that pose more problems than answers?

So, in *Physics without Einstein*, I developed a theory that required all nucleons to be charged particles having the mass of the proton or deuteron but adjacent ones being spaced at a separation distance d . For each link between adjacent nucleons there would be a meson of opposite polarity with its charge in surface contact with the nucleon charge. Using the Thomson charge formula this meant a certain amount of negative energy potential which I assumed would be deployed in creating the 'link' just mention. I described those links as electron-positron chains and evaluated the mass-energy of such links to determine the mass-energy of the meson.

The result was quite promising, there being energy balance which suggested at the time that the meson involved was the π -meson, the pion. I was here beginning to recognize that an atomic nucleus other than that of the hydrogen atom latches on to a section of aether lattice structure formed by those quons and so might drag a section of that structure with it as the atom moves through enveloping space. I was not averse to accepting the notion of aether drag, provided I could visualize how such drag could occur without the atom experiencing any momentum attributable to the aether. Here my thoughts were that aether particles might participate in an exchange of state as between quons and muons, possibly also involving continuum charge, so that the linear momentum of the quons sharing the forward motion of an atom would, on a statistical time average, be balanced by the reverse momentum of pairs of muons flowing through the quon system in the opposite direction.

I do not wish to dwell on this theme. It is all of record in my published work where it also gives physical basis to the dynamic balance of lateral aether charge displacement needed to explain Clerk Maxwell's wave equations referred to in Part I. Suffice it to say that I knew that a meson must feature in some way in atomic structure in association with the proton. Onward research, based on analysis of

the pattern of atomic mass versus atomic number, had, by 1974, convinced me that the meson would really be what I termed a 'dimuon', it being one of twice the mass-energy of the muon and equal to that unit of aether energy I had disclosed in my 1966 book *The Theory of Gravitation*.

Then came the realization that such a meson when in contact with a proton of opposite charge, would form a charge pair of minimal electrostatic energy. In their union they would shed the maximum amount of energy possible, assuming the muon energy to be the variable, but given the theoretically derived value for the latter mass-energy I had from this analysis a value of the mass-energy of the proton.

I duly informed Dr. Eagles and this led to another jointly authored paper submitted with the approval of the Director of the newly-named CSIRO National Measurement Laboratory. It was published in 1975, some thirty years ago, as I write these words. We had predicted what the proton/electron mass ratio should be, at least to a precision of a few parts in ten million, allowing for possible minor corrections owing, for example, to the small but finite size of the proton's charge.

The paper was entitled: *Calculation of the Proton Mass in a Lattice Model for the Aether*. It appeared in the periodical *Il Nuovo Cimento*, **30A**, 235-238 (1975), an English language publication of the Italian Institute of Physics offering a rapid referee process and rapid publication.

This association with Dr. Eagles meant a great deal to me because, being employed in a corporate environment, albeit with IBM, and my responsibilities then being those of Director of IBM's European Patent Operations, I was not at the time able to submit scientific papers for publication from a university address. Also, papers having the word 'aether' in their title were certainly not at all welcomed by editors of scientific journals, even if they did concern a major step forward in the field of physics. I had found it almost impossible to get my papers published once I could no longer record my Cambridge University address in the title section. Yet, given an

acceptable address and joint authorship association with a scientific colleague, here was acceptance of a paper which, as for our 1972 paper on the fine-structure constant, had the word 'aether' in the title.

This accounts for why I began publishing my own books under the name of *Sabberton Publications*, Sabberton being my wife's maiden name.

However, in the early part of the 1980s I found that the Italian Institute of Physics was, for its periodical *Lettere al Nuovo Cimento*, quite willing, subject to peer review, to consider my somewhat controversial papers and I then found that most were accepted.

Encouraged by this and finding that an opportunity was opening up in IBM for me to take early retirement I did, in 1983, duly retire and, with IBM's sponsorship, became, for the next nine years, a Senior Research Fellow at Southampton University which is located within two miles of where I live. As a result I was able then to secure publication of many papers developing my theory.

The most important of these gives a concluding account concerning the proton and its creation, but that is only by way of its introduction, because the primary objective of the paper was to account for the deuteron, the nucleus of the second isotope of hydrogen, and the neutron. It even included a theoretical derivation of the lifetime of the neutron and also the neutron's magnetic moment along with its mass in relation to the mass of the proton. The paper was published in *Hadronic Journal*, **9**, pp. 129-136 (1986).

Concerning the proton, I was able to say:

"It is only recently that measurement techniques have advanced to the point where the proton-electron mass ratio can be measured to within a precision of 41 parts in a billion. Such a value imposes a very severe test on any theory which aims to calculate this ratio, whether quantum chromodynamics or group-model lattice dynamics. Yet the authors of this experiment, Van Dyck, Moore, Farnham and Schwinberg*, writing in 1985, have been able to say:

“The value which they [Aspden and Eagles] calculate is remarkably close to our experimentally measured value (i.e. within two standard deviations). This is even more remarkable when one notes that they published this result several years before direct precision measurements of this ratio had begun.”

Int. J. Mass Spectroscopy and Ion Processes*, **66, 327 (1985).”

Now, coming to the highlight of this *Theory of Everything*, the actual process of creation of the proton, meaning, in effect, the creation of virtually the whole of the matter that constitutes our universe, this was presented in fully updated form in that 1986 paper.

However, it is so important that it deserves a chapter of its own, however brief, our next Chapter 11, but before ending here, with Dr. D. M. Eagles in mind, I just add the words: “**Thank you, David**”.

Chapter 11

THE CREATION OF THE PROTON

We have seen that the aether has in each of its cubic cells the electric charge we have referred to as the 'quon', sitting in a uniform charge continuum of opposite polarity, with a pair of virtual muons behaving like a gas in asserting pressure on the quons and assuring that the aether has a uniform energy density. In addition, though sparsely distributed, there are what we have called 'gravitons', one for every 100,000 or so such cells, that serve, when matter is present and sharing the quantized motion of those quons, in producing a force of gravity that our theory has explained by deriving the value of G, the constant of gravitation.

How, then, might such an aether, should it have energy surplus to its equilibrium requirements, create matter?

Well, one just cannot sit down and, in the comfort of one's home, work out the answer as if it were some puzzle that a little logic exercised by a mathematically-minded person might easily solve. If it were that easy, and given that the proton constituent of atomic matter was discovered about a century ago, our scientists would surely have solved the problem long ago.

Yet, once discovered and explained, every school pupil, well-trained in physics and mathematics, should be able to understand the way in which that puzzle is solved.

We begin by again quoting that fundamental formula telling us the radius a of an electrostatic charge e in terms of its mass-energy Mc^2 :

$$Mc^2 = 2e^2/3a$$

I first saw this equation in a physics book I had in my last school year (1944-45), but later found it in other books of much

earlier date, the most significant being a book I purchased in a second-hand bookshop. It was entitled: *The Recent Development of Physical Science*, by William Cecil Dampier Whetham, a Fellow of Trinity College, Cambridge. That $2e^2/3a$ expression, to be found on page 283, was said to be the ‘electric inertia’ of a ‘slowly moving corpuscle’ of charge e and it was said that J. J. Thomson had used the formula to show how the mass of such a particle increases with increase in speed and fits the related data from observation at speeds as high as 90% the speed of light when the mass has increased more than threefold. Note that the formula had been found by analysis involving charge motion and so the charge e in the book was in electromagnetic units, which means that a representation in electrostatic units, as in the above equation, must involve e/c , which explains how that factor c comes into the equation.

The reason I say that book was particularly significant is its date 1904, one year before Einstein came along in 1905 and took credit for telling us that $E = Mc^2$.

Now, of course, in 1904, the heavy electron, the muon, was yet to be discovered. For that we had to wait until 1937 when such particles were discovered in cosmic radiation. Even so, had the belief in the aether not been suppressed by acceptance of Einstein doctrine, and had wisdom prevailed in seeing the flaw in Earnshaw’s theorem that we discussed in Part I, so one could well have predicted the existence of the muon as an aether constituent. It was not to be, but let us now see what an invasion of muons importing energy from the aether can tell us if we keep in mind the above Thomson formula.

A positive muon and a negative muon might merge to pool their energy, without loss, by being in surface contact with one contracting to half its original charge radius.

This is because:

$$2(2e^2/3a) = 2e^2/3(a/2) + 2e^2/3a - e^2/(a + a/2)$$

Here the last term is the negative component of electrostatic interaction energy as between the two opposite-polarity charges e having their centres spaced at a distance equal to the sum of their radii.

This can be said to be a system having a positive muon paired with a negative dimuon, the latter being a much smaller target for an inflow of other muons seeking to create a more massive particle form.

We could therefore contemplate that, amongst many alternative options, the circumstance of that dimuon retaining its form and the muon gaining energy from the simultaneous impact of other muons which cause it to contract and so decrease in physical size by just the amount that corresponds to it becoming a proton. The energy inflow, however, will be in whole units of muon energy and so, since the proton's mass is not an integer multiple of the muon mass, some energy must be shed to create a third particle of charge e of smaller mass-energy than the muon itself.

Our picture of the proton as it is being created then becomes one comprising three charges, two of positive charge e and one of negative charge e .

To solve this puzzle I reasoned as follows. Let the proton creation process proceed in stages, the first stage being that for which the dimuon-muon combination sheds energy before further muon inflow. I regarded the dimuon component as the stable partner in this union. Then, in adopting a minimum energy state, the muon component of this charge pair expands to become a charge form of lower mass-energy denoted z . To evaluate z we then need to perform the standard mathematical exercise of equating to zero the differential of the total energy with respect to variation of z .

The above energy expression for the dimuon-muon combination can be written in the form:

$$2\mu + z - 3\mu z/(2\mu + z)$$

where z has replaced μ and the combined mass-energy $2\mu+z$ is offset by the negative electrostatic potential energy of the charge interaction. Differentiating this expression with respect to z and equating the result to zero tells us that:

$$(2\mu + z)^2 = 3(2\mu + z)\mu - 3\mu z$$

which reduces to:

$$(2\mu + z)^2 = 6\mu^2$$

and so we find that:

$$z = (\sqrt{6} - 2)\mu$$

Putting this value of z in the above energy expression shows that the mass-energy of the dimuon-muon combination when transformed to the minimum energy dimuon- z state is less than 2μ by the amount $(3/\sqrt{6} - 1)z$ or by $(5 - 2\sqrt{6})\mu$. The result, the mass-energy of the 2μ partnership with z , is $(2\sqrt{6} - 3)\mu$.

On this basis, given that such two-charge, but electrically neutral overall, particle forms can be created when two muons combine and then shed a little energy in developing into a more stable union, one might wonder whether onward bombardment and merger with more and more muons will create a heavy particle form, hopefully the proton. So we proceed by saying that n muons add their energy to that dimuon- z combination, n being odd so as to create the positively charged proton. How then does Mother Nature determine n ?

I reasoned that what might happen would be the creation of a proton as a single charge e , subject, however, to it being liable to fluctuation in form, as by it shedding the z charge and adopting a minimal energy pairing with the dimuon. Thus, without loss or gain of energy, the proton would be a simple proton one moment and a neutral proton-dimuon combination partnered by a nearby z charge a moment later, oscillating in fact between the two states.

After all, I had by the time I reached this stage of the proton puzzle, read that a famous U.S. physicist named Richard Feynman had pondered on the problem of whether a proton might be composed of three charges, and not just one. Data concerning electron and neutrino scattering from protons had caused Feynman, writing in *Science* at p. 601 of the 15 February 1974 issue to say that protons have structure as if they comprise a plurality of particles of more fundamental nature, the so-called quarks. His paper entitled '*Structure of the Proton*' has the introduction:

“Protons are not fundamental particles but seem to be made of simpler elements called quarks. The evidence for this is given. But separated quarks have never been seen. A struggle to explain this seeming paradox may

be leading us to a clearer view of the precise laws of the proton's structure and other phenomena of high energy physics.”

Feynman goes on to explain how, on quark theory, there are three kinds of quark denoted u, d and s. The s and d quarks have charge $-1/3$ and the u quark charge $+2/3$ that of the positron. The s quark has higher mass than the d and u quarks which have the same mass. From this he presents a diagram showing how three quarks can combine to produce ten different particles, but why, I wonder, can it not be said that those quarks have a unitary charge e , but that they exist in different states between which they oscillate, one state having a duration of twice the other?

That was my tentative conclusion but I will have more to say on this subject when I come to chapter 12 where I discuss the ultimate 3-charge state of a proton, once created. Also, I note here that the z charges can even be deployed by combining with muons to form pairs of protons according to the equation:

$$4z + 16\mu = 2P$$

an equation wholly consistent with what is revealed as we now come back to that factor n . How can we determine its value? Well, you have the answer. Energy is conserved and so we know that, if P denotes the energy of the proton, then P in combination with the dimuon of energy 2μ will have a minimal energy configuration that is less than P by the amount z .

Just as z paired with the dimuon has the energy given by:

$$z = (\sqrt{6} - 2)\mu$$

so the dimuon when paired with the proton has the energy:

$$2\mu = (\sqrt{6} - 2)(P)$$

Also, just as the combination of z and the dimuon has the energy given by:

$$2\mu + z - 3\mu z/(2\mu + z)$$

so the combination of the proton and the dimuon has the energy:

$$P + 2\mu - 3P\mu/(P + 2\mu)$$

Adding z to this latter expression should equal P and so we can derive a theoretical value of P in terms of μ without guessing the value of n , though the big question we then face is whether n is really going to prove to be an odd integer. If so, then we have a wonderful result, because, given muons as our building blocks, and muons being the predominant energy form of the aether, then surely the proton becomes unique and it is no wonder it is the unit of matter adopted by our universe.

This means that:

$$z + 2\mu = 3P\mu/(P + 2\mu)$$

and, since we have already shown that z has the value $(\sqrt{6} - 2)\mu$, this also means that:

$$(P + 2\mu) (\sqrt{6}) = 3P$$

or, by rearranging and replacing $3/\sqrt{6}$ by $\sqrt{3/2}$:

$$2\mu = [\sqrt{3/2} - 1]P$$

Evidently the theory tells us that P must have a value of 8.898979486 times μ and, since we know that the value of the virtual muon mass in terms of electron mass is 206.3329 from the theory presented in chapter 9, we have discovered that the proton/electron mass ratio must be 1836.152. However, what about that term n ? Is it really an odd integer?

Is P minus the mass-energy of the dimuon- z combination, $(2\sqrt{6} - 3)\mu$, an odd integer multiple of μ ? Well, you can do the necessary algebra to find out or just use your hand calculator to compute this latter quantity to see that it is 1.898979486 times μ , exactly the odd integer 7 times μ below the mass of the proton.

So, wonder of wonders, it is the merger of the virtual muons that accounts for almost all of the energy of the aether that produces the protons that account for almost all of the mass-energy of the matter that constitutes our universe and no other particle form can so dominate our material world, all because of the unique significance of that odd integer factor 7.

As to the numerical value of the proton/electron mass ratio we have seen in the previous chapter that the theory yields what amounts to a perfect answer, as duly published some 30 years ago in 1975 and as recognized in 1985 by those who made the first direct precision measurement of this quantity. Considering this alongside our theoretical derivation of G , the constant of gravitation, and h , Planck's constant, in terms of the charge e of the electron and c , the speed of light, we have here what amounts to *The Theory of Everything*. This is the long sought *Unified Field Theory*, that connects gravitation, quantum theory and particle physics. There is no need to look for the necessary inspiration on this theme by probing the dark underworld of space any further, as by producing very high energy particle collisions using apparatus that is enormously expensive and is a drain on government resources.

However, with the problem of gravitation in mind, having seen how protons are created, just consider one onward step that is likely to accompany proton creation. If proton creation draws on the muon energy resource which is not that already having dynamic balance in the aether, then gravitons must be created as part of the same process in equal measure in mass terms. Somehow the energy activity accompanying proton creation has a way of producing gravitons.

There are two primary charge forms involved, P and the dimuon 2μ . Numerically, in terms of electron mass, they have values 1836 and 2(207), respectively. Together they constitute a neutral energy quantum of 2250 electron mass units. Now just consider how energy can be deployed as between two unitary charges in contact, both charges conforming with the Thomson formula, which requires mass to be inversely proportional to charge radius. In mass terms, the overall mass M will be given by the following equation in terms of the masses m_1 and m_2 of the component charges:

$$M = m_1 + m_2 - 3m_1m_2/2(m_1 + m_2)$$

How might the total energy of 2250 electron mass units deploy between these components, given an extremely active energy background? As I noted on page 46 of my 1975 book *Gravitation*:

“One probable state is that for which most of the energy is contained in one of the charges, inasmuch as the other is possibly unstable. Thus we may have m_1 nearly equal to M and m_2 quite negligible. However, the equation has two solutions, since it is quadratic in form. Thus, whilst m_1 remains stable at the value M , m_2 may suddenly change from its near zero value to one for which:

$$m_2 - 3m_1m_2/2(m_1 + m_2) = 0$$

and so m_2 could become $M/2$ without any energy being added to the system from external sources.”

Our 2250 energy quantum in such a case comprises two energy quanta, one of 2250 electron units and one of 1125 such units held together by a negative energy potential of 1125 such units. Now, given an environment in which protons are being created and are liable to decay if lacking graviton mass balance, and a proton energy quantum being more than sufficient to separate the two charges, that may well occur, only to result in their recombination to form a neutral two-charge energy quantum of 2250 plus 1125 units, having a mass-energy of 3375 electrons. Then, since half of this is still less than 1836, one more such iteration is likely, to create a final energy quantum state of 3375 plus 1687.5 units or 5062.5 units. Assuming this energy divides between a compact charge form and an electron or positron as the second charge, the binding energy will be 1.5 electron units, this being e^2/a and the electron mass energy being $2e^2/3a$, so it will need a further inflow of energy of 1.5 units to separate the charges. Overall, allowing for the ejection of the electron or positron, the result will be the creation of a residual charge form having the mass-energy of 5063 electrons, this being the g -particle, the graviton that was introduced in Part I in deriving the value of G , the constant of gravitation.

So I say again that the solution of the mysteries surrounding the creation of particle forms that dominate our universe are not therefore dependent upon major government funding for experiments involving high energy particle supercolliders. The answers are

forthcoming anyway, given the right theoretical basis on which to build.

Admittedly there is more in physics that needs theoretical explanation, the three primary problems not being 'everything' in a literal sense, but for those who wish to be critical and more demanding I can but say that they would do well to follow my lead in first taking this aether theory forward in their search for final answers.

Chapter 12

EVERYTHING ELSE

I intend this chapter to indicate that there is so much already of record that supports my aether theory and that can be said to form part of *The Theory of Everything*. For example, my published work includes theory giving account of the magnetic moments of the proton, and the neutron as well as that of the deuteron. Although I have shown how the mass-energy of the virtual muon that features as the primary energy constituent of the aether is determined, I well know that the muon that emerges in the matter form has slightly greater mass. I have shown in my published papers what determines that mass and gone further by showing in my book *Physics Unified* (1980) how the aether determines the lifetime of that muon. The theory of the pion and the kaon, along with many other mesons have also been accounted for by this aether theory. Indeed, there are more than one hundred papers, besides my books, that give insight into aether physics having such a broader spectrum.

Rather than list these here as mere references it is appropriate to direct the reader's attention to my web site www.aspden.org where an updated record of these, including the full text of many of the papers and other publications, can be inspected.

However, there are three topics that warrant special comment here rather than a mere mention and a reference to something published elsewhere. These are the lifetime of the proton, the Hubble constant and a rather curious spin property of the electron.

Since almost all the matter constituting our universe is that of protons or antiprotons and since all other particles of matter,

including the electron, have a limited lifetime, what is the proton's secret of longevity? Note that electrons can decay in the presence of positrons but are somehow recreated by processes we refer to as quantum electrodynamics. How otherwise can they tunnel through potential barriers as we observe in certain experiments involving semiconductors? They decay on one side of such a barrier and reappear on the other side.

Suppose therefore that a proton also has a limited lifetime. Then ask yourself what happens to the energy released by its decay. The energy is pooled with other energy surplus to the equilibrium requirements of the aether and what this means, if the aether is trying everywhere to create matter, is that it will succeed because there is surplus energy available. In other words, should a proton or an electron decay, they will both be reincarnated nearby and, since we cannot tell one proton or one electron from another proton or electron, it will seem to us that they are indeed stable particles.

Note my statement: "If the aether is trying everywhere to create matter." I have to explain why that is so.

As an aside observation here I suspect there will be some physicists who find this commentary amusing but not convincing. In answer let me say that there are more amusing notions that are far less convincing being voiced by those who lead scientific opinion on such matters. Here I have in mind some words used by Paul Davies in his 1994 book about the ultimate fate of the universe: *The Last Three Minutes*. On pages 95-96 he writes:

"To see how gravity can cause proton decay, it is necessary to take into account the fact that the proton is not a truly elementary particle with a point-like form. It is actually a composite body made up of three smaller particles called quarks. Most of the time, the proton has a diameter of about a ten-trillionth of a centimetre, this being the average distance between the quarks. However, the quarks do not remain at rest but are continually changing their positions inside the proton, because of quantum-mechanical uncertainty. From

time to time, two quarks will approach each other very closely. Still more rarely, all three quarks will find themselves in extremely close proximity. It is possible that the quarks will get so close that the gravitational force between them, normally utterly negligible, will overwhelm all else. If this happens, the quarks will fall together to make a minuscule black hole. In effect, the proton collapses under its own gravity by quantum-mechanical tunnelling. The resulting minihole is highly unstable - recall the Hawking process - and more or less instantly vanishes, creating a positron. Estimates of the lifetime for proton decay via this route are very uncertain, and vary from 10^{45} years to a stupendous 10^{220} years.”

Davies goes on then to say that owing to such proton decay “the consequences for the far distant future of our universe are very profound.”

Davies does not understand the cause of gravity but he says gravity can overwhelm the electrostatic forces operative between the charge components of the proton. Note that, in saying the proton has a diameter that is about a ten-trillionth of a centimetre, he is saying that it is about the same as that of the electron according to the J. J. Thomson formula used extensively in this work. To me that suggests that two of those quarks are electrons and or positrons. Imagine a proton, once created as a stable form of matter, to comprise three unitary charges e , two of positive polarity and one of negative polarity, but one being 1836 times the mass of the electron and so of very small radius and the other two being of electron or positron form. Two states are possible if the composition flips between being a proton coupled to an electron and positron and an antiproton coupled to two positrons, spending equal time in each state. The mass overall would hardly change on average given association with other such protons and possible energy exchange.

But to suggest that a proton has a lifetime that is of longer duration than the ten or so billion year estimate of the lifetime of our

universe by a factor that is of such enormity is surely inconceivable. It deserves a grin - not a smile!

That said, we will now see how the aether governs proton creation and decay. In Part I a quantity ρ_s was introduced as the mass-density of 'quasi-matter'. We will now evaluate that quantity assuming that it represents the incidence rate at which the aether tries to create protons paired with electrons, succeeding only if there is energy surplus to equilibrium requirements. Absent such energy the success is short-lived and lasts only for the momentary duration of one cycle of the aether frequency, namely 8.093×10^{-21} seconds. This is one cycle at the Compton electron frequency.

Now, having found that the quon in each cubic cell of the aether has a volume that is 1843 times that of the electron, which is $4\pi/3$ times a cubed with each cubic cell of the aether having a volume $108\pi a$ cubed, we know that the quon has a volume that is 1/5060 times that of the cell. We have seen how nine virtual muons, seven plus the two that form the core dimuon-muon combination, can combine to create a proton or antiproton. Therefore we shall calculate the chance of proton or antiproton creation as that of an event when nine virtual muons, either five of positive charge plus four of negative charge or four of positive charge plus five of negative charge encounter the quon as target in the same aether cycle.

Given a virtual muon pair in each aether cell relocating statistically everywhere in the cell once per cycle, the quon can be said to have one eighth of its volume exposed as target in each of the eight cells that have a common corner sited within the quon. Thus there are eight positive muons and eight negative muons that are potential attackers of the target quon. The odds of a hit by nine muons of the appropriate polarity are therefore:

$$(2)(8 \times 7 \times 6 \times 5)^2 (4) / (5060 \times 8)^9 = 7.736 \times 10^{-35}$$

We know the electron charge radius from the Thomson charge formulation and measured values of e , m_e and c , and so can say that there are 3.867×10^{30} cells per cc. Therefore at any instant in every cubic metre of space there is the transient existence of 299.2 protons,

which corresponds to a mass density of 5×10^{-28} gm/cc. This is the quantity ρ_s that was introduced in chapter 7.

So I am saying, in simple terms, that all space contains a very sparse distribution of quasi-matter that has a transient existence, half of which comprises protons that are created in partnership with electrons and half of which comprises antiprotons that are created in partnership with positrons.

We have seen how its mass density is determined and how this, in turn, determines the angular momentum of stars when created, but now I can point to some further evidence in support of this finding.

Remember that I suggested earlier that Maxwell's equations did not take into account the need for dynamic balance. These equations purportedly explain how electromagnetic waves, light from distant stars, propagate through the aether. I am saying that the electric field vector involved needs to have two components attributable to charge being displaced relative to other charge. So one can write that field vector E as given by:

$$E = E_1 - E_2$$

and its time differential as:

$$dE/dt = (E_1 - E_2)F(E_2/E_1)$$

if we assume that somehow an electromagnetic wave in transit through space 'knows' its frequency of oscillation.

That is the role of function F . When light passes through a solid crystal it is subject to frequency dispersion owing to that crystal having its own resonant frequency properties. The aether has the Compton electron frequency ν_c as its resonant frequency but the aether has special properties, in that it assigns different electric field intensities E_1 and E_2 to the two components of a wave in transit, according to the wave frequency. Thus the wave frequency can be denoted f where:

$$(f)^2 = k(\nu_c)^2$$

and k is a variable equal to E/E_1 , this being equal to $1 - E_2/E_1$.

dE/dt is $2\pi f/E$ or $2\pi v_c(E_1 - E_2)\sqrt{(1-E_2/E_1)}$ for a sinusoidal planar wave and so is of the appropriate form. Note that, when f is equal to v_c , E_2 is zero and no wave of higher frequency can be propagated.

Since E_1 and E_2 involve displacement of very different electric charge forms, quons and gravitons, this causes one of them, E_2 , to be affected far more than the other if there is any wave energy loss in transit. This causes the ratio E_2/E_1 to change with distance of wave travel and so the frequency is thereby reduced.

The energy density W of such a wave is proportional to $(E)^2$ or $(kE_1)^2$, which means that $(1/W)\delta W$ can be written as $(2/k)\delta k$. Also we find that $(2/f)\delta f$ is $(1/k)\delta k$. These relationships taken together tell us that there will be a progressive and proportional reduction of frequency with distance of wave travel, meaning no frequency dispersion, but that it will be at one quarter of the rate at which wave energy is dissipated.

Now energy is shed by an electromagnetic wave in transit through space if it encounters electrons. Very little is shed by encounter with a proton owing to the much higher mass of the proton and its very much lower cross-sectional area.

The Thomson scattering cross-section of an electron is relied upon by physicists as the measure of its obstruction as evidenced by the scattering of X-rays, these being electromagnetic waves of high frequency. That cross-section is 6.67×10^{-25} sq. cm. Since we have derived a measure of the amount of obstructing matter in the aether, ρ_s , as being 5×10^{-28} gm/cc, with 1836 units of its mass being that of proton form for every electron form present, so only 2.72×10^{-31} gm/cc is that of electron form. As the electron has a mass of 9.1×10^{-28} gm, this means that an obstructing electron cross-section is encountered by a plane wave of one sq. cm area in travelling 3340 cm and so encountering a scattering cross-section at a fractional rate of 1 part in 5×10^{27} per cm travelled. In terms of frequency the proportional reduction rate is one quarter of this, meaning 1 part in 2×10^{28} per cm of travel distance.

Since such enormous distances are usually measured in terms of light years we find that the aether will attenuate the frequency of light from distant stars at a time rate factor of 21 billion years. This is the theoretical result which this analysis provides. It has no connection whatsoever with the notion of an expanding universe.

It was in 1928 that Edwin Hubble, working on the 100-inch telescope at Mt. Wilson in Southern California, began to discover that light received from distant galaxies had lower and lower frequency, the more distant those galaxies were. The wavelength of light was shifted to the red end of the spectrum and the fractional shift of wavelength z was formulated as:

$$z = DH/c$$

where D is distance travelled, H is Hubble's constant and c is the speed of light.

Narlikar, in his book *The Structure of the Universe*, published in 1977, indicates that, although the measured value of H had changed owing to improved methods of observation since Hubble made his original estimate, H had by 1977 been found to be 1.5×10^{-18} per second. The reciprocal of this, stated in years, is 21 billion years, precisely the value indicated by aether theory based on the quasi-matter creation activity that led us to the value of ρ_s that we used in Part I in deriving the mass of a star created within a space domain.

So our *Theory of Everything* has solved one of the greatest mysteries in science and revealed to us that the notions of Big Bang creation and an expanding universe are mere figments of imagination. There is no point in trying to estimate the age of the universe. All of the various theories that purport to describe the evolution of the universe from birth in a Big Bang involve assumptions that cannot be proved.

Although I have been urging those interested in these matters to give my aether theory a hearing and accept that it does offer an alternative insight into how our universe was created, cosmologists, in the main, still cling on to their expanding universe theme with its Big Bang scenario. They are understandably reluctant to alter the

opinions on which they have founded their reputation and career. However, the physical truth has to emerge at some stage. I find it gratifying therefore to have read, as I was writing this chapter, a *News* item on page 6 of the July 2005 issue of U.K. Institute of Physics member's journal *Physics World*. It is entitled: *Critics question reality of the Big Bang*. Its opening paragraph is:

“The Big Bang model of the universe is increasingly at odds with observation, and the field of cosmology is in dire straits. That is the view of over three dozen astrophysicists who converged on the University of Minho in Portugal at the end of last month to hold the first ‘Crisis In Cosmology’ conference. Participants at the meeting examined new data that, they allege, contradict the Big Bang model. They also discussed a number of alternative models of the cosmos.”

Now, of course, as seems inevitable when any item of news based on man's interpretation of available evidence, the reporter has to give those who think otherwise a chance to comment. So the report includes the statement:

“Mainstream cosmologists such as Sean Carroll at the University of Chicago disagree. ‘There is no sensible reason to doubt the Big Bang,’ he says.”

Well, I say that he should consider what I have said here about Maxwell's equation lacking dynamic balance, something that, as I have already stated, any engineer would say is essential. Given that I have shown how introducing that balance can lead us to the theoretical derivation of the Hubble constant without requiring an expanding universe, is not that a ‘sensible reason for doubting the Big Bang’?

Cosmologists have failed to give reason for the creation of matter in its primary form, the proton, yet here we have seen how muons which feature in cosmic radiation and are recognized by quantum theorists as being active in the aetherial underworld of space can create protons. Furthermore we have seen that the Hubble

constant depends upon the above picture of how a very sparse quasi-matter proton-electron state having that mass density ρ_s exists through space. So it seems highly probable that the creation of real matter in proton-electron form has similar origin. All it needs is release of energy by the aether that is surplus to its equilibrium requirements and, instead of the transient quasi-matter forms reverting to the muon background state, they then survive as real protons paired with electrons, meaning they form into hydrogen atoms.

We come now back to Earth and the topic referred to above as electron spin. When I attempted to get my early research published concerning how reacting charge, whether in metal or in the aether, must halve the intensity of an applied magnetic field, so accounting for the gyromagnetic factor-of-2 property of the electron, I was rebuffed. It was made clear to me that only those expert in quantum electrodynamics understood electron spin properties, as they had discovered the wonderful explanation of the ‘anomalous magnetic moment’ of the electron. The anomaly factor was not just the factor 2, which had been explained by Nobel Laureate Paul Dirac, but was greater than 2 by a little over that by one part in a thousand.

It was the explanation of the factor 2 that mattered in view of its importance in proving that the aether exists, but the referee physicists who assessed what I had written lived in the world of QED, ‘quantum electrodynamics’. I later found that this is a world which evolves with each advance in precision measurement requiring a change of theory by introducing hypothetical factors to adjust the numbers predicted by theory.

In any event, by 1985, B. W. Petley, in his book *The Fundamental Physical Constants and the Frontier of Measurement* was able then to report that “the g -value of the electron is now the most accurately measured of all the fundamental constants”. On page 187 he gave the measurement figure, based on measurements involving a single electron, as being:

$$g = 2(1.001159652200)$$

stated as being subject to an uncertainty of 40 parts in a trillion.

The corresponding theoretical QED evaluation reported, in spite of all its doctoring, had a greater degree of uncertainty.

Now I am introducing this here for two reasons. One concerns the subject of Hubble's constant, just discussed. The other is to point out that aether theory can do even better than QED in explaining that numerical g -value.

Readers might have noticed that, in deriving the Hubble constant theoretically, I used the Thomson scattering cross-section even though that is derived from the Larmor formula for energy radiation by an accelerated electron. You may recall that I pointed to an error that, when resolved, gave us the formula $E = Mc^2$ but indicated that an accelerated electron will not shed its own energy.

It was only when I addressed the problem of explaining that small anomalous component of the electron's g -value, that I was able to resolve this apparent inconsistency.

My finding became the basis of a paper entitled *Electron Form and Anomalous Energy Radiation* that was published in *Lettere al Nuovo Cimento*, **33**, 213 (1982). When an electron is caused to move at high speed in an orbit of very small radius it exhibits a mass property that excludes dependency upon its field energy that is seated outside a cavity of radius approximating half the Compton electron wavelength. The radial wave system within that cavity region is reflected from wave interaction at a boundary surface that has a larger radius than that of the electron charge and it is the cross-sectional area of this boundary surface that renders the electron opaque to the passage of electromagnetic waves.

Analysis of this in that paper indicated that the component of electrical field energy absorbed along with an equal amount of magnetic energy was then exactly that predicted by Larmor, but that this did not involve energy radiation by the electron. Dispersal of energy intercepted by an obstructing presence is not radiation of energy sourced in the charge that constitutes that obstruction.

As to that g -value and its theoretical derivation by my theory, I did publish this in 1986 in a paper that appeared in *Speculations in*

Science and Technology, **9**, 315-323 (1986). It was entitled: *Fundamental Constants derived from Two-Dimensional Harmonic Oscillations in an Electrically Structured Vacuum*. This was later presented in further detail on pages 48-53 of my book *Aether Science Papers*, published in 1996. The following is a quotation from that text. Note that α is the fine-structure constant, one of the three fundamental constants that this *Theory of Everything* has derived with high precision from aether theory.

“That paper [the one just referenced above] shows, in a few pages, how the electron’s g -factor can be explained with at least the same precision that is claimed for QED.

The formula is:

$$g/2 = 1 + \alpha/[2\pi(1 + \sqrt{3}/N) - \alpha]$$

Here, N is determined as the nearest prime number to the value $3\pi/2\alpha$. Since α^{-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 α^{-1} .

137.03597	1.001 159 652 365
137.03598	1.001 159 652 280
137.03599	1.001 159 652 195

Now, that paper 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 1.001 159 652 193(10) as the $g/2$ factor of the electron. Nor did I imagine that the α^{-1} value adopted would be 137.0359895(61).”

I claimed that the QED experts could not do better than this by their methods that took an enormous amount of computation that

physicists in general had no way of checking, whereas my method involved just a few pages of analysis.

What is left in our task to present *The Theory of Everything*? I submit that enough has been said to justify the writing of this work and so end this Part II. There are greater problems in the world that worrying about whether or not our universe was born in a Big Bang, not the least being whether it will end with a Big Bang if those who experiment with high energy particle colliders trigger a chain reaction of some kind.

When Lord Rees, an international leader in cosmology and space science, has reason to tell us in his book *The Last Century* that experts concerned with research on their high energy particle accelerators estimate a very low chance of a runaway disaster, one can but wonder what they are trying to prove. Is it mere curiosity, a desire for fame at having discovered a new particle, or the hope of something happening that will support belief in Big Bang Creation?

Rees tells us that the Brookhaven Report and a parallel effort by scientists from the biggest European accelerator, CERN, in Geneva indicates that, by running their experiments for ten years, the risk of a catastrophe is no more than one in fifty million. He then alerts us as to what this means. It is not that such a catastrophe might kill one fifty millionth of the world's population, but rather that there is a one in fifty million chance that the whole of the world's population will be killed.

Are we to believe that those scientists really know how to calculate those odds, when they have no idea how to decipher the messages hidden in the values of the fundamental physical constants that have already been measured with very high precision?

If it is a catastrophic end for the world's population that is a matter of concern, that is inevitable anyway, when we next traverse a space domain boundary at a very oblique angle, meaning a prolonged crossing with the turmoil accompanying the sudden loss of gravity. Geological history has recorded such events, extinction of species of life, from analysis of fossil remains. Their timing is linked

to the period of the galactic motion of our solar system. However, whilst we have no choice but to accept the inevitable, we do have a choice in deciding whether or not to fund experiments that might trigger our extinction.

Such funding is better directed at research aimed at understanding how our aether exhibits its role as an energy source in low energy experiments. It can store energy and transfer energy between different locations and return stored energy on demand. It has a way of using its energy to create matter, as we have seen. So, without prodding it by violent high-energy experiments, just to see what happens, let us cast our scientific prejudices aside and take stock of certain evidence that is being ignored and see how that might help us to discover a new non-explosive source of energy supplied from the aether itself.

This brings us to the concluding Part III of this work.