CREATION

The Physical Truth

by

Harold Aspden

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Prologue

If you were to try to borrow a large block of gold with the object of placing it in a position of rest in a wooden shack in an isolated field remote from intruding electromagnetic effects in order then to see if you could detect how it might react to that state of peaceful isolation, it is likely that you would be regarded as somewhat crazy.

Yet, truth being stranger than fiction, someone who was not crazy did succeed with such a request with the object of performing an experiment which should have helped us to understand the link between gravitation and electrical phenomena that is governed by the quantum underworld that permeates all space.

However, where gravity is concerned, along with its role in the creation of our universe, fiction has come to dominate and truth is not part of the equation. So there is need for correction.

To discover the physical truth about creation we need what has been termed *The Theory of Everything* and so, in Part I of this work, we will review that experiment involving the block of gold and explain why it is important. We shall point to a feature that was overlooked and which, once taken into account, guides us to a true understanding of the very nature of the force of gravity. This gives us an entry point to understanding the dynamics of the space medium and the link between gravity and fundamental particle forms, leading then to the formulae from which G, Newton's constant of gravitation, can be deduced theoretically in terms of the measured electrical charge to mass ratio of the electron.

Thus we will in Part I alone have achieved the main objective required of a so-called *Theory of Everything*, but, science being ever-demanding, it will need Part II to cover more on the fundamental particle theme and the related link with quantum theory. Then, since everything includes energy, an energy source that somehow created our universe, and we face a future of diminishing energy resource

unless we can somehow uncover and exploit that hidden source of energy, Part III will seek also to embrace that subject in this account of *The Theory of Everything*.

It will then be for the reader to decide if what has been disclosed has that 'ring of truth' needed to overcome the fiction of Big Bang creation and an expanding universe.

Note, however, that this text is intended to be read by the general reader having an interest in science, a moderate understanding of physics and some basic mathematics.

It is a concluding brief account of the author's efforts over 50 years to decipher in physical terms Nature's messages, as coded in the numerical values of the fundamental physical constants. The result has revealed evidence that challenges many astrophysical notions but warrants attention as it may well reveal how to bring that omnipresent energy source into the realm of technology at a time when it is most needed.

The author's earlier published work, mainly in the form of scientific papers and privately published items, is of reference on the author's website www.aspden.org and, besides addressing many related topics, provides detailed support for much that is here disclosed.

Before presenting Parts I, II and III we will, however, begin, as Chapter 1, with a short historical discourse which puts a little emphasis on Cambridge and Trinity College there, in particular, this being Isaac Newton's seat of learning and his discovery of the law of gravitation being the obvious foundation for a *Theory of Everything*.

Chapter 1

HISTORICAL INTRODUCTION

Whilst most of us beings on Earth have enough problems to contend with in our daily life without pondering on the great mysteries of science we are nevertheless aware that religion has a powerful influence on our existence. Yet religion and a belief in God, as the creator and governor of our universe, tell us little that is credible concerning how stars, and our Sun, with its planets including Earth, were created. It is all a great mystery but the word 'God' has meaning, in that it stirs an intellectual challenge, that of understanding as much as we can about our existence and the forces of nature that account for what we see and sense as this, our universe. This is the realm of science, rather than religion.

Our history tells us that besides those who ruled and governed there were those who claimed a special insight into the great mysteries of our existence and evolved religious beliefs leading to doctrinaire principles and the foundation of churches of various denominations. Sadly, the concept of God as the Creator then became an inflexible fixation in many of those religions and was not something that could evolve as we discovered more concerning the truths of nature.

This even led to us having seats of learning where one could pursue an understanding of those truths and advance in solving some of nature's mysteries, but which nevertheless demanded commitment to a particular belief in God in order to conserve the authority of those in power in the related religious community.

The search for truth by deciphering what we see by looking into the sky at night, or experience here on Earth, a search arising

from our curiosity concerning why we exist and how everything we can see was created, became a preoccupation warranting general concern, but history records only the efforts of the very few who did guide us along the forward path.

Galileo (1564-1642) was such a pioneer, an intellectual giant in his time, discovering the law of motion of falling bodies, who, though having been a medical student at the University of Pisa, gave up the study of medicine for mathematics and later made many astronomical discoveries, especially the resolution of the Milky Way into innumerable stars. Yet, when he published his findings and eventually his *Dialogue on the Two Chief World Systems* he found he had to stand trial for his views. He had encountered the displeasure of the Church of Rome.

Isaac Newton (1642-1727), who discovered the law of gravity, entered Trinity College, Cambridge in 1660 and even as an undergraduate appears to have had some conception of a universal force which could account for all motion and as the years passed so this idea came to dominate his thoughts. He then left Cambridge temporarily, just after gaining his degree in 1665, the university and its colleges having to close for two years owing to the plague, but he returned in 1668 to take up the Fellowship to which Trinity College had elected him. In due course, in 1687 he produced his monumental work of the *Principia* but then found himself representing his university as a member of Parliament, where he took his seat in 1689. It is doubtful that religious pressures influenced or limited his scientific pursuits, but after 1704 when he had published his *Opticks,* he did become increasingly occupied with theological speculations.

In a sense one could say that science, particularly the field of astronomy, arouses interest in questions which are of a theological nature and one could wonder whether science, as it evolves, might even become a religion in its own right.

With that thought in mind, and advancing another century, we could take stock of scientific knowledge at the time of Reverend William Whewell (1794-1866), the author of many philosophical,

mathematical and scientific works, and particularly, in 1858, his *Novum Organon Renovatum* in which he set forth a nineteenth-century revision of scientific method.

Whewell became Master of Trinity College, Cambridge in 1841 and Vice-Chancellor of the University in 1842, so it is not surprising to learn that a section of Trinity College is named Whewell's Court. As a research student at Trinity College I had rooms in Whewell's Court (1952-53) which accounts for why, years later, I bought a book bearing Whewell's name that I saw in a second hand bookshop. It was entitled *Astronomy and General Physics*, being a sixth edition dated 1837, the first edition having been written in 1833. The book affords an interesting insight into scientific knowledge of that period. It had a longer title on its opening page: *Astronomy and General Physics Considered with Reference to Natural Theology*.

The first words of its Chapter 1 read:

"The examination of the material world brings before us a number of things and relations of things which suggest to most minds the belief of a creating and presiding Intelligence."

Then two pages later, one reads:

"Our knowledge of nature is our knowledge of laws; of laws of operation and connexion, of laws of succession and co-existence, among the various elements and appearances around us. And it must therefore here be our aim to show how this view of the universe falls in with our conception of the Divine Author, by whom we hold the universe to be made and governed."

One can see from this that the quest to discover *The Theory of Everything* is not a just a pursuit dating from the 20th century. In our modern scientific terminology we do not refer to God in such a way. Our interest is just in the connections between physical phenomena and formulating rules or laws which experiment and observation seem to suggest, but we do not declare these to be the

handiwork of an all-powerful deity. Defining the word 'God' in the context of our universe needing a creator does give that word physical meaning but, however much we learn about science and the extent of our universe, we are limited to linking phenomena in a logical way and can never fathom how and why the vastness of space exists and how it came to contain energy from which matter has formed.

Isaac Newton gave us an insight into the force of gravity and, judging by what Whewell wrote on the subject of gravity more than a century after Newton's decease, there had been no advance in understanding the true nature of that fundamental force which affects us all. It keeps us on body Earth and we do not know why.

Whewell's book comprised 381 pages, of which three pages sufficed to cover the 'Laws of Electricity' with another three pages describing what was then known about the 'Laws of Magnetism'. Neither the contemporary researches of Ampere nor those of Michael Faraday (1791-1867) had, it seems, become sufficiently known to warrant comment. Even the findings of C. A. de Coulomb (1736-1806) and Henry Cavendish (1731-1810) were not mentioned. Cavendish had, in 1798, made the first successful measurement of the constant of gravitation G by tests on the interaction of two heavy bodies. Historical records also show that, although Coulomb is credited with the experimental verification of the inverse-square law of electrostatic charge interaction, Cavendish had performed the same experiment some ten years before Coulomb but had not seen fit to publish his findings.

Electricity is seems was better known from Benjamin Franklin's encounter with lightning by his kite experiment in exploring the electricity in the atmosphere. In discussing that Whewell was concerned with lightning and thunderbolts as conveying the idea of a superior and mighty power manifesting 'displeasure and threatening punishment', these 'destructive agents being part of a great scheme, of which every discoverable purpose is marked with beneficence as well as wisdom'.

Of magnetism Whewell first stressed its vast service to man 'by supplying him with that valuable instrument the mariner's compass'. Then he noted that magnetism has been discovered in modern times to have so close a connexion with galvanism, that they may be said to be almost different aspects of the same agent. 'All the phenomena which we can produce with magnets, we can imitate with coils of galvanic matter.' After then stating that 'the Aurora Borealis, probably an electrical phenomenon, is said, under specific circumstances, to agitate the magnetic needle', he linked this with the electrical properties of the atmosphere and concluded that 'magnetism belongs to the same system of beneficial contrivance to which electricity has already been traced'. Then came the summary statement, one which has proved to be true prophecy:

> "We see, however, on this subject very dimly and a very small way, It can hardly be doubted that magnetism has other functions than those we have noticed."

Such therefore was the wisdom of someone who would, within four years, in 1841, become Master of Trinity College, Cambridge. On the subject of aether which no book on physics written in the 19th century could ignore, Whewell also devoted just three pages to that topic. He wrote:

> "The ether is not only the vehicle of light, but has also laws, at present unknown, which connect it with heat, electricity and other agencies."

> "All analogy leads us to suppose that if we knew as much of the constitution of the luminiferous ether as we do about the constitution of our atmosphere, we should find it a machine as complex and artifical, as skilfully and admirably constructed. We know at present very little indeed of the construction of this machine."

> "If the earth had no atmosphere, or if the world had no ether, all must be inert and dead. Who constructed these three extraordinarily complex pieces of

machinery, the earth with its productions, the atmosphere, and the ether? Who fitted them into each other in many parts, and thus made it possible for them to work together? We conceive there can be but one answer; a most wise and good God."

Now, as we well know, by the end of the 19th century we knew enough about electricity to see the beginnings of a world dependent upon electricity for power and light such as could not have been imagined in Whewell's time. Thanks to Clerk Maxwell (1831-79), we also knew that the aether was electrical in nature and could store energy by displacement of its charge.

Let me now digress a little to draw attention to something I wrote on the subject of the aether, my book *Modern Aether Science* published in 1972. On page 87 of that work I wrote:

"So much of physics depends upon the interaction of electric charge that you just have no way of founding physical theories of Nature if you set out with the wrong law of electrodynamics. Care is needed because physicists are human and they make mistakes. Everyone makes mistakes, and it is particularly easy in theoretical research. The researcher is setting off on a journey in the dark along an uncharted road. If he gets lost, he has no one to put him back on the right track until someone else comes down the same road, goes back, finds a better road and bothers to come back again to collect the lost soul. All this takes time, centuries of time, and with so many people rushing around, all lost at once, the chances of sorting things out are reducing rather than increasing. But there is an added difficulty. There are those who go along the right road and come back to invite others to follow. Yet they will not follow because someone already out of reach has assured everyone that he has explored that same path and found nothing. There is imperfect recollection of what he really reported but it still

daunts the willingness to believe the more favourable reports. Such is the world of the physicist unless he is a recognized explorer of the jungle and can take a large following with him wherever he may go."

This was followed by a paragraph beginning with the words:

"I am, incidentally, thinking of certain characters and experiences of my own in putting together the above observations. The man now out of reach is the Reverend Samuel Earnshaw (1805-1888). He left behind him an interesting proposition, generally referred to as Earnshaw's theorem. According to this theorem, an isolated electric charge cannot remain in stable equilibrium under the action of electrostatic forces only. I found my papers being rejected because my discoveries were in conflict with Earnshaw's law. Hence the question: 'Who was Earnshaw?' ...."

Well, having in mind that Whewell, at Cambridge at the time, had so little say about the aether and its electrical composition, here was the Reverend Samuel Earnshaw in Cambridge, reading a paper before the Cambridge Philosophical Society in 1839 on the subject of the electrical constitution of the aether. His paper was published in the *Transactions* of that Society at pp. 77-114 in volume 7, 1842. It was entitled: '*On the Nature of the Molecular Forces which regulate the Constitution of the Luminiferous Ether*'. Earnshaw claimed to prove that the aether could not constitute electric charges retained in a relatively stable configuration, if the forces acting between them are of the usual inverse square of distance form.

At that time there had already been significant progress in understanding what was destined to be the underworld of space that is the basis of modern quantum theory, but Earnshaw killed that vision and did so because he had overlooked something of major significance. I discovered this, as did W.T. Scott who wrote a paper entitled '*Who was Earnshaw?*' published in the *American Journal of Physics* in 1959 (volume **27**, p. 418), but the damage had been done back in the mid 19th century, when physicists were deflected

away from pursuing the right path, one that does lead to the so-called *Theory of Everything*.

Note, incidentally, that title of 'Reverend' as applied to Samuel Earnshaw, another indication that such enquiry into the physics which underlies our universe is not unconnected with the pursuit of religious interests by those having the necessary scientific skill.

Even the later researches of Clerk Maxwell could not overcome this barrier which blocked our perception of the electrical structure of the aether. Had the error been recognized, then it would soon have been also recognized that the aether could comprise a uniform background continuum of charge of one polarity permeated by a system of electrical charges of the opposite polarity, the latter forming a crystal-like structure and the whole becoming a kind of invisible fluid crystal medium offering no resistance to movement of matter but yet having a structured form that could share that motion.

The speed of light, being referenced on that structured charge component, rather than an absolute frame of reference would then have provided the explanation of the null result of a famous experiment reported in 1887 by Michelson and Morley and aimed at measuring the Earth's cosmic motion through space.

It is unlikely in such circumstances that Einstein would have found a hearing for his philosophical notions concerning a theory of relativity and, since that theory has led us nowhere in our quest for a *Theory of Everything*, new theory having truthful foundation would have emerged in the 20th century with the aether as its basis. As it is, in this respect, one could say that the 20th century was *A Lost Century*.

So, in such a quest, I really wonder if what I have to say on the *Theory of Everything* in this work will find acceptance. One can wonder, however, if the task of developing such a theory is worth the effort, given what the current Master of Trinity College, Cambridge, Sir Martin Rees, now Lord Rees, has written in his book: *Our Final Century*.

He paints a picture of doom. In his opening *Prologue* Chapter 1, after saying:

> "The twentieth century brought us the bomb, and the nuclear threat will never leave us."

and then reminding us of the many other problems of our present time he says his primary aim is "to focus on twenty-first century hazards, currently less familiar, that could threaten humanity and the global environment even more". Then followed the ominous warning:

> "Experiments that crash atoms together with immense force could start a chain reaction that erodes everything on Earth, the experiments could even tear the fabric of space itself, an ultimate 'Doomsday' catastrophe whose fallout spreads at the speed of light to engulf the entire universe."

Who, he asks, should make the decision as to whether such experiments are undertaken in the future? Who else, but the wise scientists who advise governments on research funding aimed at satisfying their curiosity in their search for *The Theory of Everything*?

Such advice has, however, to be tempered by reflecting on past errors, particularly those in the field of science and taking time to decipher the messages conveyed by what is already known. We must heed a comment by Lord Rees that overlaps pages 148 and 149 of his book:

> "In the twentieth century we learnt the atomic nature of the entire material world. In the twenty-first the challenge will be to understand the arena itself, to probe the deepest nature of space and time. New insights should clarify how our universe began, and whether it is one of many. On a more practical terrestrial level, they may reveal new sources of energy latent in empty space itself."

That latter point is indeed the challenge of the 21st century, tapping energy from the aether guided by an understanding of how the aether shed the energy needed to create our universe. That is really the subject of this book, but our starting point is the discussion of an experiment that gave a null result, just as did the Michelson-Morley experiment, the latter opening the doorway through which Albert Einstein launched his Theory of Relativity. This experiment, on the contrary, opens the doorway giving entry to *The Theory of Everything* but, though a Nobel Prizewinner did open that door and stood for a while in the doorway, he failed to see the way forward.

Chapter 2

INTRODUCING GRAVITATION

We all learn about gravity by reference to Isaac Newton who formulated the law which governs how planets move around the Sun and how the Moon moves in its orbit around the Earth. Gravitation is a force of mutual attraction between two bodies, a force which is proportional to the masses of both bodies but decreases with their distance of separation in inverse proportion to the square of that distance. Thus two particles of mass M and m, respectively, separated by a distance R have a mutual force of attraction that is given by:

$$GMm/R^2$$

where G is Newton's constant of gravitation. Note that Isaac Newton lived between 1642 and 1727 and so his law and that factor G have been on our minds for a very long time.

In comparison, and concerning the force acting between two electric charges of like polarity, also conforming with an inverse square of distance law, the latter force is one of repulsion.

Now, logic might suggest that these two laws are connected in some way and that gravitation has its underlying nature seated in an electrical charge interaction, but there is the problem that one is a force of attraction and the other a force of repulsion.

Lacking insight into how such a link might be possible, it was only well into the 19th century that the mutual electromagnetic attraction of two wires carrying current in the same direction was discovered and so, inevitably, the general scientific opinion became focussed on gravitation being an electromagnetic force of attraction. Hence the quest for a theory that could bring about unification as between gravity and electromagnetism.

Yet, the problem not having been resolved in the 20th century, Einstein's century, we still in this the 21st century await discovery of

such a unifying theory and it now seems improbable that such unification in terms of electromagnetic attraction will ever be achieved.

Therefore, common sense says that we should look for a simple solution that might have occurred to Isaac Newton had he lived another 100 years and come to think in terms of the electrostatic action of the Coulomb-Cavendish era.

Imagine, as Newton might have reasoned, that we inhabit an aether medium that permeates all space and fills it with a uniformly distributed electrical charge of one polarity in which there are discrete identical charges of opposite polarity serving to neutralize the medium overall. Suppose then that something we call 'matter', being of charged particle form, but, collectively with other such particles of matter being electrically neutral overall, sits in that medium and so has displaced a measure of charge belonging to that uniform charge continuum just introduced. The mutual electrostatic force action between elements of that charge continuum will be repulsive, but, in having to separate apart to make room for particles of matter, this will force together whatever it is that sits in the voids of continuum thus created by the presence of matter. Those elements of matter that create those voids will, accordingly experience a force of mutual attraction. This surely could account for gravity. Therefore, in what follows, I shall refer to these voids as 'graviton' voids, meaning that they are occupied by something I will call 'gravitons'.

Now, this is all speculation from the viewpoint of a period when scientists really did believe in the reality of an underworld they called the 'aether', but here you can see scope for unifying gravitation and electrical action and so it is an option worth exploring in spite of the modern belief that the 'aether' is an outmoded concept.

On this basis, what would you expect? Simply that gravitation would require that a mass M would exhibit electrical properties that would correspond to those of an electrical charge of $\sqrt{(G)}M$.

Is there any evidence of this in the scientific literature? Indeed there is and this is what introduces us to the so-called 'Schuster-Wilson Hypothesis', the subject of the next chapter.

Here, however, I wish to comment further on the hypothesis that space is filled with a uniformly charged continuum of electric charge of one polarity but populated by a structured system of charged particles of opposite polarity. I will call these aether particles 'quons', but before enlarging on that theme, and aware that this may be read by physicists well versed in their subject, I need to mention the findings of a Cambridge professor who, though born in 1902, was awarded a Nobel prize as early as 1933. Paul Adrian Maurice Dirac had contrived 'almost miraculously' to explain the "then known properties of the electron, including its spin and magnetic moment' by solving a mathematical formulation of 'four simultaneous equations'. Dirac's theory, however had 'an infinity of solutions of negative energy which, being inexplicable, were thought to be a blemish on his theory. However, in 1930 Dirac interpreted these to indicate a background, or 'sea' of states from which a missing electron would appear as a positive 'hole'; in 1932 the discovery of the positron by Anderson and by Blackett and Occhialini vindicated his prediction."

These quotations are from Professor A. M. Taylor's book *Imagination and the Growth of Science* (1966). In a sense Dirac had revived the concept of the aether, as was clear from the later commentary by Sir Harrie Massey in his 1960 book *The New Age in Physics*. On page 140 under the heading **The New Aether** one reads:

> "Dirac made what was regarded as a fantastic suggestion to overcome the negative mass dilemma. If all the allowed states in which electrons have a negative mass are normally occupied no further electrons can drop into such states. Dirac made the bold assumption that what we regard as empty space, in that it possesses no material or other properties, is really by no means empty but is the condition in which all the negative mass states are occupied."

Then, on page 150, Massey has another section headed **The New Aether - Some Final Comments** in which he states:

> "We see that, after having disposed of the luminiferous aether, relativity taken together with quantum theory

has replaced it by a new, far more complex one, in the densely populated vacuum. Apart from negative mass electrons and the electromagnetic field oscillators it includes negative mass protons, neutrons and mu-mesons. There are even more mysterious denizens such as anti-neutrinos."

You will, therefore, now appreciate the fact that, though the aether was rejected following acceptance of Einstein's theory, here was Dirac effectively reviving the aether in disguise by convincing his peers that quantum theory and relativity theory could be compatible if one accepted a rather weird notion of the aether.

Dirac's aether, however, cannot explain gravity or the other primary problems, notably what determines Planck's constant and what determines the proton-electron mass ratio. These were confronted, somewhat unconvincingly, but still in the 1930s, by another Cambridge scientist, Sir Arthur Eddington who had studied under Arthur Schuster at Manchester University and after graduating moved to Trinity College, Cambridge. In the early pages of his 1935 book *New Pathways in Science* he refers to the aether in the following way:

"Whitehead once said "You cannot have first space and then things to put in it, any more than you can have first a grin and then a Cheshire cat to fit onto it". You cannot have space without things or things without space; and the adoption of thingless space (vacuum) as a standard in most of our current physical thought is a definite hindrance to the progress of physics."

So why is it that the following 70 years has not seen the development of an acceptable aether theory that really can tell us what determines the constant of gravity, the proton-electron mass ratio and Planck's constant? We persist in updating our measurement of these quantities with higher and higher precision, but what is the point of that unless we expect to see their values change or seek to test a theory that purports to explain those values?

When I came on the scene and developed my picture of the aether some fifty years ago (1955) it was not with the object of conforming with Einstein's theory or quantum theory or understanding the nature of gravitation or merely checking numerical values. I had been interested in my Cambridge research in ferromagnetism in iron and certain energy anomalies involved when iron is subject to cyclic magnetization. In my efforts also to understand why iron, nickel and cobalt are ferromagnetic I had explored mathematically the interaction forces between 3-d state Bohr orbit electrons of adjacent atoms in the iron crystal to determine how much mechanical stress is induced by magnetic polarization. I concluded that, since magnetic energy is characterized as negative potential energy and strain energy is positive, and since iron has a high modulus of elasticity, the state of ferromagnetism in iron results because it is favoured by the energy balance, magnetic energy winning over strain energy.

Such mathematical analysis, which involved an assumed synchronous motion as between electrons of adjacent atoms, portrayed something having rather special properties that I could see might be relevant to an aether, if such existed. Once I recognized that I began to explore how the aether might really store the energy in a magnetic field. That led to mathematical analysis by which the action constant of quantum theory, the basic unit of angular momentum, denoted $h/2\pi$, could be calculated in relation to the fundamental unit of electric charge e, that of the electron and the speed parameter c that we associate with the aether, c being the speed of light in vacuo. What emerged was a theoretical evaluation of the fundamental dimensionless constant known as the 'fine structure constant' $2\pi e^2/hc$, a very basic term in quantum theory. The constant h, Planck's constant, was therefore calculable in terms of e and c, a truly wonderful finding.

However, I had come to this result by visualizing the fabric of the aether, something physicists had, thanks to Albert Einstein and in spite of Paul Dirac, come to view with disdain. Furthermore, my efforts to convince my peers then ran into an obstacle posed by acceptance of that theorem of Samuel Earnshaw that I mentioned in

Chapter 1. In my physics education I had never heard of Earnshaw or his theorem, but since it allegedly proves that no system of electric particles can adopt a uniformly structured form with charges held in spaced relationship under the influence of their mutual electrostatic inverse square of distance force, either that theorem is wrong or my insight into the aether is wrong.

Earnshaw had only considered the charge interaction problem on the assumption that they are spaced within a true void. His theorem fails if they are immersed in a sea of electric charge, that background charge continuum that I had assumed to be present in the aether and it is that charge continuum that holds the secret of gravitation.

However, given the existence of such a charge continuum, the task confronting Earnshaw being to determine how aether charges would interact in their relative positioning in the aether, he would have found their structural configuration. Those charges, the quons, compensate electrically for the continuum charge and render the aether neutral overall. Being subject to interaction that is a force of mutual repulsion, they would form into a simple structured array of cubic form and so endow the aether with some properties akin to those of a crystalline solid. One such property is the determination of the speed of light propagation.

However, those quons cannot be at rest within that continuum. If they were they would be at positions in which their electrostatic interaction with the continuum has a negative energy potential. To avoid that they must be radially displaced to positions of least positive energy potential, which means that they must share a synchronous motion with surrounding quons and describe circular orbits to balance the electrostatic force by centrifugal force. So the aether is alive with energy and you see why the analogy with the ferromagnetic picture of electron motion applies.

With such an insight into the structure of the aether one can then ask what happens if an astronomical body is present and its mass displaces that electric charge $\sqrt{(G)}M$. The quons will also be displaced radially within that body and, to retain orbital synchronous

motion with other quons within the body without having their orbital speed fluctuate, the whole quon structure coextensive with that astronomical body must rotate.

This poses questions concerning 'aether drag', particularly for the case of spinning matter. Linear motion of matter through space can carry that quon structure along with that matter without there being any momentum transfer, because a countermoving aether charge form can exist to keep dynamic balance. The quon structure, in defining the electromagnetic frame of reference, would thereby account for the null finding of the famous 1887 experiment by Michelson and Morley, otherwise seen as the Achilles' heel of aether theory.

However, aether drag in the context of rotation is an open question, a question of vital importance if we are ever to understand how that expression $\sqrt{(G)}M$, besides accounting for gravity, governs how stars are created.

If, within the Sun, there is an electric field radially directed from its axis of spin, and this causes the aether within the Sun to spin at a certain rate, does that account for why the Sun began to spin when it was created?

Another question that then arises is one which says that, if we create in the laboratory an electric field within a pivotally mounted rotor that is radially directed with respect to the spin axis, will the aether within that rotor begin to spin and drag the rotor with it?

If this were possible then surely it would have been discovered already, would it not? Here, at the very outset of this work, is my dilemma. I am asking questions which should have answers, given that we claim to know so much about the physical truths that govern our universe. Aether drag with no inertial problem has for some unknown reason been discounted in favour of Einstein's doctrines, even though it seems possible, but its experimental proof has eluded us. Yet, in the context of rotation, experimentation is surely possible.

Now I can say that I have encountered in my own experiments some evidence of aether drag that warrants mention. I had assembled an electric motor which incorporated permanent magnets that

produced a magnetic field directed along the spin axis, a field which penetrated through conductive ferromagnetic rotor laminations having eight pole faces. It was coupled to an auxiliary drive motor and my object was to apply power to the drive motor to run the speed up to a certain level and then apply electric current pulsations to a solenoid wound around the motor to see how effective this was at taking over the drive operation as the power to the auxiliary motor was reduced.

Note that spinning such a rotor incorporating a magnet will develop a radial electric field in those conductive rotor laminations, this being potentially a recipe for inducing aether spin, if such exists.

What I found, to my surprise, was that, under initial start-up conditions, it took a minute or so to run up to the operating speed, whereas, if I switched off to bring the rotor to rest but then promptly applied start-up power, the motor would run up to speed in a matter of seconds. Leaving half an hour between stop and restart caused the system to revert to its longer run-up period. I even tested this for different orientations of the motor spin axis and found the phenomenon direction sensitive.

On reflection I see that as evidence pertaining to aether spin but, for the purpose of this account of *The Theory of Everything* I will seek other foundation for what I shall now describe in the pages ahead. I will, however, draw the reader's attention to a paper published long ago, in 1905, the research antedating the advent of Einstein's theory. The author, H. A. Wilson, was a Fellow of Trinity College, Cambridge at the time and the submission of the paper had the support of J. J. Thomson. It appeared in *Philosophical Transactions of the Royal Society*, **204**, 121-137 (1905).

Wilson's experiment involved rotation of a capacitor having concentric cylindrical electrodes. It was rotated about its central axis and had a solenoid powered by d.c. current for setting up a magnetic field along that spin axis. The capacitor had ebonite as dielectric and the object of the experiment was to see if rotation in a magnetic field would induce changes in the electric charge of the capacitor linearly proportional to the dielectric constant.

Keep in mind that, where there is a dielectric medium between the capacitor electrodes, the capacitor charge is proportional to ε, the dielectric constant, and comprises a component $\varepsilon - 1$ attributable to the dielectric and a component 1 attributable to the aether. So, given charge rotation in a magnetic field, we have two separate components that should make their respective contributions to the capacitor charge.

What Wilson found was that he could measure a change in capacitor charge attributable to rotation but it was proportional, not to ε but to $\varepsilon - 1$. It was as if the aether itself was not sharing the rotation, though verifying that was not the purpose of the experiment. The purpose was to test whether a theoretical proposition of H. A. Lorentz was true or not, confirmation being the result.

Now, on reading the full details of Wilson's paper, I had reason to wonder how his findings would have developed had he been seeking instead evidence of aether drag. I was very surprised to read what he said about the problems he encountered in performing the tests. My interest, you see, given that I believe a radially-directed electric charge in the aether causes the aether to spin about the defined axis, is in knowing how the aether copes when the rotor under test is forced to spin at a different rate.

It is therefore fascinating to read that, in order to get any consistency in his measurement data, given that he was using test speeds that were close to 12,000 rpm, he had to make a series of tests in which he reversed direction of the current in the solenoid and so the magnetic field at intervals of a few seconds. It was as if the aether was developing its own drag effect very gradually and was being thwarted in developing its spin by the reversals of the magnetic field and so could not react as it might do normally under steady state conditions.

Such issues pertaining to aether theory should have been fully resolved long ago, but physicists, in choosing to discard the aether in favour of man-made laws and rules based on empirical findings of limited scope, have merely bequeathed the problem to future generations.

The issue of aether drag is one of major importance warranting detailed experimental investigation as by repeating Wilson's experiment or performing analogous experiments using a metal rotor to explore the effect of displacing radially the charge of conduction electrons in such a rotor. However, physicists were so intent on formulating and verifying rules that might govern interactions between electric currents, magnetic fields and the effect of the properties of the substances used in their experiments that the aether was seen only in terms of symbols. That unity factor component of ε in Wilson's analysis was such a symbol.

Samuel Earnshaw's anti-aether legacy has therefore left its mark and made our task more difficult. For the moment, however, in now ending this Chapter 2, I will just mention that, apart from delving into Earnshaw's original publication on the subject in the archives in Cambridge, I found that a student textbook on *The Mathematical Theory of Electricity and Magnetism* had been written in 1908 by J. H. Jeans including reference to that theorem. Jeans, as a young man, had entered Trinity College, Cambridge just 10 years earlier, in 1898, and his book, even in its fifth and final edition of 1925, could hardly take account of what was to emerge from quantum theory. In that fifth edition there was an interesting commentary that appeared in small print immediately following his account of Earnshaw's theorem.

It seems that Jeans was preoccupied by the problem of a molecule comprising a stable aggregation of electric charges and his case that this is forbidden by Earnshaw's theorem. He wondered whether the inverse square law of force held up at small molecular distances but in the final words of that added commentary concluded that it did 'since recent experiments on the deflection of positively charged α-particles by matter indicate that the law of the inverse square holds down to distances of the order of 10^{-11} cms, a distance which is less than a thousandth part of the radius of the hydrogen atom.'

Our concern, however, is the aether, its defiance of Earnshaw's theorem and the sad situation of the unrecognized error in applying that theorem, an error that when corrected makes the aether a reality.

If only this fact had been recognized back in 1842 when Earnshaw's paper was published.

My task ahead is to convince you that the aether has a charge continuum of uniform charge density containing a system of charges that I have referred to as 'gravitons' and 'quons'. The quons, which have lower mass than the electron, define the electromagnetic frame of reference by forming into a cubic structured array, which everywhere has motion in tiny circular orbits, motion that accounts for quantum theory phenomena. The gravitons are sparsely distributed, have far greater mass than the quons, greater even than the proton, and their role is to provide dynamic balance for motion of the quons.

The aether also contains an abundance of virtual mu-mesons, muons, and is constantly trying to deploy these so as to create matter in the form of protons paired with electrons. So the strory of *CREATION* as presented here is merely an exercise in deciphering the evidence which betrays the existence of such an aether and portraying that aether in sufficient detail to allow us to derive the specific values of the constant of gravitation, the proton-electron mass ratio and Planck's constant, the primary constant that dominates quantum theory.

Chapter 3

THE SCHUSTER-WILSON HYPOTHESIS

You may not have heard of the 'Schuster-Wilson Hypothesis' and I now wonder how I came to be interested in the subject. It was probably because I had a special research interest in magnetism and had read something about the Sun and Earth both exhibiting magnetic moments proportional to their angular momenta. Earth has a magnetic field, as we know from use of the magnetic compass. It also spins about its axis. The physical formula for magnetic moment has factors in common with those for angular momentum, and so the ratio of magnetic moment to angular momentum becomes, simply, $Q/2Mc$, where Q is electric charge, M is mass and c is the speed of light, the factor which converts Q in electrostatic units to Q/c in electromagnetic units.

My research involved the study of magnetic reaction effects induced in iron and had led me to an interest in what is known as the 'gyromagnetic ratio', the factor relating magnetic moment and angular momentum in an iron rod when the direction of magnetism is suddenly reversed. Assuming that electrons account for both the magnetism and the angular momentum reaction, the inverse of the above ratio, in theory, should be $e/2mc$, where e is electron charge in electrostatic units and m is electron mass. I knew that this effect had been suggested in 1908 by O. W. Richardson and that it was first observed experimentally by A. Einstein and W. J. de Haas (1915-1916). Other experimenters pursued the subject, notably J. Q. Stewart (1918) as did W. Sucksmith and L. F. Bates, who, in 1923, found that the inverse of the gyromagnetic ratio observed had a value slightly smaller than e/mc.

The discrepancy factor-of-two posed a problem which physicists then, in the Dirac era, 'brushed under the carpet', as it were,

by inventing the notion of so-called 'half-spin' and incorporating this into quantum theory. L. F. Bates was one of the two external examiners that Cambridge appointed to judge my Ph.D. thesis, which may account for my curiosity about this particular subject, an interest I pursued following my period at Cambridge. It was then, in the middle of the 1950s, that my interest in the aether led me to discover that the reaction of electric charge in motion, whether by free conduction electrons in metal or by charge in motion within the aether, will always oppose an applied magnetic field to halve its effective strength. This arises from maximization of the kinetic energy of the reaction, an energy density which equals and accounts for the level of magnetic field energy we attribute to a magnetic field.

The mathematical case is easily presented. I use the units of that 1950 period, the so-called 'centimetre-gram system', because such units are better suited to analysis of the physics of the aether. The magnetic moment of an electrostatic charge e, describing a circular orbit of radius r at a speed v, is $evr/2c$ and the related angular momentum is simply mvr and so the ratio of these two quantities is $e/2mc$.

Given the presence of a magnetic field of strength H, electrons in motion in such a field will react to that field by describing a circular motion that sets up such a component of magnetic moment opposing the field. The force equation is:

$$Hev/c = mv^2/r$$

which can be rearranged to give:

$$H(evr/2c) = mv^2/2$$

This is a measure of kinetic energy and so I asked myself whether what we refer to as magnetic field energy density might really have physical significance as the kinetic energy density of electric charge reacting to the presence of such a magnetic field. I ventured then to imagine that the magnetic field that we measure might be a net value of that quantity, the primary field being actually greater in intensity than the measured field by a factor k. So I then formulated the equation:

$$H_a - 4\pi k\Sigma(evr/2c) = H$$

the Σ symbol indicating summation for all the reacting charges in unit volume of the field. H_a is the actual strength of the applied field. Rearranging this equation and replacing that *evr/2c* term by use of the equation involving kinetic energy, one has:

$$H_a H - H^2 = 4\pi k E$$

where E is the relevant kinetic energy density. Now here is an equation which invites the thought that if kinetic energy density tends to a maximum, as it does when drawing energy from a source whose energy potential tends to be minimal, then differentiating E with respect to H with H_a constant and equating to zero to find the condition for maximum energy density should tell us something interesting.

One finds that:

$$H_a - 2H = 0$$

which tells us that the applied field is actually twice as strong as the effective field. So that factor k must have the value 2. We think the field we have applied has a strength H but it really has the strength $2H$ and is halved by the reaction field.

As a result the energy density E is $(k - 1)H^2/4\pi k$, which is $H^2/8\pi$, the magnetic energy density we associate with the magnetic field.

So this segment of our *Theory of Everything* tells us that magnetic field energy is really the kinetic energy component of charge in motion in the field that reacts to oppose the field by just the amount needed to halve its strength. In so doing there is a factor of two that must be taken into account when considering the change in magnetic moment of a ferromagnetic rod in relation to a change in its angular momentum.

The interesting consequence of this is that it is the energy deployment that governs whether or not a charge reacts to a magnetic field. Our man-made empirical laws have their limitations. We need to accept that the 'rules of thumb' that we apply to tell us how a moving charge is deflected by a magnetic field are subject to there not being too many such charges active in that field. If there are too few then we have no problem because in the background there are

aether charges that can provide back-up as needed to match the magnetic field energy requirement. However, if there are too many electrons and their motion involves more kinetic energy than is required to match the energy density of the magnetic field, then only a proportion of these electrons will react, in spite of this being contrary to our empirical laws.

I am not indulging here in mere speculation. Physicists do know that they have a problem. All I am pointing out is that the problem is solved by accepting the half-field reaction phenomenon and with it the existence of the aether. I quote the following from page 37 of my 1980 book *Physics Unified*.

> "If there are free electrons moving around in conductors, as we believe, how is it that in a steady magnetic field they do not develop a reacting helical motion and substantially cancel the field? This is a classical problem. There was no evidence of substantial diamagnetism, and so statistical arguments were applied and, unfortunately, these are based on some rather arbitrary assumptions. The subject is well summarized in a book by J. H. Van Vleck (1932) entitled *The Theory of Electric and Magnetic Susceptibilities* published by Oxford University Press. Statistics were applied in a way that tends to conflict with the accepted laws of magnetic induction. Reactions which require angular momentum of electrons to be unidirectional were avoided by asserting that angular momentum is shared equally between opposite directions. Alternatively, it is argued that there are collisions between electrons and the notional boundaries of a conductor and these collisions supposedly introduce a reverse component of angular momentum. Another argument is that the Lorentz force on a reacting charge is at right angles to the charge motion. Hence the magnetic field to which the charge is reacting cannot transfer energy to the reacting charge. All these arguments are

unconvincing. They require arbitrary and questionable assumptions, especially the latter, which seems to deny Faraday's discovery of induction. It is better to accept that diamagnetism exists and investigate why its effects are hidden."

Then followed a footnote on that page saying that this problem was the starting point in 1955 for my interest that led to what was described in that book, which included, of course, the above analysis of the half-field reaction we are discussing here.

My published work on this subject has, however, been ignored, presumably because physicists do not wish to accept a revival of a belief in a real aether medium.

So here I am now writing about a theme that has really puzzled physicists by not allowing them to dodge the issue by their connived 'spin' techniques, namely the broader problem of a unified field theory, the so-called *Theory of Everything*.

On the subject of spin in a physical sense, the converse of the Richardson effect has also been observed, it being found possible to magnetize iron rods by spinning them about their axes. This effect was predicted by Perry (1890) and was anticipated also by A. Schuster (1911-12) but first observed in 1914-15 by S. J. Barnett.

Bear in mind that these were tests on iron rods that were not charged electrically, which means that the electric charge generating the magnetic effect was internal to the atomic system of charge together with any free electrons arising from atomic ionization. It is not surprising, therefore, at least to me, to find that astronomical bodies having no overall net electric charge can exhibit a magnetic moment owing to their rotation.

Such was the basis of the Schuster-Wilson Hypothesis. I wrote about this in the second (1966) edition of my book *The Theory of Gravitation* and quote the following from pages 95-96 of that work.

"A. Schuster (1912) and H. A. Wilson (1923) have shown that the magnetic moments and angular momenta of the Sun and Earth are approximately related by a common ratio. This has led to the

hypothesis that a fundamental property exists which causes any rotating body to have a magnetic moment. A particularly significant result appears when the quantitative aspects of this hypothesis are considered. It was shown by Wilson that the right order of magnitude for the magnetic fields of Earth and Sun is obtained if it is assumed that a moving mass, measured in gravitational units of $\sqrt{G}$ per unit mass, has the same effect as a moving negative charge, measured in electrostatic units. Blackett (1947) has expressed the same result in the following form:

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

where β is a constant of the order of unity, c is the speed of light and G is the constant of gravitation."

By then, 1947, Blackett, who had been engaged on research on cosmic radiation at Cambridge had moved on, first to become a professor at Birkbeck College, London, followed by succeeding Lawrence Bragg at Manchester University, where he was involved in radio-astronomy and the radio telescope development at Jodrell Bank. Babcock (1947) in that year had reported success in measuring the magnetic field of the star 78 Virginis. This made it possible for Blackett to apply the Schuster-Wilson hypothesis to three bodies instead of two. The hypothesis held up by being verified as applicable to them all, the range of angular momentum being 10^{10}.

According to Blackett's data, as published in the journal *Nature*, **159**, 658-666 (1947), the values of β are, for Earth 1.29, for the Sun 0.92 and for 78 Virginis 0.95. In approximating unity, here was an indication identical to the findings applicable to the laboratory gyromagnetic ratio experiments telling us that the factor-of-two anomaly applies also to electrical action within astronomical bodies. This means that the so-called '*g*-factor' has more general scope than just the assumed spin property of electrons, a fact which confirms my belief that our understanding of electromagnetism needs modification to admit what I call a 'half-field reaction'. Magnetic fields produced

by electric currents are really twice as strong as existing theory indicates but the field medium, whether seen as that of the vacuum or that within matter, invariably reacts to deflect moving electric charges present into a reacting orbital motion which cancels half of the applied field. This makes the ratio of the resulting magnetic moment to the related angular momentum double the value expected theoretically by use of standard theory.

Indeed, regardless of the cosmological significance of the Schuster-Wilson Hypothesis, this evidence, in combination with laboratory research related to the gyromagnetic ratio, is assuredly proof that a real aether exists, one containing electrical charges that are ever moving.

This fact seemingly escaped the notice of Professor Blackett and, in 1947, it was another seven years before I was destined to realize the truths about this aether reaction and the significance of that factor 2. By then I had left Manchester University where I spent my undergraduate years (1945-48) and Cambridge University where I did research for my Ph.D (1950-53). I had entered the corporate world of industry and my writings, not then emerging from an academic seat of learning and being based on reviving a belief in the aether, were duly ignored.

As to the importance of the Schuster-Wilson Hypothesis, I think the lengths of Professor Blackett's papers, the one in *Nature* just referenced and the one referenced below, speak for themselves. Yet the subject, an unsolved mystery, is never mentioned by cosmologists today who write about the stars that form the universe.

Professor Blackett was awarded a Nobel prize in 1948 for his work on cosmic radiation and then, within four or so years (1952-53), reported in *Philosophical Transactions of the Royal Society,* **245A**, 309-370 (1952/3), on his experimental effort to test the Schuster-Wilson Hypothesis. This brings us to that 'Golden Experiment' already mentioned, the subject of our next chapter, but first I just wish to summarize a little and outline where we are headed in this work.

I insist that we need to accept the reality of an aether. It is essential to account for that factor-of-2 discrepancy termed the 'gyromagnetic ratio'. The aether must contain free charge in motion, possibly its muon population, that reacts to oppose an applied magnetic field and in so doing deploys kinetic energy which accounts for the magnetic field energy stored. That energy is recoverable from the aether as we well know.

Furthermore I have declared my support for the notion that an amount of electric charge of $\sqrt{G}$ times a related amount of mass is the key to understanding gravitation. Gravitation is not a phenomenon linked to electromagnetism as such. It is, in fact, one that involves electrostatic interaction, the latter being of the usual repulsion form as between like polarity charges, which in pushing itself apart in the presence of intruding matter in the aether, results in that matter experiencing a force of mutual attraction.

I have commented on the unsolved problem of aether drag posed, as I see it, by Wilson's 1905 experiment and drawn attention to the hypothesis postulated by that same Wilson in association with Schuster, a hypothesis which is relevant to that $\sqrt{G}$ factor relating the gravitational mass property to electric charge.

I shall, as we proceed in this Part I, show how G is determined theoretically in terms of the aether and its structure. Also, though proof is left to Part II, I shall justify the formulation:

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

which relates the angular velocity ω of aether caused to spin by the coextensive presence of matter of mass density ρ_m, with ρ_O denoting the mass density of the quon-cum-graviton components in the aether.

Subject to aether drag being effective for rotation of an astronomical body, that ω factor, being independent of the physical size or mass of the astronomical body involved, can convey an important message, a message having, as we shall now see, direct relevance to the Schuster-Wilson Hypothesis.

Chapter 4

TESTING A BLOCK OF GOLD

Given that the Earth, the Sun and the star 78 Virginis all exhibit the physical property that their mass when spinning produces a magnetic field as if seated in an electrostatic charge of $\sqrt{G}$ per unit mass, one might expect such a property to be universal and so apply to an isolated test specimen here on body Earth.

Blackett set out to test this using a large block of gold, gold being chosen because of its non-magnetic properties and its very high mass density. It weighed 15.2 kg and was of solid cylindrical form. He did not spin it because he planned to rely on it sharing the Earth's slow rotary motion of one revolution per day. The magnetic moment so generated, according to the Schuster-Wilson Hypothesis, would be very small indeed, but Blackett had developed a magnetometer of such high sensitivity that, provided extraneous interference could be avoided, should allow his tests to be viable.

One can but wonder about the security problems involved and the need for secrecy, given success in being able to borrow, or rather, as the paper declares, rent, such a mass of gold, thanks no doubt to his standing as a Nobel Laureate. After all, the experiment was not housed in a secure laboratory building but in a small wooden structure situated in a field in a rural location chosen to be remote from noise, vibration and electric interference. However, be that as it may, what was the outcome of this experiment and what does it tell us?

What was expected? To answer this we will review in the table below some of the data of record in Blackett's 1947 paper in *Nature*. The angular velocity is denoted ω radians per second. U denotes angular momentum. H denotes the magnetic field in gauss and P denotes magnetic moment.

	EARTH	**SUN**	**78 VIRGINIS**
Mass	6.0×10^{27}	2.0×10^{33}	4.6×10^{33}
Radius	6.37×10^{8}	6.97×10^{10}	1.4×10^{11}
ω	7.3×10^{-5}	2.9×10^{-6}	7.3×10^{-5}
U	7.1×10^{40}	1.12×10^{49}	2.6×10^{51}
H	0.61	53	1500
P	7.9×10^{25}	8.9×10^{33}	2.1×10^{36}
P/U	1.11×10^{-15}	0.79×10^{-15}	0.81×10^{-15}

It can be seen that the ratio of magnetic moment to angular momentum P/U is of similar value for the Earth, the Sun and the star 78 Virginis. Furthermore, note that in the units used the value of $\sqrt{(G)}/c$ is 0.86×10^{-15}, which, considering the enormous differences in size and mass of the three bodies, is highly significant given the data in the bottom row of the table.

It certainly is no wonder that Nobel Laureate Blackett felt it important to undertake his experiment to see if the property indicated was universal and applied to all bodies, large or small, including that gold cylinder that he knew would share the Earth's rate of rotation.

Well, sad as it is, that experiment gave a null result. The hypothesis did not stand up, at least in respect of tests on solid bodies, in spite of its apparent applicability to body Earth. Does that mean that we should abandon the hypothesis, in spite of its relevance to stars? Definitely not! To do so means turning away from the clearest evidence we will ever have of a pathway forward in our quest to find the cosmological link between electrical action and gravitation, evidence that has three independent messages.

Message No. 1 resides in that gyromagnetic factor of 2 which points to a magnetic field that is ever subject to the half-field reaction

already mentioned and so points the finger firmly at the need to accept that the aether exists.

Message No. 2 resides in the evident relationship between electrostatic charge and mass in terms of that factor $\sqrt{G}$. What does this tell us? Well, just think about that by asking yourself a simple question. Given that stars comprise little other than the most fundamental of all atomic forms, namely hydrogen, ask yourself what happens near the surface of a star as gravity pulls hydrogen atoms close enough together so that some ionize by shedding electrons. Protons, the most fundamental of all positively charged particle forms of electrical matter, then exist in a free state amongst electrons, the most fundamental of all negatively charged particle forms that constitute matter. The Coulomb electrostatic interaction forces acting between these particles will contend to govern the way the Sun's particles are then distributed, their contest being with the mutual gravitational forces of attraction that exist between those particles. The proton has 1836 times the mass of the electron and so one can be sure that the protons will dominate and succeed in the contest to get somewhat closer together with other protons in spite of the mutual electrostatic repulsion forces that exist between them. Analysis of the statistical result of all this tells us clearly that the protons will endow the Sun with a net positive electrical charge density throughout its whole body, with a surplus of electrons in the Sun's surface regions. That positive charge density, in electrostatic units, will be $\sqrt{G}$ times the mass density of hydrogen gas at the pressure which brings those atoms into ionizing contact. It needs only a very small proportion of the atoms to ionize and release enough protons to create this state of equilibrium. By rotating the Sun must then have a magnetic moment related to that $\sqrt{G}$ times mass factor. Also the Sun must therefore have what is very nearly a uniform mass density and a uniform temperature throughout its whole body.

This is contrary to standard belief but fully in accord with what we can see and measure here on Earth when we cause atoms to ionize, whereupon there is energy radiation commensurate with a temperature measured in thousands of degrees. The Sun's surface

temperature being some 6,000°. Such energy radiation within the body of the Sun is matched by absorption of that energy by nearby atoms in which protons recombine with electrons. The aether mediates in this process. However, at the Sun's surface energy radiation escapes and has to find a remote destiny as it is absorbed by bodies such as Earth or the transiently-existing quasi-matter present in space, the latter, by its ever-ongoing creation and decay activity, serving as a catalyst to absorb energy into the quantum underworld of the aether.

Note that it is pure hypothesis to think that nuclear reactions occurring at the very centre of the Sun account for its source of radiant energy. Colliding electrons of adjacent atoms at the Sun's surface yield the necessary energy and then those ionized atoms, upon recovering their electrons, have to draw energy from the underworld of space that regulates quantum theory and determines the properties of the atom. An atom is alive with energy and its components never stop moving.

So stars derive their power from the aether and, if composed of hydrogen gas under pressure, they, or at least their radiating core regions, must exhibit a mass density that corresponds to adjacent atoms having the orbital diameter of their electron orbits defining their spacing. In the Sun the atomic spacing is not that we see in a solid body where crystals form with the atoms close packed. It is more likely that any tendency to define a structure will favour a simple cubic distribution of atoms, given the limited effect of single electron screening of the inter-proton activity at close range and the need to balance gravitational interaction between the free protons within the star. So we can estimate the mass density of a star by dividing the mass of the hydrogen atom, 1.673×10^{-24} gm, by the cube of twice the radius of its electron's orbit, that being twice the Bohr radius or twice 5.29×10^{-9} cm. Do the calculation and you will find the mass density is 1.41 gm/cc. Then look up the astronomical data for the Sun's mass, 1.989×10^{33} gm, and suppose that the Sun's mass density has that 1.41 gm/cc value. On this basis we can estimate the physical size of the Sun to find that its radius should, in theory, be

approximately 6.96×10^{10} cm. See then the astronomical measure of this recorded in Blackett's data above.

Theory founded on our knowledge of atomic structure gives results in perfect accord with astronomical observation. This is surely something we cannot ignore. It shows we are on track in our search for the *Theory of Everything*. After all, the Sun, being the dominant star in our vision of the universe and the universe comprising little other than stars, to understand the physical theory of the processes governing stars and their formation does amounts to very nearly everything.

Now, just as atomic structure can give us an insight into the structure of stars, might it be that the structure of the aether can add further insight as part of our *Theory of Everything*? I picture the aether as a simple cubic-structured array of aether charges, those quons, set in a uniform background charge continuum of opposite polarity and have good reason for suggesting that the particles that form the nuclei of atoms other than hydrogen position themselves at quon sites in that aether structure.

That may seem a bold assumption given that atomic physicists are happy enough in imagining the atomic nucleus to be just a close aggregation of protons and neutrons. However, atomic physicists do not tell us how those protons are held together against the action of their mutual electrostatic repulsion. They merely invent the notion of so-called 'gluons' and so leave us to imagine what that means. My imagination then pictures bead-like strings of an alternating sequence of electrons and positrons held together by electrostatic force but stretching between two of those quon sites in the aether structure and holding protons together. Then I look for evidence of that simple cubic structure, such as that provided by the iron atom.

Iron comes close to having an optimum nuclear structure in that it comprises 26 nucleons and so one can picture occupancy of sites in a 3x3x3 structure other than the central site. We learn about the 'packing fraction' in our study of the physics governing atoms. It is a measure of how atoms might evolve if the energy per nucleon unit were to seek to minimize by atoms splitting apart or fusing

together. As to why this is relevant to stars I can but quote a few words from a 1957 textbook on page 1218 of *Physics* by S. G. Starling and A. J. Woodhall:

> "It has been suggested by Millikan that the coalition of four protons to form a helium atom may occur at places in the universe where conditions are suitable. The loss in mass liberates energy which may be calculated. This loss, known as the **packing effect**, is probably due to the rearrangement of the intense fields within the nucleus."

This is a very vague suggestion, which is why we must have a clearer picture of things, even though it taxes our imagination and depends upon reviving belief in an aether. Hence the relevance of my 3x3x3 cubic array of aether charge sites, which will be seen to be important once I declare that aether drag depends upon the presence of atoms having those links between nucleons. That reference to helium surely implies a 2x2 square array having four links, and further implies that a hydrogen star having no other type of atom present will not experience aether drag, whereas one having helium or atoms of higher mass present in adequate numbers will exhibit aether drag.

As an aside comment here it is appropriate to mention that on the eve of writing the epilogue to this work, I read an E-Mail item I received from the U.K. Institute of Physics which said that nuclear physicists had created a silicon atom that contained 42 nucleons. This is surely so exceptional a discovery that it can but have major implications for fundamental theory.

What came then to my mind was a picture of a 3x3x3 cubic array of aether lattice sites, with a charged nucleon at each of the 8 corner sites and at the centres of each of the 6 faces of that cubic array. This accounts for the 14 units of nuclear charge that signifies the silicon atom. Then, since atomic nuclei can exhibit a magnetic moment associated with spin about a central axis, I pictured rotation about an axis formed by two of those face-centred nucleons, these being protons. That would mean that 24 nucleons would account for

the spin momentum. Of these the 8 at corner sites would be protons and the 4 at the face-centre sites would be deuterons, but the remaining 12 would each need to be deuterons neutralized by an electron.

The clear significance of this is the involvement of aether structure in the sub-structure of the atomic nucleus of atoms other than hydrogen and the implication this has for aether drag, a theme which introduces Message No. 3.

Message No. 3 is blindingly clear once I point out that the Sun would be spinning much faster if it recovered all the angular momentum shed in forming the planets. I estimated the angular momentum as being 3.2×10^{50} gm.cm^2/s, which is a little over 28 times that shown in the table. It means that the Sun would have rotated 28 times faster before shedding the planets, its angular velocity then being 8.1×10^{-5} rad/s.

Why is this relevant? Well, compare this with the other data for angular velocity applicable to the Earth and to the star 78 Virginis and speculate as to what this might mean.

Regardless of the radius of these three astronomical bodies there is the implication that something causes their angular velocities to be very similar in magnitude. Then remember that equation for ω that I introduced at the end of the previous chapter:

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

I have just put the case for declaring that stars composed of hydrogen have a mass density that is 1.41 gm/cc. So, were I, as I will in Part II, to prove theoretically that ρ_O has the value 288 gm/cc, then you would see that ω is predicted to have the value 7.6×10^{-5} rad/s. Compare this with the data applicable to the Sun and 78 Virginis. Surely here is a message that must be heeded.

The Schuster-Wilson Hypothesis cannot therefore be ignored. So, before ending this chapter, I will indulge in a little speculation.

I imagine the star 78 Virginis as being almost wholly composed of hydrogen but having a very small amount of matter of higher atomic mass form. Its aether will therefore have a spin rate of

the magnitude set by that equation for ω with a mass density of 1.41 gm/cc.

As to the Sun I imagine this at initial creation to be the same, apart from containing a higher proportion of the higher atomic mass form, enough for the Sun to eject completely when a certain event occurs, this being a traversal of what I shall later refer to as a space domain boundary.

Note that in the contest between gravity and electrostatic repulsion the bare protons freed by ionization of hydrogen atoms will claim priority in moving into the body of the Sun, leaving the heavier atoms, though also ionized, in surface regions. The added electron burden deprives the latter of easy mobility when compared with the proton.

So, at creation, the Sun will experience aether drag and so be caused to spin at the angular velocity defined by the above formula, but upon shedding the matter that formed the planets, it would be left with no aether drag and so left with just enough angular momentum to account for its one revolution every 25 or so days. Its aether however would still keep spinning at what is close to being, like the Earth, a daily rate.

As to the Earth, here we have a fascinating problem. One can surmise that the atoms which formed the planets would have been ionized during their formative phase. The average mass density of the Earth is four times greater than 1.41 gm/cc, and so the Earth's aether would have begun to spin four times faster than the Earth spins today. R. A. Lyttleton states in *Science Journal*, **5**, 53 (1969) that before the Moon was ejected the Earth rotated once every 5.5 hours. However, what, you may wonder determined the size of the Moon in relation to body Earth and, indeed, the size of the mass shed by the Sun in creating the planets? I will not account for that here but direct attention to pages 50-53 of my book *Modern Aether Science* (1972) where I show how this theory of electrical charge action can explain that in an excellent way.

As to the onward formation of body Earth, it would, upon shedding the Moon, lose its state of ionization as it solidified.

Accordingly, the electric charge factor determined by the Schuster-Wilson Hypothesis and the equilibrium between repulsion of positive ions and gravitational attraction, would no longer govern the rate of its aether spin.

Possibly the Earth gave birth to the Moon in the same traumatic event that caused the Sun to shed the matter that created the planets or perhaps at the next space domain boundary traversal, in its cosmic motion as part of the then-formed solar system. It would then slow down to its daily rate of today.

But what about its aether drag? It comprises atoms, the nuclei of which lock onto the quon lattice structure of the aether and that means aether drag. Rotation of aether with body Earth means radial electric charge displacement with respect to the Earth's axis of spin and so Earth itself has a magnetic moment attributable to that rotating charge. Readers interested in the detailed calculation of the Earth's magnetic moment will find this in several of the books I have written, for example at pages 32-33 of *The Theory of Gravitation* (1960), at pages 166-169 of *Physics without Einstein* (1969) and at pages 168-169 of *Physics Unified* (1980).

Having claimed that the Earth has a coextensive aether that rotates with it, one must wonder if its motion can be detected. In fact it can. It is well to remember that, though the Michelson-Morley experiment failed to detect the Earth's cosmic motion through space, aether being dragged linearly along with that motion, the later experiment by Michelson in 1923-25 in association with Gale and Pearson, *Astrophysical Journal*, **61**, 140 (1925), did detect rotation about the Earth's axis using speed of light propagation techniques. The rotation was sensed using an optical interferometry mirror configuration, because light travels in straight lines and, though its speed is constant relative to the aether, it is not deflected by the aether between its mirror reflections.

In summary, the Schuster-Wilson Hypothesis is well founded so far as it applies to astronomical bodies and the evidence clearly points to the role played by the aether. The failure of Blackett's experiment with the gold block did not invalidate the hypothesis.

The Earth exhibits geomagnetism because there is a coextensive sphere of aether that rotates with it and there is a synchronous interaction as between the quantized orbital motion of aether charge belonging to a structured array within that sphere and that of charge in enveloping aether which is not spinning. This causes a radial displacement of electric charge confined within the bounds of that sphere. However, owing to the orbital and cosmic motion of body Earth through that enveloping aether medium there are unbound aether charges moving through the Earth at high speed in an opposite direction, so keeping aether momentum balance, and further serving to neutralize electrically charge radially displaced so far as it might be sensed as a net radial electric field. The overall result is then an effect solely attributable to electrodynamic action caused by charge rotation, a net magnetic field with no accompanying electric field. This means that Earth exhibits its geomagnetism because a uniformly dense sphere of aether charge rotates with its body and the same amount of aether charge of opposite polarity rotates in the same sense in ionospheric regions.

The latter has double the effect of the former in terms of magnetic moment but is opposite in direction, but the combined effect results in a geomagnetic field pattern that resembles more closely the action of a magnetic dipole at the Earth's centre than a magnetic field pattern to be expected from a strict interpretation of the effect of the Schuster-Wilson Hypothesis. Relevant experiments in support of this are those of S. K. Runcorn et al., *Philosophical Magazine*, **41**, 783-791 (1950) and *Philosophical Transactions of the Royal Society*, **244A**, 113 (1951/2). That ionospheric aether charge also seems to be constrained to rotate about an axis tilted slightly with respect to the Earth's spin axis and to be slowly precessing about that axis, thereby explaining why the magnetic north and south poles migrate slowly around the geographic poles.

We will, in the next chapter, confront the problem of what it is that determines the precise value of G, the constant of gravitation, coming then in Chapter 6 to the problem of how stars are actually created.

Chapter 5

THREE MEN OF TRINITY

The problem we now address is the question: "What regulates the value of G, the constant of gravitation?" Concerning this question one might wonder whether, arising from Isaac Newton's time at Trinity College, Cambridge, the college and the university had some kind of ghost influencing those who followed him in the ongoing search for *The Theory of Everything*.

I have, in Chapter 1, already mentioned Henry Cavendish (1731-1810) who, in 1798, made the first successful measurement of G, the constant of gravitation. Cavendish had been a student at Peterhouse College, Cambridge, and the name 'Cavendish' lives on there as the name of the physics laboratory.

Clerk Maxwell (1831-79) became the first Cavendish Professor of Experimental Physics. Maxwell first graduated at Edinburgh University but then went to Cambridge and, at Trinity College, in 1854 became second wrangler. 'Wrangle' means 'to brawl or engage in loud or vulgar or confused argument or quarrel', hardly a commendation, but a 'wrangler' at Cambridge University has a special meaning. It denotes one's ranking in merit relative to other contenders in an examination for what is referred to as the 'mathematical tripos'.

Maxwell is famous for his equations governing electromagnetic field phenomena, the physics pertaining to what we know today as radio communication. In 1871 at the age of forty-two he published his greatest work *Electricity and Magnetism*, a work which remains virtually unchanged to this day. It is said that 'one of the merits of the theory of relativity is that it leaves Maxwell's equations unchanged since they are invariant to the Lorentz transformations'. For my part I say: "Thank Goodness it did, because Einstein's theory has done enough damage in retarding our efforts to

build *The Theory of Everything* without us having to revise Maxwell's equations as well."

However, those equations of Clerk Maxwell hide a secret not shared by Einstein's theory which, once revealed conveys an important message in our quest to understand the cause of gravity, as we shall see below.

The second Cavendish Professor of Experimental Physics at Cambridge, Maxwell's successor in 1879, was Lord Rayleigh (1842-1919). Though his work ranged over the whole field of physics he was famous for his outstanding contributions in acoustics and optics. He was awarded the Nobel prize in 1904 for his discovery of the rare argon gas. Rayleigh entered Trinity College, Cambridge and was a senior wrangler in 1865.

His successor as Cavendish professor, in 1884, was J. J. Thomson, who had entered Trinity College in 1876 and was later to become Master of Trinity College in 1919 for the remainder of his life. He won the Nobel Prize in 1906. He was famous for having discovered the electron.

Thomson is the third of the *Three Men of Trinity* in this account of gravitation, the first being Newton and the second Maxwell.

Newton gave us the law of gravity and bequeathed us the problem of what determines *G*. Thomson gave us the electron and the evidence we need to formulate detail of its composition and form, this being an essential basis for evaluating *G* within the framework of a quantum theory of gravity. Maxwell gave us some equations which apply to the electrical properties of the aether, but which, unfortunately, were seen more in a mathematical context than a physical context, all because of the error arising from having misinterpreted the findings of that other Cambridge scholar, the Reverend Samuel Earnshaw, already mentioned.

Well, what is that secret? Electromagnetic waves arise from oscillatory charge displacement in the aether in a lateral direction relative to the direction of wave propagation. Charge is displaced at right angles to wave motion. Maxwell's equations are expressed, not

in terms of electrical aether charges having physical form, but in terms of field strength.

Now, just as I have asserted and shown that our understanding of magnetic fields has to adjust to the acceptance that there is a 'half-field reaction' accounting for the gyromagnetic ratio factor-of-two, itself proving that there is an aether, so one can see that Maxwell's equations hide the fact that lateral charge displacement cannot occur without a physical reaction. If you have action you must have reaction. What is it that pushes charge sideways with the passage of a wave? The dynamics of the process demand counterbalance!

What has this to do with gravity? Well, if one is to understand our quantum underworld, quantum mechanics with its Heisenberg jitter motion and the so-called 'Principle of Uncertainty' as to position and motion but certainty as to its quantum of action and its associated angular momentum quantum, then matter sharing that jitter must have something providing dynamic balance.

I adduce from this the notion that there is an electrical charge form within the aether system that I have referred to as the 'graviton', the role of the graviton being to assure dynamic balance for the quantum jitter of associated matter. So the force of gravity is not the direct interaction of matter but the interaction of gravitons coupled dynamically with the same mass of matter.

My early analysis of the aether and its quantum properties led me to evaluate the charge density of its continuum component in the late 1950s and the data is of record in my short 48 page booklet *The Theory of Gravitation* published in 1960. I confess that, although gravity was the subject of three pages in that work, the primary theme was the aether and how it determined the value of that fundamental quantity mentioned in Chapter 2, which atomic physicists know as the 'fine structure constant'. Its reciprocal is $hc/2\pi e^2$, a pure number, where h is Planck's constant, c is the speed of light, and e is the charge of the electron. This quantity has an experimental value close to 137.036 but from my theory at the time, owing to a lack of insight into one minor aspect of the aether, I could only reach the conclusion that the theoretical value was slightly less than 137.30.   However,

based on deriving the lattice dimension d of the cubic array of aether charges as 6.371×10^{-11} cm and regarding the neutralizing continuum charge density σ as e/d^3, I found σ to be 1.857×10^{21} esu/cc, e being then known to be 4.802×10^{-10} esu.

Knowing this value of σ we can formulate an equation involving G and the effective volume V of the graviton. It is:

$$M\sqrt{G} = \sigma V$$

The next task is to relate charge volume with the mass M of the particle form having that volume. Here we take note that J. J. Thomson had accounted for the mass m_e of the electron in terms of its charge e being confined within a sphere of radius a, namely:

$$m_e c^2 = 2e^2/3a$$

This is an energy equation, one of record well before Einstein came along claiming to have discovered the formula $E = Mc^2$. Thomson's formula had explained the mass property of the electron in terms of the electromagnetic charge of the electron and c is the factor which relates the units of electrostatic charge and electromagnetic charge.

So, if the graviton were to be an electron we could evaluate its charge radius a knowing, as we do, the electron's mass and charge and so deduce its charge volume and then derive a value of G. However, that would give the constant of gravitation far too high a value, so we need to say that Thomson's formula can apply to other charge forms of greater mass and so much smaller volume, and see if any of the known fundamental particles found in our high energy experiments gives the right answer for G.

This surely is the obvious way forward in our efforts to account for gravitation in our quest to understand gravitation.

Well, in my onward theoretical efforts on this subject, I paused to consider the fact that I was destined to find the graviton mass had to be somewhat greater than that of the proton, the nucleus of the hydrogen atom. I had got that far in my 1960 version of *The Theory of Gravitation*. The problem I then faced was that gravity is not something that sees mass as being in fixed units of such size.

Gravity is a phenomenon that acts in proportion to mass-energy of whatever magnitude, large or small.

Accordingly, when I wrote the 1966 edition of *The Theory of Gravitation* I contemplated the graviton as conforming with Thomson's formula but being subject to small fluctuations in volume as a function of energy shed by transfer to the system of matter. The effective mass of such energy was then deemed to be the relevant mass in the equation involving *G*.

The energy of the graviton, for small changes of its radius, decreases in proportion to its increase in radius, but its volume increases in proportion to three times its increase in radius. Therefore σ*V* in the above equation needs to become *3σV* to advance along these lines.

My calculations, as presented in that 1966 text, then led to me declaring that the graviton has a mass-energy of 2.587 GeV, its mass being some 5063 times the mass of the electron.

So, what had I achieved? My case for understanding the physical basis of gravitation in terms of electrical particle theory depended upon recognizing the hidden existence of an aether particle form everywhere in space, a particle having a mass-energy that did not match any of those of record in particle data tables.

However, I did on pages 81 and 82 of my 1966 *The Theory of Gravitation* speculate on how such a particle form might be revealed by its decay products. My theory presumed that gravitons exist in opposite polarity charge pairs, their charge magnitude being the same as that of the electron. Decay would involve mutual annihilation of pairs of gravitons with spin-off particle forms created also in pairs.

Having cosmic radiation in mind and knowing that mu-mesons, so-called heavy electrons, feature in that radiation, no doubt as decay products, I considered subtracting the energy of a pair of mu-mesons from that graviton mass-energy. In electron mass terms this means deducting 2(206) from 5063 to obtain approximately 2(2326) and I was pleased to find that particle data records indicated that the Σ° hyperon was stated to have a mass 2326 times that of the electron.

That was encouraging and so I duly published my findings. This was some 40 years prior to the publication of what I am now writing but no one expressed interest in what I had to say. I was not then part of a university community as I was then earning my living as a Senior Manager in IBM, albeit located at IBM's U.K. Research Laboratory.

Nevertheless, this theoretical effort being my hobby pursuit, I persisted in my efforts and, in 1969, published my book *Physics without Einstein*, in which, on pages 119-120, I revisited this graviton decay theme. There I drew attention to other particle decay evidence pointing to the existence of the graviton. This included data strongly suggesting that graviton decay modes could include pion creation or kaon creation. At that time the mass of the pion, based on the experiments of at least four separate research groups, was deemed to be about 276 times that of the electron and I contemplated the creation of a particle form involving the combination of a graviton and a proton and the shedding of two pions. The result would be a particle having a mass 5063 + 1836 - 2(276) or 6447 in electron units, equivalent to a mass-energy of 3,245 MeV.

I was able to follow this by the statement:

"Now, when protons are supplied to an environment in which pions are being produced, such a particle is actually formed. A. D. Krisch *et al*, *Physical Review Letters,* **16**, 709 (1966) have claimed that this reaction produces the largest elementary particle to be discovered. They write: 'We believe that this is firm evidence for the existence of a nucleon resonance with mass 3245±10 MeV .... It seems remarkable that such a massive particle should be so stable.'..."

So here, in 1966, was a report that it had been discovered that protons colliding with something as target could shed pions whilst inducing such a nucleon resonance. It had to be that the target itself had an energy greater than that of the proton and could possibly be the graviton.

My research reported in 1966 had, in my opinion, explained the force of gravity and linked it with a fundamental particle of mass energy 2587 MeV but such a particle had not, so far as I was aware, been discovered. Yet here in that same year there was this report by Krisch *et al.* It was clear evidence that some fundamental particle form of greater mass than the proton had to exist in the underworld of space and I believe I was lucky to be able to mention the relevance of this discovery in my 1969 book.

Reflecting on this situation some 20 years later when I had made even further progress in understanding the true nature of gravitation and reported this in a paper that appeared in *Hadronic Journal,* **12**, 101-108 (1989) I was able to put on record the following statement:

> "Then in 1977 a CERN-based research effort resulted in a paper *Physics Letters,* **66B**, 185 (1977) authored by 30 scientists, which reported on a resonance peak produced by proton-antiproton interaction at 12 GeV. The indicated mass of the charged particle thus discovered (designated the *I* particle) was 2.60 ± 0.01 GeV/c^2.
>
> The half width of this resonance at half maximum was 9 MeV/c^2. The resonance was close enough to 2587 MeV for this to be seen as evidence of the mass-energy of the *g*-particle (the graviton). Indeed, it was Dr. D. M. Eagles of the National Measurement Laboratory of CSIRO in Australia who drew this paper to the author's (my) attention, within a month of its publication, referring to it as 'good news'. Dr Eagles had published a review paper some months previously, *Int. J. Theor. Phys.,* **15***, 265 (1976),* in which the author's (my) hypothetical *g*-particle (There estimated as 5062.59 in terms of the electron rest mass) was shown in its *G*-related connection. This paper showed that the author's (my) research compared favourably with rival theories.

With such a clear resonance peak it is difficult to understand why this 2.60 GeV resonance is not included in the 1986 listings of the Particle Data Group. This is even more mystifying when one reads in a very substantial review paper by Prentice, *Phys. Rep.,* **83**, 102 (1982), that, in one range of investigation, there is 'the longest lived entry giving a fitted mass of 2583 ± 26 MeV/c^2.'.."

I could but see this as confirmation that the particle form I had predicted as being the graviton needed to relate gravity with a fundamental electrical particle form really did exist.

However, with the passage of time, my theory of gravity involved another breakthrough discovery. It occurred to me that maybe there exist two forms of graviton, the 2587 MeV graviton which can account for the smallest gravitational action and a graviton which, instead of shedding energy to match the mass-energy involved, acts in a primary capacity in the dynamic balance capacity but in whole units of mass-energy in measure equal to the mass of matter needing dynamic balance.

Here I had vision of a partnership with this new graviton doing the real work in keeping the primary balance and serving as an agency in what becomes a quantum theory of gravitation, with the 2587 MeV graviton having a relatively passive but important role in fine-tuning the phenomenon of gravitation by coping with small energy fluctuations that are ever present in the workings of our material universe.

I was led to this discovery when I made an empirical investigation of the spectrum of mesons that had been discovered and saw how the Thomson formula I had used to relate mass-energy and charge volume could explain quantitative relationships as between those mesons. A key factor in this effort was the recognition that the volume of space occupied by the charges of these mesons was conserved in their creation and decay processes, a feature which gives special importance to that background charge continuum of the aether.

The outcome of this effort was summarized in the paper referenced above, *Hadronic Journal,* **12**, 101-108 (1989), where, building from the proton particle form as a base, a progressive combination with heavy electrons gave a stage by stage creation of a whole spectrum of mesons. By 'heavy electrons' I am referring to the lepton forms, the muon and the taon. These are seen as the mystery particles, being so fundamental, as is the electron, but having no recognized role in relation to the composition of matter.

The taon, or tau-particle, had not been discovered when I formulated *G* in terms of the graviton in writing my 1966 account *The Theory of Gravitation*. There I had derived the equation:

$$\sqrt{G} = (4\pi)(e/m_e)/(108\pi)^3(g)^4$$

where e/m_e is the electron's charge/mass ratio in electrostatic units and g is the mass of the graviton in terms of electron mass units. The 108π factor comes from the analysis formulating the fine-structure constant using my theory of the quantum properties of the aether.

The formula gives the correct value of *G* when *g* is 5063, corresponding to a mass-energy of 2587 MeV.

The theory leading to this formula for the constant of gravitation had shown how the mass-energy of the muon played a major role in keeping equilibrium in the aether system but an understanding of the role played by the taon came later as I report in that paper just referenced. Indeed, the taon proved to be the other graviton form in partnership with the *g* graviton.

There are two taons for each *g* graviton and, to preserve the action defined by that equation for *G,* their energy ratio g/τ must satisfy an equation based on keeping the net energy to charge volume ratio the same as applies to fluctuations for *g* alone. That is, the energy of *g* plus twice the energy of τ when divided by the charge volume of *g* plus twice that of τ must equal the energy of *g* divided by three times the charge volume of *g*.

When this calculation is performed based on use of the Thomson formula already mentioned, one finds that g/τ is 1.452627 and, the theory having shown that τ has the mass-energy 1781 MeV, a result in accord with observation, we therefore find, by this *Theory*

of Everything that *g* has the value 2587 MeV that gives us the correct value of *G* according to the above equation.

This surely puts this theory on a very sound foundation. Apart from the theory giving a precise account of the magnitude of the force of gravitation in relation to the mass of the interacting bodies it has done so by providing a role for the heavy lepton that has been named the taon or tau-particle. Also, incidentally, the theory has provided a major role for the medium sized lepton, the muon, otherwise known as the heavy electron.

Moreover, the theory has shown that gravitation is not an electromagnetic interaction as is assumed by those who struggle in their search for a *Unified Field Theory* and this itself is a major step forward. Also, having glimpsed the fact that probing into the structure and workings of the aether itself we have entered deep into the realm of particle physics, it is to be expected that our *Theory of Everything* will have something to tell us about how protons are created, and that becomes our primary task in Part II of this work.

In summary, the *Three Men of Trinity* are Isaac Newton, Clerk Maxwell and J. J. Thomson. Newton discovered the form of the law of gravitation and gave us the problem of understanding how Mother Nature decides the value of *G*. This value was not known in Newton's time. Its quantitative determination had to await the experimental research findings of Henry Cavendish in 1798. Maxwell gave us an insight into how electromagnetic waves propagate through the aether and unwittingly provided the foothold we needed for advancing our understanding of what underlies gravitational action, namely the recognition of the need for dynamic balance within the aether. Thomson gave us the governing particle formula that is essential to our understanding of gravitational force and particle creation and so dominates our *Theory of Everything*.

In the next chapter we now see if we can discover what determines the size of the stars we see surrounding us in such enormous quantities.

Chapter 6

HOW STARS ARE CREATED

The Theory of Everything is incomplete unless it can explain how the universe, meaning its numerous stars, was created. It could not have emerged from nothing at an instant when time supposedly began. The so-called Big Bang is mere hypothesis which came about because astronomers could see no way of explaining the observed red shift of the spectrum of distant stars, other than as a Doppler effect attributable to their progressive separation as part of an expanding universe.

So, before our quest is complete, we shall need to return to this theme and present the correct explanation for the red shift phenomenon.

It will be in Part II that we delve into the nature of the quantum underworld of the aether that fills all space but, though our physics can decipher the electrical structure and form of the aether and so understand its properties, we have no way of explaining why it exists. *The Theory of Everything* can but be a theory which explains the connection between everything in terms of physical interaction.

If you pose the question; "Who created the aether and why?", then, in using that word 'who', you are simply reverting to religious doctrine that defines God as the Creator and have wandered away from the realm of physics.

The foundation on which *The Theory of Everything* has to build, based on scientific evidence gleaned over the past five centuries is the medium that fills all space, the aether.

In this chapter we could simply assume that we are on track if we accept what has been suggested so far, that the aether comprises a uniform electric charge continuum of one electric polarity as background for a population of electric charges of discrete form, charges which collectively neutralize the aether as a whole. The

additional presence of particles of matter in that continuum of charge density σ per cc. accounts for a charge displacement whereby the electrostatic repulsion inherent to that continuum charge encourages energy minimization by asserting forces which urge those particles of matter to move closer together. This allows the continuum charge to distribute itself by separating as far as it can, consistent with retaining its uniformity. As already stated, such is the nature of the force of gravity that acts between matter and so this is embraced within our *Theory of Everything*. We do need the aether to provide the energy source from which the universe was created, but the aether serves the secondary purpose of explaining the force of gravity that will act upon that matter once created.

One obvious question is why is it that there are so many stars? Why not one enormous star? To answer this let us consider again the fact that the Sun and our Earth both exhibit magnetism and let us take stock of a little geological history concerning the Earth's magnetism. The evidence is clear. The magnetic poles interchange in polarity, on average, every few hundred thousand years or so as if traversing a boundary that causes positive charge to become negative charge and vice versa. Earth, along with the rest of our solar system, is moving through the cosmic background at a speed that is about 1/800 that of light and so the spacing between such boundaries is of the order of hundreds of light years. At such boundary crossings it is as if the spinning aether within our Earth reverses direction over a few thousand years, something that is surely very improbable.

When the pattern of reversals is plotted over time, having in mind that the reversals occur at irregular intervals, one sees that it is as if the aether, on a vast scale, has a cubic structure which governs its effect in inducing a magnetic moment in proportion to the Earth's rate of spin. Since neither Earth nor its aether can reverse their direction of spin in these events, one must conclude that the aether seems to be divided into regions separated by planar boundaries, as if its continuum charge polarity is opposite on opposite sides of a planar boundary or the direction of the underlying quantum spin motion of its charges is oppositely directed on those opposite sides.

See the figure on the next page, which is reproduced from p.171 of my book *Physics Unified* published in 1980.

The pattern of reversals as plotted over a period of four million years clearly indicates a cubic boundary structure having a boundary spacing of about 500 light years, it taking some 400,000 years between boundary encounters if travelling at 1/800 of the speed of light in a direction at right angles to such a boundary.

Guided by such evidence I could but conclude that throughout the whole of space, the aether is segmented into what I will call 'space domains', choosing the word 'domain' in view of the analogy with a state that exists in iron within its body-centred cubic crystal structure. The ferromagnetic state of unpolarized iron is accompanied by the formation of magnetic domains with parallel domain boundaries spaced at some 100 microns or so apart, the direction of magnetization being opposite in adjacent domains.

So now we have a specific scenario to consider. On the one hand there is the thought that maybe at the time of creation a star or a binary pair of stars is born in each individual space domain and the stars eventually group together to form galaxies. On the other hand we then must wonder what happens when a star acquires its cosmic motion and, in travelling through the aether, eventually traverses a space domain boundary.

If the charge polarity of the aether continuum on one side of that boundary is opposite to that on the other side, then, apart from magnetism reversing direction, we have a problem with gravity during the short period when the star or our Earth sits astride such a space boundary. Either there will be a loss of gravity or a reversal, meaning an anti-gravitational effect, given the above interpretation of the Schuster-Wilson hypothesis.

A boundary traversal in a direction at right angles to the plane of the boundary will mean a rapid crossing with considerable upheaval but a traversal at a very oblique angle, one almost parallel with the plane of the boundary will have enormous consequences.

Is there supporting evidence? Well, yes, because it is of geological record from fossil data that species of life have been wiped out at times when the geomagnetic field has reversed. As to the extreme situation having enormous consequences, that is a matter of speculation, but imagine the fate of a star, particularly a large star, making a very prolonged boundary traversal. It could blow itself apart owing to its loss of gravity or its gravity reversal tearing it to pieces, bearing in mind it has a state of spin and an enormous inertial energy is involved. Might this be what is observed on occasion in the spectrum of distant stars, a supernova event?

Our *Theory of Everything* is proceeding to develop, you see, and on the basis of this discussion we can understand why numerous stars are formed in the process of Creation, rather than one gigantic star.   Indeed, maybe every star in due course suffers the fate of a supernova and its substance has to reform to create a new star.

Yet we still have to answer the question as to why, given the existence of the aether, even an aether divided into space domains, matter as such has to exist and take the form of stars and their offspring, meaning planets such as body Earth.

Now, given that space is filled with something we call the aether, an electrically charged medium that must have a quality of perfection and uniformity consistent with an equilibrium, minimal energy state, at least over much of the vastness of each individual space domain, there is nevertheless imperfection owing to those domain boundaries. Equilibrium cannot be universal and so some energy is surplus to the state of equilibrium.

I see this as suggesting that the aether has shed energy commensurate with the area of those space domain boundaries. If there is energy that is not intrinsic to the stable state of the aether it is reasonable to assume that such energy goes into the creation of matter. I will, in Part II, explain how protons are created, pointing out that the aether, even in its stable activity, tries to create matter, protons and electron, on an ongoing and random statistical basis throughout space. This accounts for the transient existence of a kind of quasi-matter mass density, albeit a very sparse mass density, but

the energy shed by those boundary regions is deployed to the extent that some of that quasi-matter becomes real matter that forms into stars.

So far as a star at its initial creation is concerned, it can form because protons and electrons are created and gravity brings them together, but its physical size, as averaged between all stars, must in some way depend upon the average size, the volume, of those aether space domains.

Our *Theory of Everything* is not just an exercise in linking gravitation and electrical action in one unified theory. It is far more since we must explain why our universe has stars that have mass of the order of that of our own Sun, rather than stars a million times or more greater in mass.

When I originally developed this theory I regarded gravitation as arising from the existence of an orderly charge structure and an orderly harmonic motion of charge in the aether. I still adhere to that theme, but I placed too much emphasis on assuming that prior to the creation of matter in the form of stars, the aether was, as it were, overheated with its constituent charge disordered. Thus I argued that gravity appeared only when the aether had cooled down and settled in its ordered state. This would then bring the widely dispersed protons and electrons together, with the protons coming together faster owing to their high mutual rate of acceleration. The result was that a star would form initially with a positive core charge and a negative surface charge, in measure consistent with the Schuster-Wilson hypothesis. Such a situation creates within the star the radial electric field action that induces aether spin and transfers angular momentum to the newly born star.

I saw this process as being analogous to the onset of ferromagnetism in iron when it cools through the Curie temperature and thereby forms those magnetic domains mentioned above

I had not, in my early writings on the subject, come to realize that, of their own accord, the hydrogen atoms that form in creating the star would, merely by electron collision between adjacent atoms, determine the mass density of the star and account for that radial

charge displacement, regardless of an event in which gravity comes into existence.

We have now reached the stage where I can present the next major piece of evidence to prove that we are advancing on solid ground. I now present once again the equation that I shall derive in Part II when we have probed the structure of the aether. It is the simple formulation:

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

where ω is the angular velocity of a star just created, ρ_m is its mass density, G is the constant of gravitation and ρ_O is a mass density pertaining to the aether.

We will also see in Part II how ρ_O is determined as 288 gm/cc. We know the mean mass density of the Sun. It is 1.41 gm/cc, this being also the mass density of hydrogen assuming that each atom occupies the volume of a cube of side dimension double the Bohr radius of its orbiting electron. With G as 6.67 10^{-8} in c.g.s units this gives a value of ω of 7.6×10^{-5} rad/s.

From this we can calculate the angular momentum that the aether must shed to create the Sun. As noted early in chapter 4, the Sun has a radius R of approximately 6.97×10^{10} cm, and a mass M of 1.989×10^{33} gm, so our theory tells us that the angular momentum shed by the aether to create the Sun is:

$$(2/5)MR^2\omega$$

which is approximately 3×10^{50} gm.cm^2/s.

One must now wonder how this compares with the actual angular momentum of the solar system today, assuming that the planets were shed by the Sun in its traversals of space domain boundaries. Presumably the angular momentum has been conserved, though one can wonder if other matter bringing with it angular momentum has been added to the solar system since its initial formation.

Take note that, given that ω is, in theory, the same for all stars when created, and since M and R are related by a mass density that is the same for all stars when created, there is only one factor then

needed to determine the size, mass and angular momentum of the newly formed star.

Whether this factor is a quantity of angular momentum or a quantity of mass is something we need to determine as we probe the factors governing the size of the space domain.   Meanwhile, however, let us now estimate the angular momentum of the solar system from the data we have concerning the planets.

The relevant data is presented in Table I, where the angular momentum of the Sun and each planet is listed in units for which the Earth's angular momentum in orbit around the Sun is unity.

TABLE I

Body	Mass	Orbital Radius	Period years/rev.	Angular momentum
Sun	332,800	----	-------	20 approx.
Mercury	0.05	0.387	0.24	0.03
Venus	0.82	0.723	0.62	0.69
Earth	1.00	1.00	1.00	1.00
Mars	0.11	1.52	1.88	0.135
Jupiter	317.8	5.20	11.86	724.6
Saturn	95.2	9.54	29.46	294.1
Uranus	14.5	19.18	84.01	63.5
Neptune	17.2	30.07	165	94.3
Pluto	0.11	39.44	248	0.69

The Earth's mass of approximately 6×10^{27} gm and its orbital radius of approximately 1.5×10^{13} cm combine with its angular motion through 2π radians per year of 3.15×10^7 seconds to give 2.7×10^{47} gm.cm^2/s for that Earth unit.

As can be seen by summing the last column, the solar system accounts for 1200 such units, some 3.2×10^{50} gm.cm^2/s units in all.

We arrive therefore at the quite remarkable result that this *Theory of Everything* is telling us, not only how G, the constant of gravity, is determined by the properties of the aether, but also how stars are created.

The evidence from geomagnetic field reversals has directed our attention to a cubic space domain structure and intuition is now suggesting that each such space domain is the birthplace of a star, or possibly a binary star pair, but the task ahead is to explain why the dimensions of the cubic space domains are of the order of 500 light years. Also we must seek the answer as to how such a space domain determines the amount of mass-energy needed to create a star or, alternatively, the necessary quantum of angular momentum of the order of 3×10^{50} gm.cm^2/s.

This is quite a challenge but the next and final chapter of this Part I shows us how the aether meets that challenge.

Chapter 7

SPACE DOMAINS

What is quite incredible is the fact that cosmologists accept without question the belief that gravitation is a universal force that acts between all particles of matter whatever the distance between them. They do not understand what causes the force of gravity but yet they build their understanding of the universe on the assumption that G, the constant of gravitation, is in no way affected by the distance of separation of stars, however great that distance may be.

It takes about 8 minutes for light from the Sun to reach us here on Earth, with that light travelling at a speed of 300,000 km/s, and we do know that gravitation acts over such a vast range with G having a value that agrees with its action here on Earth as between two heavy bodies. However, we have a vision of a universe that extends over the distance traversed by light in some ten and more billion years, something hardly comparable with 8 minutes, and yet that does not daunt the cosmological community. They still assume that gravitation has an infinite range.

Why, one must wonder, if all the stars in the universe are being pulled towards one another by gravity, they have not all come together to form one single massive body? "Ah", those cosmologists say, "it is because when the universe was created they were all formed together in one place but, owing to a massive explosion of some kind, they have been forced apart and are still moving steadily away from that point of creation in spite of that gravitational attraction and the lapse of the ten and more billion years." They just tell us the universe is expanding!

Now, so far as I am aware, the only real clue they have that implies an expanding universe is their observation that distant stars

exhibit a spectral red shift, the frequency of the light they emit having line spectra that are shifted towards the red end of the spectrum. This signifies loss of frequency in transit but cosmologists have decided that the frequency of an electromagnetic wave is not reduced in its passage through space and so they infer that a Doppler Effect is involved, meaning relative recession of everything as everything moves apart from everything else.

Not understanding the underlying cause of gravity and not understanding how electromagnetic waves might suffer loss of frequency in transit, they have built a picture of what they call 'Big Bang' creation and now leave us wondering about what preceded that event and how such a vast amount of energy could emerge suddenly from nowhere.

You do not have to be a genius to see that something is quite wrong and wonder why such ideas are tolerated. An engineer would not build a universe in which electromagnetic waves can travel with sideways oscillations unless something else was oscillating to keep the dynamic balance. So Maxwell's equations which define the properties of electromagnetic waves are not those that would be formulated by an engineer, because they ignore the need for such a balance. Once we have two of 'something' oscillating in unison as part of the mechanism that conveys an electromagnetic wave, we have scope for understanding how the obstructing presence of something else in the aether can affect one of those 'somethings' more than the other. That could be a recipe for dragging the oscillation frequency down and causing those electromagnetic waves to reduce in frequency the further they travel.

However, physicists regard Maxwell's equations as sacrosanct and, having accepted what Einstein has proposed, have even dispensed with the need for an aether and so, relying on what physicists have said, cosmologists can but wander in the dark and try to make sense of what they see in the sky at night.

Meanwhile, however, there are those theoretical physicists who ponder on the problem of symmetry and, when it comes to the creation of matter, tell us that the universe must contain as much

matter as antimatter. This in another way of saying that whatever form electric charge takes in our universe, if some appears in a particular form as positive charge then an equal amount much appear elsewhere in space in the same form as negative charge.

Now, to me, what this means is that, if one believes in the reality of an aether containing a charge continuum that somehow governs the force of gravity within a region pervaded by a continuum having the same charge polarity, there will, elsewhere in space, be regions of continuum of opposite charge polarity. So gravitation can only exert its attractive influence within its own continuum region.

Hence I conceived the existence of 'space domains', albeit of vast extent, but still of quite small dimensions relative to the scale of the whole universe. I do not regard such domains as 'magnetized domains'. They are regions in which aether charges all share a common synchronous motion, which is clockwise in one domain and anticlockwise in an adjacent domain. This does not induce magnetization because those charges within a domain collectively determine the electromagnetic reference frame in that domain and so their motion cannot generate a magnetic field. However, as we shall see in Part II, where matter is present and rotating bodily together with coextensive aether, this can cause the magnetic field generated by that rotation to be oppositely directed in adjacent space domains. Hence the relevance of the geomagnetic field reversals I mentioned in Chapter 5. It implied about 500 light years for the dimensions of what I have called a 'space domain', at least for the region of space that our solar system is travelling through in this era of time.

As can be seen I am trying to avoid mere hypothesis and proceed instead by logic guided by the clues which nature provides. To verify my case I then insist on deriving some numerical physical data that supports what I say, as otherwise one's endeavours are mere phantasy. So I shall, before I conclude this *Theory of Everything* need to derive something numerical pertaining to the value of the Hubble constant, the fundamental factor which cosmologists rely on in their concept of the expanding universe. That is I must derive

something approximating that factor without recourse to the expansion theme. Also, however, my immediate task in this chapter, is the theoretical derivation of the size of the space domains that permeate all space. This is based on the assumption that each domain is the seat of creation of a single star or a binary pair of stars in a universe that is not expanding.

However, stars acquire motion in their creation and so they can leave their home domain and encounter the gravitational attraction of other stars, whereupon they tend to form galactic clusters which spread over many such space domains and have several stars then occupying each such domain that is located within the bounds of that galaxy.

They can even seem to be attracted to other stars within a galaxy extending over thousands of space domains owing to the proximity of other stars moving in the same direction and their gravitational linkage when in a common domain.

There are so many stars and so many galaxies that I cannot even begin to theorize on the quantitative factors that apply on such a universal scale and so I will restrict my onward analysis to the creation of a typical star in a typical space domain, based on the physics of the underlying aether medium.

As to a typical star, the only one I can be sure of in terms of its mass and physical size is our Sun and I have no way of knowing whether it was created in a space domain having the same side cube dimension of 500 light years as that of the domains through which it has been travelling over the past four million years or so. However, *The Theory of Everything* can surely rise to this challenge.

As a first step let us ask how many stars there are and how much space they occupy. "Who to ask and who to trust?" is then the problem. Well, as long ago as 1931, Cambridge University Press published a book entitled *Stars and their Courses* by that other man of Trinity, Sir James Jeans. He was a professor of mathematics at Princeton, New Jersey, U.S.A. from 1905 to 1909 and professor of astronomy at the Royal Institution in London from 1924 to 1929 but

also for twenty-one years he was a research associate of Mount Wilson Observatory, California.

On page 149 I found a statement that answered my question. It reads:

> "Within this distance of 140 million light-years, about two million nebulae are visible. Each contains about as much matter as 2000 million Suns, so that the total amount of matter within range of our telescopes is roughly that of 4000 million million Suns. We may describe this as the total amount of matter we can see in our telescopes; the total amount of matter in the universe must of course be greater than this."

So, if you consider a sphere of radius 140 million light years and divide its volume by 4000 million million, one could have a very rough estimate of the side dimension of a cubic space domain, assuming one star is created in each such domain. The answer is 1421 light years. This is gratifyingly of the right order of magnitude but is about three times the value implied from geomagnetic reversal data.

Now, I chose this 1931 book by Jeans for reference because I thought that might antedate the acceptance of the belief in the notion of the Big Bang creation of the stars. Yet there on its page 144 was a section headed *The Expanding Universe* and enlightenment for the reader concerning its creation:

> "Of late years there has been a further development of a sensational kind. Every child knows that it is easy to blow a soap-bubble, but far less easy to keep it in existence for more than a minute or two; after that it is apt suddenly to burst and disappear. Quite recently it has been discovered that the universe is like this. A Belgian mathematician, Lemaitre, has shewn that Einstein's universe has properties like those of a soap bubble."

He goes on to explain that as the soap-film increases in size, it gets ever thinner and thinner, and its different bits, the 'great star-cities' which lie in the soap bubble, get further and further apart.

Such is the picture of things in the world of cosmologist who chooses to ignore the aether. Even a child can understand how stars are created, thanks to Einstein's universe replicating the action of a bursting soap bubble!

I prefer to bring the aether into the act and look to the creation of stars within those cubic space domains that I envisage.

Now, to avoid appearing as if I am a lone voice in seeking to give space a cubic structure, it is appropriate here to quote some introductory comments that appeared in a paper I wrote in 1983 when I became a Senior Research Fellow at the University of Southampton here in England.

The paper was entitled *Planar Boundaries of the Space-Time Lattice* and it appeared in the 16th October 1983 issue of the Italian Institute of Physics publication *Lettere al Nuovo Cimento*, **38**, p. 243. The first two paragraphs, preceded by a Summary, were:

"*Summary*. - Having regard to the developing interest in a lattice-structured vacuum in interpreting the structure of particles, an aspect of the electrically-structured lattice model of the vacuum is discussed in relation to electric-field energy. It is shown that a necessary condition is that the lattice should have planar boundaries. This implies a domain structure somewhat analogous to that found in ferromagnetic materials.

Modern physical theory is tending to regard the vacuum medium as having structure somewhat analogous to that of crystalline materials. Thus we see WEISSKOPF (*Physics Today*, **34-11**, 69: 1981) discussing quantum electroweak dynamics and asserting that the Higgs field implies that the vacuum has a certain fixed direction in isospace, namely that of the spinor associated with the Higgs field.

WEISSKOPF states that the situation is like that of a ferromagnet, in which the direction in real space is determined as long as the energy transfers are smaller than the Curie energy.

This, of course, implies an ordered structure of the vacuum medium, a feature discussed at some length by REBBI (*Scientific American*, **248**, 36: 1983) in an article entitled *The Lattice Theory of Quark Confinement*. REBBI refers to a 1974 proposal by WILSON that QCD (Quantum Chromodynamics) should be formulated on a cubic lattice, an array that divides space and time into discrete points, but is essentially an approximation to real space-time. The advantage is that this allows calculations to be made that would otherwise be impossible."

That paper then explained why space must be segmented, sliced as it were, by having parallel planar boundaries dividing sectors of opposite polarity electrical charge continuum containing neutralizing aether charges in an ordered array. The aether of this form is a medium in which those charges within large segments of each 'slice' can be displaced in unison to describe at high speed small circular orbits in planes generally parallel with the planar boundaries. We shall see in Part II of this work how this accounts for quantum theory but here our object is to focus on how the aether forms space domains.

The angular momentum of the aether itself, ignoring the existence of stars, must be zero overall. So within each charge continuum planar-bound slice of the aether there are large segments that have those aether charges rotating collectively in their orderly array in clockwise orbits and adjacent segments that have the same number of aether charges rotating in anti-clockwise orbits. For simplicity and symmetry this suggests parallel boundaries in all three orthogonal directions which define cubic domain regions. Having regard to the fact that each such domain is electrically neutral overall, its individual charges collectively having the same net charge but

opposite polarity of the continuum charge, there can be no electrostatic force interaction between those domains. Gravity, being an electrostatic force set up between graviton-occupied voids within the continuum of an individual domain, can therefore not act across a space domain boundary.

This presents a picture of the aether that we can now analyse theoretically to estimate the size of a cubic space domain in which our Sun was created.

I do not regard reliance on 'symmetry' as a principle in physics and so, guided by how domain size is determined in a ferromagnetic crystal, I will assume that the action is governed by balance of a negative energy potential and a positive energy potential. In a ferromagnetic crystal the magnetic energy has negative potential, meaning the crystal has shed energy according to domain volume in order to use that energy in establishing the domain walls, a function of area. The opposite applies for aether space domains. A polarization direction factor is involved in the ferromagnetic case, along with factors dependent upon inclusions, impurities in the crystal and so the domain structure has planar boundaries but has rectangular rather than simple square form that applies to a cubic domain.

In the aether we have a rather fascinating scenario that accounts for the negative energy potential. What I am about to describe, therefore, may seem speculative, but, step by step, as this work proceeds you will see every such step fully justified in physical terms. There is, however, some doubt as to the precise quantitative evaluation of what I will call 'boundary energy' and this makes precise determination of space domain size impossible by pure theory.

Begin by picturing the aether as having vast extent with no matter present, just the electrical charges attributable to its continuum and its particle-like charge components, electrically neutral overall and somehow having as much of one polarity form of charge as of the opposite polarity.

See it as seething with energy, not just electric field energy but energy of motion, kinetic energy. Then accept that it is constantly trying, but succeeding only transiently on a statistical basis, to create everywhere in space the basic form of matter, a proton paired with an electron or an antiproton paired with a positron. Somehow those protons, anti-protons, electrons and positrons appear momentarily, as if created by heavy lepton annihilation, and then they too decay to recreate the leptons. Note that our aether is alive with lepton activity. Particle physicists well know from their study of QED, quantum electrodynamics, that electron-positron pairs and their muon pair or taon pair equivalents can appear in space as if from nowhere in their particle reaction experiments. These are classified as 'leptons'.

Now, however, bearing in mind that such quasi-matter always exists everywhere, even if very sparsely distributed throughout the aether, consider its gravitational interaction with the gravitons that exist through the aether to provide dynamic balance for the charges that electrically neutralize the continuum charge. This will give rise to a measure of gravitational potential energy, a negative quantity, in proportion to the volume of the region within which gravitation is effective. Since the aether component of this interaction is locked in position all the energy so released is trapped where it is released and, since it is not a component of the rhythmic quantum motion, this means that it stays put as a thermal vibration, meaning the aether has a 'cosmic temperature'. It also means that it cannot give rise to a gravitational force acting between gravitons providing dynamic balance for aether charge and gravitons linked to quasi-matter. Keep in mind that force is not a primary agency. It is a consequence of energy transfer, meaning that if energy cannot relocate it cannot give rise to a force.

However, although the gravitational potential energy here discussed, in changing state, does not transfer in the sense of relocating elsewhere, it does shed a related amount of angular momentum which we will find amounts to E/Ω, where E is the energy involved and Ω is the angular velocity of the aether rhythm, that corresponding to the Compton electron frequency.

This angular momentum has nowhere to go unless it can accompany and become a property of real matter somehow created in appropriate measure by the aether. So where then is this source of energy that can be deployed to create real matter?

For this we can look to the gap that must exist between adjacent space domains to allow freedom of motion, given the fact that the aether charges in adjacent domains have cyclic rhythms that are in anti-phase with one another or not in phase at all. This gap, conceivably as great as one unit distance of lattice spacing of the aether charge, implies release of energy per domain in proportion to domain boundary area. This is what I mean by 'boundary energy'. So, given that we expect the angular momentum to be shed as a function of space domain volume, in an amount matching the mass energy released in proportion to domain boundary area, we then see this condition as determining the size of the space domain. It would be cubic in form as this assures the least boundary area for a given volume owing to the volume-related negative potential energy property of gravitation.

What all this amounts to is that the aether must (a) contain cubic space domains all of similar size, (b) have a small cosmic temperature, (c) contain an amount of matter per domain that has, when created, an angular momentum determined by the space domain size, (d) contain a sparse but uniform distribution of quasi-matter and (e) create a universe that, apart from occasional fluctuations such as occur when stars traverse a space domain boundary, is essentially in a steady, non-evolving state.

One can forget the notion of Big Bang creation, thanks to the presence of that quasi-matter which, as we shall see, reduces the frequency of electromagnetic waves in transit and so that of starlight from distant galaxies. This kills the thought that the universe is expanding and so restores some sense to cosmological theory.

By 'quasi-matter' I mean the ongoing creation of protons in a transient sense statistically distributed throughout the domain. The quantity of such matter within a domain sets an upper limit on the mass of a star that can be created within such a domain. It also

suggests that where a single star is created per domain then all such stars should have the same mass.

Yet, again referring to that book by Jeans entitled *The Stars and their Courses*, I see on pp. 76-77 the sentence:

"It is very rare to find a star with ten times the weight of the Sun, and no star yet found has as little as a tenth of the Sun's weight."

This may seem to conflict with what has just been stated. However, do bear in mind that when a star traverses a space domain boundary it may once in eons of time do so at a very low angle of incidence. Since gravitation does not act between matter in adjacent domains, the star may then break up with its components consolidating into stars of smaller weight. Conversely, since stars will, in their onwards migration through space enter domains already containing several stars there is a chance of collision and consolidation in forming a much heavier star. Therefore, astronomical observation of the overall spectrum of types of star in no way disproves the creation process indicated by this domain theory.

On this basis, if our later analysis of aether structure, gives us reason to believe that space is permeated by a mass density ρ_S of 'quasi-matter' and has planar boundaries that shed energy having a mass equivalent of ρ_B per unit area, then the side dimension D of a space domain cube will be given by:

$$3D^2\rho_B = M$$

where M is the mass of the Sun. Note that, although a cube has six side faces, we take only the boundary energy of three faces as applicable because the boundary energy released is shared between adjacent domains.

Another equation that applies is:

$$A = (3/5)(4\pi/3)^2 G\rho_S\rho_O R^5(c^2/\Omega)$$

where: $$D^3 = (4\pi/3)R^3$$

and where A signifies the angular momentum acquired by the Sun when first created, c is the speed of light, used here to convert mass into energy, Ω is the angular frequency of the quantum underworld,

the aether, ρ_O is the mass density of the aether and R is the radius of a sphere having the same volume as a cube of side dimension D. Note that in deriving this equation I had in mind that a solid sphere of uniform mass density subject to self gravitation has a negative gravitational potential energy of magnitude (3/5) times its mass squared as divided by its radius. Where there are two mass systems M_1 and M_2 occupying the same sphere, $2M_1M_2$ replaces the mass squared term. However, the mass density of the aether comprises two systems of equal mass in dynamic balance and only one such system is subject to gravitation. Hence that factor of 2 is cancelled in formulating the resulting angular momentum.

So here we have two equations from which D can be determined, one independent of data involving the Sun as a typical star and one dependent upon such data.

We will derive the value of ρ_S in Part II, to find that it has the value 5×10^{-28} gm/cc and since Ω is 7.8×10^{20} rad/s, as we know from data concerning the Compton electron frequency, and c is approximately 3×10^{10} cm/s, we can relate A and D. As noted earlier the mass density ρ_O has the value 288 gm/cc.

Having found, and indeed justified, the value of A, both from theoretical and observational data in Chapter 6, we can deduce the value of D. With A as 3.2×10^{50} gm.cm^2/s D becomes 4.86×10^{20} cm, which is 514 light years.

Now, as to the other equation for D, the one involving domain boundary energy, we will find in Part II that the aether on a microscopic scale also comprises cubic cells, each of side dimension 6.371×10^{-11} cm, and each the seat of an aether charge of mass 3.714×10^{-29} gm, which corresponds to a mass density of 144 gm/cc, half the value of ρ_O, the mass density term used in the formula for the angular velocity of a star when created. I assume that the boundary energy shed will not be that of the mass of the aether charge involved but rather its electric displacement energy and kinetic energy and so ρ_B is a fraction of $144\times6.371\times10^{-11}$ gm/sq.cm or of 9.17×10^{-9} gm/sq.cm. Putting this in the relevant equation, with M, the Sun's mass as 2×10^{33} gm, we obtain a value of D of 3×10^{20} cm, which is

317 light years. However, if that fraction were, say, one third, this value of D would become 549 light years.

The question then is how such an estimate of the size of a space domain compares with the 400,000 year figure derived from geomagnetic field reversal data. The answer to this is found from research reported in October 1977 by Smoot, Gorenstein and Muller (*Physical Review Letters*, **39**, 898). The importance of this discovery is clear as it was rapidly reported by the scientific press. '*Aether drift detected at last*' was a headline in the journal *Nature*, November 3, 1977, at p. 9. The May 1978 issue of *Scientific American* featured an article on the same subject under the title: *'The Cosmic Background Radiation and the New Aether Drift'*.

The relevant experimental investigation had involved radiometers carried by U-2 aircraft at altitudes of 20 km which detected a component of Earth motion through space at 390 ± 60 km/s. The cosmic radiation background is deemed to be isotropic in the space devoid of matter, the aether, and since the experiment revealed it to be anisotropic relative to Earth, then the measure of that anisotropy indicated our Earth's speed through enveloping aether.

Since the pattern of geomagnetic field reversals indicated a cubic domain structure of 400,000 years in time dimension, with the Earth travelling through space at 390 km/s, one finds that the side dimension of the space domain is 400,000 times 390 km times the number of seconds in a year, 31,536,000. This is a distance of 4.91×10^{20} cm or 519 light years.

What was measured by those air-borne radiometers was the cosmic background temperature. It is 2.7 K in the vicinity of Earth and scientists see this as being attributable to radiation from residue arising from the Big Bang. I say that it is attributable to energy trapped in position within the aether as that of a thermal vibration of aether charges that have shed some angular momentum that has found its way into the motion of a star.

Let us now examine how aether theory explains that 2.7 K temperature.

Now here it needs a little inspiration to make the next step. I have reasoned that dynamic balance in the aether needs those gravitons introduced earlier. They exist in two groups, those associated with the aether charges that I call quons and those associated with matter. The gravitons provide dynamic balance for the circular motion of those charges, a motion shared by matter. The former group interact but, apart from energy fluctuations about an equilibrium level, they sustain their interaction potential and are held in the aether as if they belong to a kind of crystal body. In contrast matter has freedom of motion, just as, by analogy there are electrons in a metal crystal that are free to move as evidenced by electrical conductivity of metal. They also outnumber the matter-related gravitons by an enormous ratio but each and everyone of them within the common space domain interacts with the gravitons linked to matter. There is gravitational potential energy involved in this interaction but it is subject to a constraint not applicable for action as between separate sets of gravitons linked to separated matter.

This is the basis of that equation above containing the terms G, ρ_S and ρ_O.

This is a very important consideration not discussed in the curriculum of physics. Indeed, I have seen only one mention of relevance to this topic, a quotation which Leon Brillouin presented on its own in an opening page of his book *Relativity Reexamined*, published by Academic Press in 1970. It reads:

"To form any notion at all of the flux of gravitational energy, we must first localize the energy.

Heaviside -1893"

It caused me to write a paper entitled *The Inverse-Square Law of Force and its Spatial Energy Distribution* which did find acceptance by the Institute of Physics in U.K. and so was published in *J. Phys. A: Math. Gen.,* **13**, 3649-3655 (1980).

I devoted several pages (17-22) of my 1980 book *Physics Unified* to this topic, considering how field energy might be differently distributed in relation to two interacting bodies if they were subject (a) to a mutual inverse-square law of attraction versus

(b) a mutual inverse square law of repulsion. Then on pages 178-180 I extended this to the case where the interaction was between a central body and an enveloping system of uniform mass density extending virtually to infinity. The energy of the interaction involved in this latter case was exactly that given by the usual formula but its location was not with that central body but was exclusively located with the interacting mass belonging to that enveloping system, in other words seated in the aether itself.

This result meant that in the near presence of a star the aether is conditioned by the presence of energy associated with the star's gravitational potential. I saw this as an indication that a related amount of angular momentum had been shed by the quantum Heisenberg jitter motion of the aether whilst the energy so released had been deployed into thermal motion of the aether itself. Accordingly, the aether in the vicinity of a star has itself a temperature that is a measure of the gravitational potential of one aether charge, the quon, in its interaction with the mass of the star.

So I tested this idea by working out what the near-to-Earth aether temperature might be based on the gravitational effect of the Sun together with body Earth.   The total gravitational potential is approximately:

$$G(M/R + m/r)$$

where G is the constant of gravitation, 6.67×10^{-8}, M is the mass of the Sun, 1.989×10^{33}, R is here the astronomical unit, the distance between Earth and Sun, 1.496×10^{13}, m is the mass of the Earth, 5.977×10^{27}, and r is the Earth's radius, 6.378×10^{8}, all in c.g.s. units.

This gives a gravitational potential of 9.49×10^{12} which, when multiplied by the mass of the quon in the aether is a measure of energy and should tell us the temperature of the aether. The quon has only two degrees of freedom for thermal motion owing to its quantum constraints requiring it to retain its synchrony with other quons, and so the resulting gravitational potential energy will be kT, where k is Boltzmann's constant 1.38×10^{-16}.

So if I now dare to suggest that this temperature has the value 2.7 Kelvin that we measure as the cosmic background temperature

near to body Earth, seen not as a residue of the Big Bang, but as evidence of the existence of the aether, I have an approximate measure of the mass of the quon. The result is approximately 4×10^{-29} gm, which is less than the mass of the electron by a factor of the order of 25.

Keep this in mind when we come in Part II to evaluate the mass of the quon from first principles. I have already referred to its derived value as being 3.714×10^{-29} gm above in deriving a value for D, the size of a space domain. Also in Part II we will show why those quons in the aether move in circular orbits at an angular frequency Ω corresponding to what is known as the Compton electron frequency, some 7.8×10^{20} radians per second. Since, for every unit of gravitational energy potential shed to account for that cosmic temperature, we have $1/\Omega$ units of angular momentum shed as well, all of which is deemed to go into the relevant star at creation, so we were able to estimate the size of the space domain involved. The only other aether factor involved was the mean mass density ρ_O of the combination of quons and gravitons.

So my theory is rising to the challenge. In deriving the value of $G,$ Newton's constant of gravitation, by pure theory based on interpreting the nature of the aether and explaining how stars are created in an aether background divided into space domains, we are able to solve some of the mysteries of our universe. Undoubtedly there are many problems and scope for questioning the assumptions involved. Note that I have assumed that the angular momentum of the solar system is conserved. This no doubt is true so long as the solar system stays within the space domain in which it was created, but imagine what happens when it traverses a space domain boundary, as it has done thousands of times since creation. Under the action of gravity angular momentum is conserved, but if for brief periods gravitation as between Sun and planet is non-active, as it is during in space domain boundary traversal, there could be a change in angular momentum.

Such are the uncertainties we face, but one can still be sure that we are dealing in real physics and not notional ideas such as the hypothesis of Big Bang creation.

This bring us to the end of Part I where I have tried to address the problems of cosmology, essentially the creation of the stars and the understanding of the physical basis of gravitation. I have still to derive the Hubble constant based on this aether theory, but that will be an important feature of Part II which follows.

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 electron's 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.aspden.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 hv, where v 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 3x3x3 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 v then the spin angular velocity is $2\pi(v/4)$ and so the angular momentum of the photon will be:

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

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 $2\sigma/\rho_O$, because ρ_O is the combined mass density of the muons and gravitons, we find that:

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

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 (16x15)/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_ec^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_ec^2 is equal to $2e^2/3a$. Here a is the charge radius of the electron.

So we can then see that:

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

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 $137.03602\pm1\frac{1}{2}$ 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:

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

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 that 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 υ_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:

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

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

dE/dt is $2\pi fE$ or $2\pi \upsilon_C(E_1 - E_2)\sqrt{(1-E_2/E_1)}$ for a sinusoidal planar wave and so is of the appropriate form. Note that, when f is equal to υ_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 that 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.

Chapter 13

NUCLEAR FUSION

When our energy resources in the form of coal, oil and natural gas are unable to sustain our needs, as is inevitable as the world's population continues to grow, we will no longer need to worry about the pollution and damage to our atmosphere caused by these forms of fuel. Instead, our worry will be how to power our industries and our agricultural machines besides transporting the food we need. The memory of vacations involving air travel will be the least of our concerns.

Today's worry, that of June 3, 2005, according to news reports here in U.K. is the problem of the damage to health caused by overhead electric power lines. We worry also about the environmental consequences of expanding our airports and the traffic congestion on our roads, all of which arise from consuming energy at an escalating rate.

So long as those of us who are old enough not to survive past the evil day find comfort with things as they are, we will do little if anything to face up to the reality that lies ahead.

Since our government has to be seen to do something on the alternative energy front, we pin our faith in windmills and just hope that one day a 21st century Don Quixote will come along, tilt his lance at a windmill, and conquer it by introducing us to a new and far better revolutionary something that will allow us to tap energy from that mysterious medium that I call the aether.

Meanwhile, the real experts of the power industry urge more emphasis on nuclear power, even though existing atomic power plants are in decay, ever hoping that nuclear fusion will one day prove possible. What then is 'nuclear fusion'? Scientists will tell you that

it is the energy source that powers the Sun and that nuclear fusion is the process that accounts for the hydrogen bomb, a proven weapon of enormous explosive power well exceeding that of the atomic bombs which, in World War II, destroyed Nagasaki and Hiroshimo.

I have, in Part I of this work, made it quite clear that the Sun is not powered by a nuclear furnace. I well know that if the nuclei of hydrogen atoms fuse together, they will form heavier particles and shed a little mass, enough, according to the formula $E = Mc^2$, to account for the vast heat output of our Sun, if that were a possible scenario within the body of the Sun. However, the truth is that the Sun's energy comes from the aether itself by activity at the Sun's surface as hydrogen atoms pulled tightly together by gravitation experience collisions between their electrons, the result being ionization, radiation of energy and then recovery as the quantum underworld restores the lost energy in rehabilitating the electrons with their parent atoms.

The Sun is not a fusion reactor that is controlled in some unknown way so as avoid a mammoth explosion. Indeed, the only guiding light for nuclear fusion as the Sun's energy source, short of the suggestion by Jeans in *Nature*, **70**, 101, June 2, 1904 who first seeded the thought of mutual annihilation of oppositely charged particles converting mass into energy, is the explosive power of the hydrogen bomb. Surely wisdom then says that we should look elsewhere for our future source of power, if only for reasons of safety.

Wisdom also says that we should rethink some of the assumptions scientists have made in their rush to understand the secrets of the atom. For example, once they found by experiment that they could accelerate atoms to high speeds and, by their collision, produce a new particle which they called the 'neutron', they assumed this to be a neutral constituent of the atom and discounted their earlier ideas about atomic nuclei containing electrons. The neutron has no electric charge but, curiously, it does have a magnetic moment and so must comprise a combination of electric charge such that when it spins it will produce a magnetic field.

Given then that we know that all atoms other than hydrogen have atomic nuclei that have masses as if they contain N proton-sized nucleons but an electric charge as if they contain less than N protons, the proton being the single-nucleon nucleus of the hydrogen atom, atomic physicists jumped to the conclusion that neutrons accounted for the difference.

Where, however, is there any proof that this assumption is correct? The neutron seen in our experiments has a short lifetime. It decays in minutes to create a proton and an electron. Where is the theory that explains this decay? If the theory exists, does it tell us why neutrons in an atom do not decay? We seek a *Theory of Everything* but admit to knowing little or nothing relevant to this problem, even though our atomic physicists tell us that their research will lead to viable nuclear fusion reactors that can solve the world's future energy problems.

Well such theory does exist but it requires neutrons to decay once created whether or not they exist within the atom. This theory has been ignored by particle physicists. See my paper on the neutron lifetime, *Lettere al Nuovo Cimento*, **31**, 383-384, (1981). It has been ignored even though, by pure theory, it indicated a neutron lifetime of 898 seconds, a value which was exactly the median of the recommended value as listed in measurement data used by particle physicists. So I am able to say, with confidence, that there are no neutrons, as such, in atomic nuclei. All you have, other than aether charge, is protons and/or antiprotons combined with some leptons, particularly electrons and positrons.

So why has this any bearing upon nuclear fusion, the fusion of two protons to create a particle of mass a little less than the combined mass of two protons by shedding a particle or particle group having the positive electric charge e? Why, given that I see no future in high energy nuclear fusion reactors as our ultimate power source, am I even discussing this subject in Part III of this work?

The reason is that there is mounting evidence of developments concerning what has come to be known as 'cold fusion', laboratory bench-type experiments that generate heat anomalously by a process

which utilizes heavy water, water the atoms of which have deuterons as their nuclei.

It was some few years before news of such findings became public that my theoretical endeavour to understand the structure of the proton, of the neutron and of the deuteron succeeded and culminated in the publication of my paper in *Hadronic Journal*, **9**, 129-136 (1986).

It shows that the deuteron has three states between which, subject to energy fluctuations attributable to the underlying quantum state of the aether, it flips constantly, spending a portion of the time in one or other of those states. The statistical factors governing the transitions allowed determination of the mass-energy of each state and the time apportionment of each state and so allowed the mass of the deuteron to be calculated in terms of proton mass. The result was in full agreement with measurement data. Moreover, since it was found that in one of these states the deuteron had split momentarily into a neutral core particle form with a positron as a satellite, it was seen that its core could not, for the one-seventh of the time that it spent in that state, contribute to the deuteron's magnetic moment. As a result I was able to calculate, by pure theory, the expected value of that magnetic moment in units of nuclear magnetons. My theory gave the result as 0.857439, whereas the measured value of record was 0.857438. So you can begin to understand why I am so sure of my ground in writing this account.

As to the fusion theme in relation to the proton, this comes into perspective when I note that the analysis showed that the deuteron mass-energy is at its highest during that one-seventh period, thanks to the quantum energy fluctuations involved. In contrast, as I had shown earlier in my published work, the proton, once created in its stable state as matter, flips between three states, one of very short duration where it has the bare form P discussed in Chapter 11, and two of very nearly equal duration where it comprises either a positive charge form P combined with an electron-positron charge pair or a negative charge form P combined with two positrons, one on either side of P. This picture of the three-state proton seemed relevant to the ideas being

mooted about the proton having a three-quark structure, but for my part the proton mass was definitely the energy quantum I had calculated leading to the 1975 publication mentioned in Chapter 10 and all that was involved to account for the electron and positron components was quantum energy fluctuations. The proton was, in the main, flipping between a slightly higher mass state and a slightly lower mass state in relation to P.

The point of interest then is that, though the mass norm of the proton is higher than one half of that of the deuteron, there are intervals of time when the proton has a mass a just a little greater than half that of the deuteron. Given a background of quantum energy fluctuations at the Compton electron frequency that account for electron-positron pair creation, this is a recipe for the creation of protons from the fission of deuterons. Then there is the converse situation, with intervals of time when a group of protons can convert into deuterons in their lowest energy state so that proton fusion has a statistical chance of occurrence leading to creation of deuterons.

It is then an easy task to work out the likely relative abundance of protons and deuterons that results from such a process. However, do note that the transmutation between protons and deuterons involves imbalance of one unit of electric charge. This means that the rate of transmutation is governed by external influences which somehow can take up the charge imbalance.

Proceeding on this theme, it was only after I heard about the cold fusion discovery of Martin Fleischmann and Stanley Pons that I actually did the relative abundance calculation. In its full detail it is of record in my 1994 publication *ENERGY SCIENCE REPORT No. 5* entitled *Power from Water: Cold Fusion..*

I there derived the formula:

$$H^1/H^2 = (S_1)^N (P_1)/(S_2)^n (P_2)$$

which gives the proton/deuteron abundance ratio predicted by my theory. Here S_1 is 2, the proton being in its least energy state half the time, S_2 is 7, the deuteron being in its highest energy state 1/7th of the time, P_1 is 18, P_2 is 16, N is 35 and n is 8, these values being calculated by considering interaction of collective groups of protons

and deuterons on the basis of conservation of energy, charge volume and charge parity.

This formula then gave that abundance ratio as $9(16/7)^8$, which is

$$6705:1$$

telling me that there should be 1491 deuterons for every ten million protons. I then found on page 65 of section 9 of a reference book, the 1967 second edition of the McGraw-Hill *Handbook of Physics* edited by Condon and Odishaw, that in every ten million hydrogen atoms there are 1492 nucleated by deuterons. This therefore is another really wonderful result that gives substance to this *Theory of Everything*.

Consider what it tells us. The water molecule comprises two hydrogen atoms plus one oxygen atom. The hydrogen atom may have a proton as its nucleus or a deuteron as its nucleus. This means that the oceans of the world contain vast numbers of protons and deuterons. Those transmutations as between protons and deuterons therefore must occur on an ongoing basis as a surface phenomenon on body Earth. Instead of looking at the Sun and seeing it as a nuclear fusion reactor, we should look instead at the sea and the clouds in the sky and imagine the ongoing nuclear fusion and nuclear fission taking place as between protons and deuterons. That raises the obvious question: "Does that guide us in our search for a new source of power?"

It may well because, as mentioned above, it needs something extraneous of an electrical nature to help things along, because electric charge is shed when two protons fuse together to create a deuteron.

We well know that water evaporates from the oceans and disperses through the atmosphere where it forms clouds that acquire electrical charge which periodically discharge in a flash of lightning? Here is the stimulus that can stir the reaction, if it so happens that the proton/deuteron abundance ratio has become different from the norm. On the other hand, assuming that abundance ratio is at that norm, can it be that an electrical discharge from a cloud having a charge polarity

that is, say, positive overall can trigger transmutations in one sense, deuteron to proton, whereas a negative discharge would trigger proton fusion to enhance the abundance of deuterons? I do not know the answer to this and am not a Benjamin Franklin ready to fly a kite in wet weather to see if I can induce heavy water to fall as rain.

However, heavy water is so-called because it consists, almost exclusively, of water molecules which include deuterons rather than protons and I do know that heavy water is manufactured as a by-product of electrolysis of normal water. I also know that Fleischmann and Pons in the experiments by which they discovered cold fusion, used electrolysis to inject deuterium ions into a palladium cathode. The anomalous phenomenon of excess heat generation resulted but the energy involved could not have come from a natural adjustment of the deuteron-proton abundance ratio. Instead we have to consider fusion of two deuterons resulting in two particles having the combined mass of four nucleons, accompanied by release of energy, there being two such possibilities. Either we create a proton plus a triton, the nucleus of tritium, the third isotope of hydrogen, or we create an isotope of helium He^3 plus a neutron.

It is known that the first such reaction releases energy amounting to 4 MeV, whereas the second delivers 3.3 MeV. Nuclear physicists, however, believe that such reactions cannot occur unless a very high temperature is involved. As Sir Harrie Massey puts it in the 1966 edition of his book *The New Age in Physics*:

> "No nuclei can react with each other unless they possess sufficient energy of relative motion to overcome electrical repulsion between them. If one is concerned only with the study of nuclear reactions and not with their large scale generation, the required energy of relative motion can be obtained by using particle reactors. Far more energy must be expended in accelerating the particle beams than can be obtained from the reactions they initiate. The only other possibility is to use energy of random motion, in other words, heat energy. This can only be effective if the

mean energies of the particles are of the order of 1,000 eV, which means a temperature of 100,000,000 degrees C."

So, you see, the Sun on this basis must have such a temperature at its core if it is kept alive by nuclear fusion and cold nuclear fusion is therefore impossible. Yet, I can say that Sir Harrie Massey did not understand how protons are created by energy drawn from the aether, as was proved in Part II of this work, and so he was unaware that the virtual muons of the aether could intrude in the nuclear energy game and play a part which triggers the cold fusion reaction. Nor did Sir Harrie Massey know that theoretical progress would reveal that the deuteron is constantly exchanging energy with other deuterons or the aether as it cycles between its three energy states.

However, nuclear reactors produce neutrons in the second stage of the deuteron fusion reaction mentioned above, and so the nuclear physicist tells us that without neutrons appearing in so-called cold fusion experiments, there is no evidence of a nuclear reaction having occurred. But, surely, if the reaction is occurring within a metal cathode, in palladium in the Fleischmann and Pons experiment, rather than in a particle accelerator, it might be that the deuteron fusion is restricted to the reaction creating protons and tritons, without there being any neutron production. Tritons have a mean lifetime of 12 years and so the heat developed would not come from triton decay but would be simply that generated by the release of 4 MeV per fusion reaction within the palladium cathode.

As to the triton, does our *Theory of Everything* tell us anything about that? Well, yes, it does. It can even show how to derive that 12 year lifetime, as is of record at pages 41-43 of my *ENERGY SCIENCE REPORT No. 5*, already mentioned. The paper there referenced was, I may mention, presented by me at a conference held by ANPA, the Alternative Natural Philosophy Association, in Cambridge, England, during 9-12 September 1993.

So how do we view the future from the point of view of generating energy using nuclear fusion? I first heard of the experimental attempts to tame the inward pinch action of an electrical

discharge in a reactor sufficiently to trigger a hot fusion reaction in 1958, some 47 years ago. Since then the vast sums of money spent on research in trying to develop a workable reactor have been wasted. The Sun worshippers, meaning the nuclear physicists who really do believe the Sun is a nuclear reactor, may just as well revert to the 1837 philosophy of the Reverend William Whewell that was mentioned in Chapter 1 of this work. As to cold fusion that is another matter, but little progress on that front is likely until physicists have a better grasp of the theory involved and can see what might be possible.

That problem I mentioned concerning the mystery as to why overhead power lines are proving to be a health hazard is another example of physicists having a problem with theory. They have based their understanding of electrical current interactions solely on experimental data arising from interactions where electric current invariably flows around a closed path through metal, meaning it is carried by electrons. Yet they apply the theory also to interactions where current may be conveyed not by electrons, but by heavy ions. Is there a difference? Well, just go and sit under an overhead power line which conveys electric current oscillating at 50 or 60 Hz, through spaced-apart cables, carrying current in opposite directions at any instant. You may feel nothing, but what about your body fluids, your blood for example?

Water dissociates naturally into positive and negative ions and so must your blood. Those ions are not electrons. They have a mass that is tens of thousands of times greater than the electron. They are in constant motion, if only that of thermal motion, and so, since our Earth has a magnetic field, they will move about in circular arcs between collisions as they react to oppose that magnetic field. Then consider the aggravation owing to the intrusion of the magnetic and electric pulsations that stem from that overhead power line. If you are a physicist, ask yourself what happens to an electron moving in a strong magnetic field if it is subjected to electrical pulsations at the particular frequency of the resulting orbital reaction and is to avoid collision with other electrons. There can be resonance leading to an escalating charge acceleration. Very high frequencies are needed in

that electron case owing to the strength of the controlling magnetic field required and the small mass of the electron. However, by theory, standard theory, you should then be able to show that the much greater ion mass, that of the hydronium ion or the hydroxyl ion present in aqueous solutions, and the much lower strength of the Earth's magnetic field, bring the resonance frequency into the 50 Hz - 60 Hz range. Might you then think that over exposure to the action of that overhead power line could, conceivably, set up unwanted activity or pressures across membranes in your body that might prove harmful?

You surely would, after reading about the medical evidence that proves the cancer risk is significantly higher for those who live quite close to such power lines.

However, this is a subject where physicists admit they are baffled, even though standard theory offers the answer, so it is no wonder physicists are even more baffled when it comes to finding a new way of generating the energy that flows through those power lines, the way forward depending upon theory that they have yet to embrace, *The Theory of Everything*.

Yes, one day they will solve the power line problem by transmitting high voltage power as d.c. current rather than a.c., but will they find the new energy resource, one that involves drawing power from the aether, before it is all too late?

For the record here I draw attention to my *ENERGY SCIENCE REPORT No. 10* entitled *CYCLOTRON RESONANCE IN HUMAN BODY CELLS* published in 1997 which is of record on my web site www.aspden.org.

Chapter 14

FORCE ACTION OF THE AETHER

It was in 1966 that I first published my theory concerning electrodynamic action. The historical development of electrical theory is almost entirely founded on empirical evidence, the facts of experiment, from which the laws of electromagnetism that we now rely upon emerged. I say 'almost' because there is one very important aspect that lacks empirical support and relies solely on assumption.

I refer to the interaction force set up between two isolated electric charges owing to their motion. Forces are measured only where the interaction involves a closed circuital current flow around a wire circuit or its equivalent, the electron currents within the body of a magnet that set up a magnetic field.

As a result we have an electrodynamic force law that tells us that two current elements, such as those due to two moving electrons, will interact electromagnetically by setting up forces on one another that act at right angles to charge motion. This means that, in the general case where the charges are not both moving along the same straight line, their interaction forces will not be in balance. So our laws of physics tell us that, collectively, those two electrons are being pushed by something or are themselves pushing something, as otherwise they would defy the law of action and reaction that we have accepted since the time of Isaac Newton.

Where is the experiment that measures the force interaction between two, and only two, moving electric charges? A little consideration shows that the law of electrodynamic action that we use in the teaching of physics requires that imbalance of force to set up a turning couple such as would cause that pair of charges to develop a

spin motion about their mutual centre of gravity. Energy would need to flow in or be shed to sustain the force action and, since physicists have rejected the notion of the aether, that poses a mystery needing a solution.

So how did the great minds of science get around this problem? Well, Ampere simply decided that action must equal reaction and devised a law that satisfied that assumption, a law we never use as it has no practical application. Lorentz, three-quarters of a century later, devised the law we do use, one which, for integration of action of current flow around a complete closed circuit, assures force balance. Yet it is a law that still leaves us with the problem when applied to the interaction of two electric charges in motion.

I became interested in this theme when I tried to link the gravitational interaction of two electrons with electrodynamics, the fundamental challenge that is the aim of a so-called *Unified Field Theory*. I was open minded compared with my fellow physicists, because I believe the aether has a real existence and has a part to play in this scenario. Furthermore, I was aware that there was a long-standing unsolved problem as to why what are called 'cold-cathode' electric discharges result in an inexplicable reaction force on the cathode of the discharge tube. That force is proportional to the square of current and that tells us that it is an electrodynamic force. The feature here that differs from conventional electric circuit theory is that the current circuit involves electron current flow in wires external to the discharge tube, but a discharge current in the tube carried by positive ions that are much heavier than electrons.

To me this meant that charge mass plays a part in the electrodynamic interaction, even where current flow was circuital, provided current in one part of that closed circuit involved electron flow with current in the other part involving heavy ion flow. So, by 1966 I had worked out the new theory involved, accepting that the aether might intrude by asserting a force accounting for the imbalance indicated by such experiments but not accepting that such two-charge electrodynamic interaction could develop a turning couple on the system.

The result was a new law of electrodynamics that came within the empirical ambit of possible laws suggested Sir Edmund Whittaker, a Fellow of Trinity College, Cambridge. See page 87 of the first volume, *The Classical Theories,* of his *History of the Theories of the Aether and Electricity*, 1951 edition. The point of relevance was that the formulation included three terms, two of which in combination represented the Lorentz force law that we use, but the other term of which posed the problem. This third term, for electron interaction attributable to flow around a closed circuit, integrates to zero. However, my theory introduced a mass ratio factor, ion mass/electron mass, into the third term for the cold-cathode discharge application, and this does not integrate to zero for closed circuital current flow. I had therefore a physical explanation for the anomalous forces observed, but equally I was looking at a situation that must involve energy inflow from the aether.

I well knew that action has to equal reaction but this is subject to the rider 'for a complete system', whereas if the aether is part of that system there can be action and reaction involving force as between aether and matter.

In 1966 my interest in this was not 'energy' in the context of tapping energy from the aether, but rather one of understanding the nature of the force of gravity. My new law of electrodynamics with that mass ratio as unity but without closed circuit flow of electrical charge had the necessary form, it being an inverse square of distance force law acting directly between the interacting elements.

That is why the law is presented in a book entitled: *The Theory of Gravitation*. Also I did manage in 1969 to get this new law published in *The Journal of the Franklin Institute*, **287**, 179-183 under the title: *The Law of Electrodynamics.*

It did not miss my notice when, in 1978, researchers involving high energy plasma discharges found:

> ".. experimental evidence for an anomalous electron-ion energy transfer in a relativistic-electron-beam-heated plasma that is 1000 times faster than can be predicted by classical processes."

The authors, J. D. Sethian, D. A. Hammer and C. B. Wharton, *Physical Review Letters*, **40**, 451 (1978), suggested at the end of their paper 'without particular justification' that the anomalous factor might be the hydrogen ion to electron mass ratio. I find it very curious that those intent on finding a way to generate energy from controlled nuclear fusion triggered by powerful electrical discharges miss seeing an alternative way forward when anomalous cathode reaction forces on this scale are encountered. Something had to account for what was observed. Yet it was left unexplained, even though I had already drawn attention to the subject in that paper published in USA some nine years earlier.

Just remember that action is equal to reaction and so if electrons pushing on a heavy ion can assert a force that is far greater than the reaction force on the electrons there has to be something else contributing to the action. In so doing it will deliver energy. That something can only be the aether and the way I had arrived at the correct law of electrodynamic interaction between moving electric charges had been based on the assumption, not that the action and reaction as between those charges had to balance, but that interaction between any pair of charges could not, of itself, set up a turning couple. For interaction between moving charges of different masses, the latter assumption led to a law of electrodynamics that explained the force anomaly observed but also implied energy exchange as between the aether and those charges.

So it was indeed gratifying when, in due course, I was contacted by a Canadian scientist Paulo Correa who, in his experiments involving electrical discharges in a rarified gas, had discovered an anomalous gain in energy. His apparatus was delivering more energy output than was supplied as input, as verified by using two separate batteries of storage cells, one which received its charge from the discharge tube as the other fed charge to the tube. What was particularly gratifying was that Paulo Correa had seen that what I had published concerning the law of electrodynamics in that 1969 paper could explain this seemingly incredible discovery.

The Correa inventions were the subject of three U.S. patents, Nos. 5,416,391 and 5,449,989 issued in 1995 and No. 5,502,354 issued in 1996 and my *Journal of the Franklin Institute* paper was duly referenced.

Paulo and Alexandra Correa are to be commended for their successful research efforts on a project which defies explanation in terms of standard electrodynamic theory. Unlike prior researchers who have encountered anomalous results in the plasma discharge field and reported their findings, albeit with an expression of surprise, the Correa's have gone further and drawn attention to the link with the alternative theory that must apply.

Seeing this as clear evidence that energy can be tapped from the aether, I was so impressed that I then, in that year 1996, wrote *ENERGY SCIENCE REPORT No. 8: THE CORREA INVENTION* and this, along with most of my other publications, is now of record on my web site www.aspden.org. Now, having regard to the overwhelming scientific attitude that is locked into the theme of thermonuclear fusion and its supposed relevance to the Sun's energy source, I feel I should say a little more about the aether in that context. I have tended to avoid speculation that does not lead to confirming evidence in the form of theoretical evaluation of physical constants as a check on the theory. However, given the incredible efforts of research effort aimed at detecting neutrino emission from the Sun, to confirm what scientists believe is its energy source, I must pose the suggestion that the aether has some interplay in absorbing solar radiation.

As I see the aether it does not comprise electric charge in electron form, but it does contain tau-particles, as gravitons, and muons. The electron in company with its antiparticle, the positron, can emerge from the aether by a process of creation which taps energy from the aether. Particle physicists refer to this as Q.E.D., quantum electrodynamics, but accept that electron-positron pair annihilation must follow unless there is an independent source of energy of the right amount. The photon energy quanta involved have the frequency

of the aether, namely the mass-energy of the electron or positron as divided by Planck's constant.

So when some of the energy of solar radiation is absorbed by matter here on body Earth it adopts a lower grade heat energy form but is eventually onwardly radiated into enveloping space in photon quanta that cannot of themselves induce the creation of electrons and positrons. Do keep in mind that analogy I presented in Chapter 8 concerning money transfer in the banking system. Energy as such may well be absorbed into the aether close to the radiating source but momentum imparted to the aether coupled with a frequency factor can convey a message that unlocks aether energy in the far distance.

Maybe momentum is the overriding factor once the frequency falls below a certain threshold and the regeneration process that then absorbs that momentum creates the particle form that is prevalent in the aether, namely that of virtual muons. This would mean that energy radiated into outer space finds itself intercepted and deployed in creating the very particles that, in turn, create the proton in company with the electron, thereby producing hydrogen.

In other words one could say that matter, the stars, our Earth and our very selves are mere catalysts by which energy shed by the aether is absorbed, given material form and then eventually dispersed by decay, only to materialize once again elsewhere in atomic form in a never ending cycle of evolution.

The challenge we face in accepting this scenario is that of finding a way in which to influence this aetherial process just a little so that, putting it rather bluntly, we intercept some of the energy and use it to advantage without waiting for it to materialize as atoms of high atomic mass that can be harnessed in a nuclear fission reactor or as atoms that form hydrocarbons and so petroleum or natural gas which we can then burn.

Plasma gas discharge technology may become the solution but there is the alternative prospect of so-called 'cold fusion' that warrants further mention, the subject of the next chapter.

Chapter 15

POWER FROM THE AETHER

There is now little time left in which we can be rescued from the impending energy crisis by the discovery of a new non-polluting source of energy. We look to our scientists and particularly those expert in physics to seek and find the answer. This is not a time for amusement and the shaking of one's head when confronted by the claims of the would-be pioneers who struggle to find what might prove to be the 'breakthrough'.

I can but point my finger at the aether as a source of energy, well knowing that this will evoke a smile from those who bow to the mathematical four-space doctrine of Albert Einstein and so cannot see the aether as something real.

But I can point my finger particularly at two properties of the aether which I see as emerging in experimental efforts by those few who risk ridicule for going in search of what is now called 'free energy'.

A good summary starting point for readers interested in such efforts is the 2001 book *The Search for Free Energy* by Keith Tutt (published by Simon & Schuster). It includes an introductory commentary by Sir Arthur C. Clarke, who is quoted on the back cover as saying:

> "I do not believe any unbiased reader will put down this book without feeling that something strange is happening at the fringes of physics; exactly the same thing happened just a century ago, when a new and totally unexpected source of energy was discovered."

Clarke referred here to Becquerel's 1896 fogged photographic plate discovery which heralded radioactivity and was destined to lead to nuclear power. However, the 'strange' activity in today's frame of

reference is far from being comparable with the situation a century ago. Today's scientists rely on their research projects being very heavily funded by the governments of the nations to which they belong and there is powerful resistance to the suggestion that there might be a new and alternative energy path to follow.

Just read what Keith Tutt has to say about the discovery by Stanley Pons and Martin Fleischmann concerning 'cold fusion' and the reaction of Eugene Mallove upon witnessing how M.I.T. scientists responded to protect their vested research interests. It is extremely sad that Mallove, such an enthusiastic pioneer interested in the 'free energy' theme, has been murdered since that book was written.

Read also what Keith Tutt has to say about U.S. government interests being asserted to revoke an already granted U.S. patent. The patent which concerned a new method of generating energy, seen as linked to cold fusion, had been granted because 'it met the criteria that it is new, useful and non-obvious, and was fully disclosed as to how it works'. Yet someone with influence had asserted it involved 'perpetual motion' and, that being heresy and by definition impossible, so the powers that be were quick to declare the patent (U.S. Patent No. 6,024,935) needed reevaluation and so grant should be withdrawn.

Imagine therefore the task of obtaining grant of a U.S. Patent that dares to claim a method of tapping energy from the aether, an aether outlawed by Albert Einstein and so deemed to be nonexistent.

Dare one then remind the scientific world that the President of the United States is composed of numerous perpetual motion machines, since each atom in his body has electrons in perpetual motion about their atomic nuclei? All I am saying is that it is the quantum underworld we call the aether that provides the energy needed to sustain that motion and so it is a viable technological objective to research and duly patent methods of borrowing energy from that omnipresent aether that we all inhabit.

Now what are those aether properties to which I point my finger? One is the property I see at work when a star is created and is caused to spin about its axis. Gravity pulls the hydrogen atoms into

contact. They ionize and the free protons sense gravity in stronger measure than do the electrons in relation to their electric charge and so what results within the body of the star is a radially directed electric field. It is that of a positive core charge enveloped in a concentric negative surface charge.

Although energy deployment within the aether governs the electrodynamic action between two moving electric charges it cannot develop a turning couple effective on those charges, whereas a radial electric field from a core system of charge can induce rotation. This causes electric displacement in the aether itself and this affects the underlying quantized motion (Heisenberg jitter) of the quons in the aether, which, to conserve synchronism with the motion of adjacent quons, must then rotate bodily as a group about the axis to which that electric field is radial. This imports energy from enveloping aether owing to the inter-quon phase lock, energy which cannot be returned if the electric field were to subside, unless, that is, the star is ruptured as in a supernova event.

However, the message is one which says: "Focus attention on technology which involves setting up an electric field inducing aether charge displacement radial from an axis appropriately orientated in space."

Then look at those diagrams and photographs pertaining to the free energy generators of the Methernitha community in Switzerland, the scientists of which are withholding the secret of their operation. Keith Tutt devotes the whole of his 30 page Chapter 5 to this one subject. One sees a Wimshurst-type machine for separating positive and negative electric charge and what can best be described as high voltage capacitors having Leyden jar configuration for storing that electric charge. A high voltage set up between concentric cylindrical electrodes is surely replicating the radial electric field conditions that exists within stars. No doubt this induces aether spin and so energy inflow. Somehow those Methernitha scientists have contrived to stimulate an oscillatory condition that imports energy at a steady rate, whereas in the case of a star the action is a one-off event. Maybe they have incorporated some feature in their apparatus which triggers its

operation and they do not understand precisely how it functions and so are being more secretive as a result.

Consider also what Keith Tutt tells us in his Chapter 4 under the title *The N-Machine - Michael Faraday's Mysterious Legacy*. Several researchers have claimed to have evidence of excess power generation when spinning metal rotors having a magnetic field directed along their spin axis. Some use rotating magnets and others use an iron rotor within a current-carrying concentric winding to produce the magnetic field. Here again, there is charge displacement radially with respect to axis of spin, but the mystery prevails in how to sustain the occasional anomalous 'over-unity' energy performance seen in such systems. Again, somehow one has to contend with the need for a feature that can trigger and then sustain onward pulsations so as to have a steady inflow of energy from the aether spin induced.

Even I, as already mentioned, in my own research pursuits involving the rapid rotation of magnets about their axis of magnetization, have found anomalous inertial effects that point to aether sharing the spin involved. The physical orientation of the spin axis is a factor affecting operation.

Our long term future energy salvation may well depend upon the serious undertaking of government sponsored research in this field, remembering also the efforts of Nikola Tesla, the subject of Keith Tutt's Chapter 2. Such research is far more important than embarking on projects based firmly on the false notion that our Sun is powered by nuclear fusion. It would be research founded on the correct notion as to how stars are created by the aether shedding energy both by matter creation and imparting spin motion.

However, in the shorter term, an interim, if not alternative, solution is in sight, this being the other property of the aether to which I point my finger, namely the vacuum energy fluctuations arising from the aether's virtual muon activity. Government sponsored research must be directed at understanding the aether and its activity in creating protons and deuterons and bringing about their fusion in shedding energy whilst forming particles of greater mass.

Let us seek to understand what underlies the messages we already have from the 'cold fusion' scenario. We then come back to the physics by which the proton is created from the merger of virtual muons.

I have already, in Chapter 13 of this work, explained that my interest in the cold fusion theme led me, in 1994, to publish my theory accounting for the relative abundance of the hydrogen isotope H_1 (proton) and the hydrogen isotope H_2 (deuteron). As there mentioned, it appeared in my *ENERGY SCIENCE REPORT No. 5* which was entitled *Power from Water: Cold Fusion.* In Appendix C of that publication I included the text of the paper I had read at a conference in Cambridge during 9-12 September 1993.

Now, I must not underestimate the importance of something that featured in that paper, and so I repeat it here. I had introduced the subject by referring to an item of mine published in the American Institute of Physics journal *Physics Today*, **37**, p. 15 (1984), long before the announcement of the Fleischmann-Pons cold fusion discovery.

There I drew attention to the *P* and *Q* scenario where a proton of energy *P* was attracted to an oppositely-charged partner of smaller energy *Q*. If each has a charge *e* bounded by a sphere of radius determined by the Thomson charge formula, the total energy of the *P* and *Q* charges in surface contact is:

$$P + Q - 3PQ/2(P+Q)$$

The term preceded by the minus sign is the binding energy involved and for this to be a maximum, *P* and *Q* must have a certain relationship. This is when $1 + Q/P$ is the square root of 3/2. The reader may then verify that with *P* as 1836 the value of *Q* is 413, the latter being the combined energy of two virtual muons, that is two mu-mesons, given that we are here using electron mass-energy units.

Accordingly, when I came to write about cold fusion involving union between pairs of protons owing to bombardment by virtual muons in the ongoing energy activity of the aether, I was able to report in the following words quoted from that Cambridge text:

"The algorithm which the reader may keep in mind in the analysis which follows is the curious mathematical fact that $4Q$, meaning four mu-meson pairs, if combined with the energy released by creating two *(P:Q)* systems from two bare P components will be exactly that needed to create a new proton or antiproton P.

To prove this write:

$$P = 4Q + 3PQ/(P + Q) - 2Q$$

and then rearrange this algebraically as:

$$P(P + Q) = 2Q(P + Q) + 3PQ$$

or: $\quad 3P^2 = 2P^2 + 4PQ + 2Q^2 = 2(P + Q)^2$

which is the above relationship between P and Q as calculated from minimization of energy potential.

It follows, therefore, that if a particle containing two P nucleons is bombarded by the mu-meson vacuum energy background there is a condition where 8 mu-mesons will create a third P. This is tantamount to a fusion process occurring at room temperature which adds a nucleon to a deuteron."

Note also that in that *Physics Today* account I drew attention to the fact that the energy represented by the *(P:Q)* combination is exactly half that of the heavy lepton, the tau-particle, so one might wonder if the creation of two *(P:Q)* systems can capture an electron or positron to create such a tau-particle or four such systems might become a tau lepton pair.

All this amounts to is the recognition that the aether is ever active in effort to create protons and in then encouraging them to combine with muons to develop other particle forms, subject to energy being conserved, but on a limited scale set by statistical factors.

Cold fusion is not forbidden and, in water, given the existence of ions in the form of protons and deuterons, with statistical factors influencing their abundance ratio, but subject to extraneous electrical

action, we may see a way in which to tap the aether's vast energy resource.

For example, suppose we put ordinary water in an electrolytic cell between a cathode and an anode, with the voltage difference being less than is needed to trigger electrolysis. There will be some ionic dissociation and so the positive ions will migrate towards the cathode. The cathode might then absorb a proton into its metal structure. Should there be an adjacent cell which shares the same electrode but has a second electrode at a lower voltage, maybe that proton will emerge to find itself part of a positive ion in that adjacent cell. So, assuming that deuterons are less inclined to penetrate through that cathode of the first cell, we will find the water in the adjacent cells changing in composition. One cell will decrease in its proton/deuteron abundance whilst the other cell increases in it proton/deuteron abundance. Then, given the presence of a suitable catalyst, there will be forces at work by which the aether seeks to recover the natural abundance condition, a process involving cold fusion.

Maybe this will import heat energy drawn from the muon activity of the aether, notwithstanding the fact that the process is at room temperature. It is only by experiment that such possibilities can be explored but we should not declare such speculation as impossible owing to having categorized nuclear fusion as confined to the realm of catastrophic explosions and very high temperature.

So when I read what Keith Tutt has to say in his book about the research of Stanley Pons and Martin Fleischmann using heavy water in their cells, about Dr. James A. Patterson's cell which operates on ordinary water, and then about Randell Mills and what is referred to as *Blacklight's Power Struggle*, I can but be hopeful that there are prospects for our energy future.

Prospects, however, which can only be realised once particle physicists who think they know all that one needs to know about nuclear power and seek only to create Big Bang sounds in their particle colliders, wake up to their ignorance. They do not understand quantum theory sufficiently to be able to derive from first principle

theory the value they measure as Planck's constant or its dimensionless formulation as the fine-structure constant. They do not know how to derive G, the constant of gravitation, in terms of the charge/mass ratio of the electron by pure theory. They do not know how Mother Nature creates the proton and determines the proton/electron mass ratio. Yet all these feature in *The Theory of Everything* presented in this brief account, an account which explains how stars are created and how our Sun is powered by an energy source other than nuclear fusion.

Certainly, as I further stress in the next chapter, there is no wisdom in giving more and more government funding to advance the research interests of nuclear physicists until those physicists study what is said in these pages and, if they can with any justification, have disproved this case for restoring belief in a real aether medium.

Chapter 16

POWER FROM WISDOM

The Theory of Everything will not of itself solve the energy problems that the future will bring. It needs wisdom and the exercise of common sense. Scientists and those in government who sponsor research by investing enormous sums of money to fund projects pertaining to space exploration, high energy particle colliders and fusion reactors aimed at replicating the Sun's heat source need to heed what *The Theory of Everything* is saying.

It says that to understand gravitation, how the stars were created and how the smallest particles of matter were created, as well as the power source that feeds the Sun, is just a matter of deciphering the coded messages that are already of record from past experiments.

In the immediate future the priority for investment of research funding should be directed specifically at finding the best way of harnessing alternative energy resources, guided by the one certain fact that emerges from *The Theory of Everything*, namely that that source is the omnipresent quantum underworld, the aether.

The 'aether' is a reality we cannot ignore. It is not, as a modern dictionary declares, merely 'a substance formerly believed to fill all space and to be responsible for transmitting electromagnetic waves'. It is, as an older dictionary, one I had in 1939 when at school, describes as the 'subtle elastic fluid permeating space and filling interstices between particles of air and other matter'. That fluid, in trying itself to expand owing to self-repulsive electrostatic force action, is what pushes those particles together and so accounts for the phenomenon of gravitation. But that fluid also sustains the quantum jitter motion of those particles and thereby is a source of

energy, one that powers our Sun, as was explained in Part I of this work.

The 'Golden Experiment' mentioned in that Part I was a landmark experiment along the pathway towards our understanding of the factors which govern the creation of our universe. Nobel Laureate Blackett expected the experiment to confirm the hypothesis that matter of higher than normal mass density, when rotating, produces a magnetic field as if it contains a higher than normal measure of electric charge dependent upon G, the constant of gravitation. When the experiment gave a null result, Blackett did not see what that meant, namely that the aether itself has a hand in this and the aether itself is not more concentrated within that block of gold that he used.

I really referred to that experiment to make the point that a 'null' finding in an experiment does not rule out the existence of a real aether, but can point to its very existence. The 'null' outcome of the famous Michelson-Morley experiment was deemed by physicists as disproving the existence of the aether. Yet it merely proved that a structured component of the aether is dragged along by the Earth's matter, but the aether, being a kind of electrical fluid crystal composition, has a way of avoiding imbalance and so a momentum problem. As to how it does this I can but speculate. The quons, in their quantum jitter motion, move at the speed c of light in circular orbits relative to the graviton-cum-continuum system. Their speed in the inertial frame is c/2 and so, upon crashing into quons at the forward boundary of an aether region in motion, they may well be freed from their cubic lattice formation and seek to relocate in that lattice by travelling at speed c/2 through the lattice to its rearward boundaries where lattice sites are freed by quon separation.

The proof that the aether exists lies in the success of our being able to derive the precise values of the main constants of physics by analysis of aether structure. However, physicists are ever sceptical, particularly if acceptance means having to alter course and admit that one's past efforts have been somewhat futile. Therefore, we will have

to await the dawn when further proof comes from generating our power needs by tapping energy from the aether itself.

I hope that what has already been recorded in this work will help those who take up the challenge to look for the best ways of tapping energy from the omnipresent aether. Hopefully those advising governments as to the funding of such projects will give this subject particular attention.

However, for the interest of the general reader, I wish now to devote the remainder of this chapter to a cynical insight into what I see as a dying struggle to preserve the notion that the Sun is powered by a nuclear furnace.

My source of reference is an up-to-date account written by Dave Wark of the Imperial College in London and the Rutherford Appleton Laboratory here in U.K. It appears in the June 2005 issue of *Physics World*, the monthly journal for members of the U.K. Institute of Physics.

It ends with the words:

"Neutrino mass is important in our understanding of the universe as a whole, and, furthermore neutrinos may have generated all the matter of which we are made. Not a bad pay-off for a tank of cleaning fluid and some wonky backgrounds in a proton-decay experiment."

This is the wisdom on which our future depends! Dave Wark sees neutrinos as holding the secret to nearly everything and yet I have not included the neutrino in my foregoing account of *The Theory of Everything*!

I claim that no one, not even Dave Wark, really knows what a neutrino is. It was invented as a book keeping exercise in keeping the balance of energy and momentum in certain particle reactions, especially those involving electrons, muons and taons, the key players in my aether theory. There were discrepancies and the accountants who had to ensure the accounts were in balance had not been told about the aether. So the books were 'cooked' as physicists invented a 'ghost' particle, the neutrino, to account for the loss of momentum and energy in certain particle transmutations. Indeed Dave Wark's

article is entitled: *Neutrinos: Ghosts of Matter*. That book keeping exercise did not recognize the existence of the aether and the possibility that it might have some interplay with matter, either in exerting or absorbing force or in supplying or absorbing energy.

Neutrinos seem not to have any mass and yet they are quanta of energy that supposedly travel through matter at the high speed of light with only the occasional encounter. If they exist as particles, they are elusive and hard to detect.

My belief is that when physicists talk about neutrinos they are really, but unwittingly, talking about the aether. So look at the first sentence of that statement quoted above and rephrase it by substituting a reference to aether to replace the neutrino. It then reads:

"The aether is important in our understanding of the universe as a whole, and, furthermore the aether may have generated all the matter of which we are made."

Yes, it is the aether that is the 'ghost' world, and, yes, it is possible for the aether to exert forces on matter and transfer energy to matter as well as absorbing energy shed by matter. Do you really think that the energy radiated by all the stars in the universe, energy radiated for countless billions of years, all goes nowhere as it journeys to outer space? Surely, it is absorbed by the aether and this energy input upsets the equilibrium of the aether and so the energy is duly shed by the creation of matter as protons, electrons and their anti-particles.

Now look at Dave Wark's second sentence in the final paragraph quoted above. What does he mean when he talks about 'a tank of cleaning fluid'?

Well, let us turn to the beginning of Dave Wark's article. He tells us the universe began with a Big Bang 13.7 billion years ago and expanded into the cosmos we see today. But there is a problem. 'The universe is dominated by matter and contains very little antimatter. The laws of physics do allow energy to be converted into matter, but require that almost equal quantities of antimatter are produced in the process'. He then states that 'it is now becoming clear that the answer

to this puzzle could come from a very unexpected quarter; the behaviour of neutrinos'.

Apparently in the 1930s researchers noted that energy seemed to disappear when one atomic nucleus decayed into another nucleus plus an electron. So 'Wolfgang Pauli hit upon a "desperate remedy" to explain the situation' - he invented the neutrino!

A few paragraphs later Wark tells us that:

"For decades astronomers had thought that the most likely power source for the Sun and other stars was thermonuclear fusion, but no direct proof was available."

"In the 1960s, while other particle physicists were investigating all the newly discovered particles, Ray Davis at the Brookhaven National Laboratory in the US was pursuing the idea of using neutrinos as a probe. In the basic fusion reactions in the Sun, four protons are converted into a helium-4 nucleus, emitting two positrons and two electron neutrinos in the process. These neutrinos have a wide range of energies and vast numbers of them escape from the Sun without interacting with anything, hurtling towards the Earth at close to the speed of light."

So, here was a 'desperate remedy' giving stimulus to an 'idea', the idea of Ray Davis being to 'assemble a large mass of some target atom that will very occasionally undergo a nuclear reaction triggered by a solar neutrino'. The target was an isotope of chlorine 'which Davis managed to obtain at an acceptable cost in the form of 600,000 litres of cleaning fluid'.

Then comes the statement:

"The first results of this audacious experiment were announced in 1968, and surprised almost everyone. Davis' team only detected about 30% of the neutrinos predicted by the best solar models available, namely those developed by Bahcall and colleagues."

This did not deter these experts who really knew that the Sun had to be a nuclear fusion reactor operating at temperature of 100 million or so degrees. Indeed, we are then told that some twenty years later another experiment, the Kamiokande experiment in Japan, confirmed Davis' results. This led to the award of the 2002 Nobel Prize in Physics, shared between Davis and Masatoshi Koshiba of the University of Tokyo. This latter experiment involved several thousand tons of pure water in a deep tank underground, but the measured flux of neutrinos was still much lower than expected and so ideas were needed as to how to account for the discrepancy.

Given then the assumption that neither the solar model nor the experiments were at fault, there just had to be some more 'cooking of the books' to ease the worry and have a satisfying answer. The solution proposed was, quoting again from Dave Wark's article:

> "that neutrinos may change from one flavour to another on their journey from the Sun to the Earth. Since the existing experiments were predominantly sensitive to electron neutrinos, rather than muon or tau neutrinos, this could explain why we only detect about a third of the solar neutrinos."

Then one reads:

> "But there was one big problem with this neutrino-oscillation idea: it requires that neutrinos have mass, which they do not in the Standard Model."

Keep in mind that this all depends anyway upon the basic assumption that the Sun is powered by thermonuclear reactions at the very centre of its core, a mere unwarranted assumption, one that (as I say again) can be easily contradicted by the fact that close to the Sun's surface gravity squeezes hydrogen atoms so close together that some electrons and protons are freed owing to ionization. The mutual gravitational attraction of free protons ensures that within the Sun there is enough positive charge to balance, by its mutual electrostatic repulsion, any further compaction owing to the force of gravity. The Sun just cannot be much different in its central core, either in

temperature or mass density, than it is near its surface, as was discussed in Part I of this work.

However much neutrinos in transit through space might change in flavour, whatever that means, that has no bearing whatsoever on the Sun's energy source. But, in spite of the problem of neutrino mass and conflict with the Standard Model of particle physics, we are told by Dave Wark that physicists of the Sudbury Neutrino Observatory (SNO) in Canada have demonstrated that neutrinos can change flavour. Instead of using pure water in their experiment they used 1000 tonnes of heavy water which, as Wark puts it, 'is not generally found at your local hardware store'.

When I read what followed I was reminded of the prologue I had written for this work, concerning the task of borrowing a large and valuable chunk of gold for use in an experiment. Wark states:

"Luckily, Ontario Hydro uses large quantities of heavy water in its nuclear reactors and was willing to lend us one reactor's worth on the condition that we give it back (it is worth hundreds of millions of dollars)."

That was in 1999, after the detector housing this huge amount of very valuable water was built underground, thanks to 'INCO nickel-mining company being supernaturally tolerant of a bunch of physicists doing rather odd things in its extremely profitable mine'. Then in 2001 and 2002 happiness followed, according to Wark, as the experiment 'confirmed beautifully the neutrino-oscillation hypothesis'.

Such, it seems, is today's world of the particle physicist, who now looks into the future, a future that will bring us 'the neutrino factory'. I am not sure what this means, but Dave Wark is confident when he writes:

"Technological developments should make it possible to build a neutrino factory some time soon, hopefully before I retire in about 20 years time. In today's hyper-competitive funding system, it is very doubtful if Davis could have secured the resources to build the (heavy water) experiment at all. We must therefore be careful

that we do not squeeze out the sense of adventure and curiosity that leads to the entirely new."

However, while this quest to get government funding to enjoy a 'sense of adventure' in proving ideas that allow one to give a further lease of life for unproven and unsupportable false notions goes on, there are those of us who would rather see such funding going into laboratory research aimed at tapping energy from the aether.

A preliminary in this quest is the need to understand the fabric and inner workings of the aether as evidenced by its role in determining the values of the fundamental physical constants. We measure these constants to a very high degree of precision, essentially to satisfy that spirit of adventure which is driven by curiosity as to whether those constants change with the passage of time. They seem not to and so the engine room of space, the aether, is running well and steady and it warrants a visit to see if we can harness it as a power source that feeds our energy needs.

If the aether is merely seen as a 'neutrino factory', however, all that will emerge, if we are lucky, is some sporadic, possibly explosive, outbursts of radiation that have no practical use whatsoever. But, as I noted in Chapter 1, if we are unlucky then, as Lord Rees puts it in choosing his book title *Our Final Century*, what we face is a doomsday syndrome.

On the other hand, if the aether is seen for what it is and we correct the errors in our basic knowledge of physics, particularly the error of accepting the nineteenth century findings of the Reverend Samuel Earnshaw, then there is hope for our future.

Let us hope that the quest to find a new energy source, one which captures energy from the aether will not initiate a runaway and uncontrollable chain reaction such as might occur in the oceans of the world if ordinary water were to begin to transform into heavy water. The deuteron is the heavier stable isotope of hydrogen. Atomic scientists are well satisfied that they understand the spectrum of atoms and their different isotopes but they ever hope to harness atomic transmutation as a new source of energy.

Yet when I began writing this book I thought I understood why atoms having a nuclear charge of Z units could not have a nuclear mass of N units much in excess of 2.5 times Z. Yet, as I mentioned in Chapter 4 we are now informed that atomic physicists have found a way of creating silicon atoms which contain 42 nucleons, some three times the Z value of 14. The creation of such freak atomic forms does seem a very risky pursuit since instability can lead to nuclear transmutations.

So long as research is guided by being based on sound theoretical foundation there is hope that catastrophe can be avoided, but if we seek knowledge from high energy experiments that gamble on discovering what that foundation might be then we may as well read what Lord Rees says in his book *Our Final Century* and then await the inevitable.

May I then say as a final comment: "By definition and by simple English, there is nothing in empty space, so if one seeks to probe the nature of space then one must accept that there is a real aether medium, otherwise there is nothing to probe. Something must exist in space devoid of matter and the challenge is to understand what it is. The *Theory of Everything* that we have been discussing provides that understanding."

An Epilogue

In writing this book I have tried to be brief in outlining how I decoded the key messages that Nature provides as clues concerning the physics which governs the operation of our universe. However, how I advanced step by step in building an overall picture of the aether, that fills all space and accounts for the creation of particles which dance to the tune of quantum theory, is surely not how Mother Nature herself gave birth to her creation.

So, with the benefit of hindsight, I will here offer a little speculation as to what may have happened in the early stages of creation, as a possible guide that might be of help to scientists who research this aether theme in the future.

I see the beginning as a vast expanse of space containing energy seated in electric charge. The energy would have a uniform density and the charges would have unitary form of unit magnitude e, destined later to become the charge assumed by the proton, when the latter emerged at a later stage in the creation process. However, as to the primordial aether, I imagine groups of four such charges defining each unit volume (cell) of space, this group of four comprising a pair of virtual muons, one of positive charge and one of negative charge, these accounting for almost all of the energy in that cell, and there being within that cell a quon charge immersed in a uniform continuum of unit charge of opposite polarity.

Now, although the wisdom of J. J. Thomson and other scientists of a century past had realised that a charge e confined within a sphere of radius a would have an energy $2e^2/3a$, Mother Nature would have been well aware of this when creating the aether and so she would assign this amount of energy to the quon. However, this would mean that the quon would tend to expand unless restrained in some way, as by pressure, and so, avoiding too much speculation, there would need to be the presence of something accounting for a

uniform energy density in that space cell, something having an energy density equal to the energy of the quon as divided by its volume. This is the role assigned to the virtual muon pair, they being subject to sporadic, but later regular periodic, mutual annihilation followed by recreation in a kind of statistical spread of positions within the cell. Whether the quon and continuum charge forms are involved in this transformation of muon states is an open issue, but it seems highly probable in view of the unitary charge factor.

Accordingly, the virtual muons along with the quons and that balancing continuum charge, the latter having energy that is negligible in relative terms, are seen as constituting the aether from which our quantum underworld first evolved.

The key point so far is that the quon is exceptional from the viewpoint of its charge being contained within a definite amount of space owing to the pressure action of those virtual muons. Should other charged particles be created, with the charge e confined within a smaller volume, then their stability would need to be attributable to some other factor. The quon is, therefore, the charge form having the least energy and so the least mass of all possible particle forms.

Of relevance then is the proposition that, in order for a sphere containing charge e to expand, the energy has to go somewhere. Owing to inherent symmetry the charge centre will not move as a result of that expansion and so potential energy released by self-expansion of charge cannot go into kinetic energy. This implies stability subject to other disturbing factors.

Then there is the consideration that if there are two or more charges of identical size in reasonably close proximity, they could exchange energy by one expanding as others contract a little. What this means is that Nature encourages survival by charges that belong to the same family and preferably, for long survival, a primary and dominant family. So the evolution of the aether would surely involve the creation of a dominant charged particle form.

This then suggests that the ongoing creation and decay of the virtual muons could account for the creation of such a particle form, where the quon is the target for attack, leading to conversion to higher

mass form. Now, we have seen in the main text of this work how the merger of virtual muons and onward muon combination creates a unique particle form, the proton, and so I suggest that even in the aether in its very early stage of evolution the proton was being created, but not initially as matter that would survive.

The reason I say this is the consideration that no order had yet come about. The primordial aether was just a system of energy and electric charge with sporadic action, mutual charge pair annihilation and recreation. Those protons themselves would surely sit in a medium so active with failed attempts to create more protons in close proximity that energy quanta of near to proton size would easily upset the stability of existing protons and then use them as a nucleus to fabricate particle forms of even higher mass.

This introduces the process described earlier in Chapter 11, where I explained how a particle having a mass nearly 5063 times that of the electron would be created, this being the *g*-particle. It is a significant component of the early aether and, though later serving in a role linked to gravitation, its initial creation and existence had nothing whatsoever to do with the phenomenon of gravitation.

In spite of this I cannot resist reminding readers that the formulation of *G*, the constant of gravitation, in my *Theory of Everything* has the form:

$$\sqrt{G} = (4\pi)(e/m_e)/(108\pi)^3(g)^4$$

where *g* is 5063 and e/m_e is the electron's charge/mass ratio.

I now must admit that I am still quite perplexed as to the actual nature of what I have described as the 'charge continuum'. It provides an electrically compensating background as if its charge density is uniform. Yet the charge density within a sphere enclosing a charge *e* is not uniformly distributed but is distributed within that spherical form in such a way that the electrical energy density is uniform. Also there is another perplexing problem because the evidence I have derived from reactions involving creation of different particle forms indicates that the volume of space collectively occupied by charge in particle form is conserved in the reactions by which they

are created. Does this mean that the continuum medium, whatever it is, has a volume that resists change?

So here is the weakness in my *Theory of Everything* but the fact remains that I do have a theory that explains what the scientific community regards as amounting to everything, namely a theory linking gravitation with electrical phenomena and the field of quantum electrodynamics.

That said let us come back to thinking about Mother Nature as she nurtures her creation, the aether, into the form we owe our existence to today. Those *g*-particles have appeared in an energy inferno comprising virtual muons and quons and so, at least for a while, chaos must prevail. Gradually, however, what emerges is a state of equilibrium, an orderly condition in which the *g*-particles engage in a partnership with the quons, as if performing a waltz in a dance hall. The *g*-particles take up position in the charge continuum and cause it to move in a cyclic motion in counterbalance with the quons, thereby giving the aether, our quantum underworld, a sense of rhythm, a frequency, meaning the emergence of what we call 'time'. In so doing the quons, which repel one another electrically, form into an orderly structure which is bodily displaced relative to the charge continuum and so those *g*-particles which move in counterbalance. That structure is the array pattern of simple cubic form as found in some atomic crystalline structures of matter.

Accordingly, we then have the birth of our quantum underworld, which operates by optimizing its energy deployment but is tolerant of minor energy fluctuations that are an inevitable feature in the vast expanse of space.

Such energy fluctuations will, of course, involve proton creation as matter and related *g*-particle creation but the dynamic balance already prevailing must be preserved. So, how might that occur?

Note that the primary need for dynamic balance is not that of the virtual muon system, but simply that of the quon lattice structure that adopts that cubic configuration and develops what we have termed the 'Heisenberg jitter motion', a harmonious circular orbital

motion at the aether rhythm frequency that we refer to as the 'Compton electron frequency'. Those g-particles take up positions and move in those orbits in juxtaposition with the quons, thereby ensuring dynamic balance.

Now, as to energy fluctuations and with gravitation in mind, there is that need for the existence of a second particle form sharing the motion of the g-particles. This serves as a partner in providing the dynamic balance for the quons and facilitates energy fluctuations involving charge pair creation and annihilation. In other words our aether needs the presence of another particle form, besides the muon, of the kind physicists refer to as being a 'lepton'. I am not here thinking of the electron, but rather what proved to be the taon, the tau-particle, which causes one to believe that the g-particle must also be a lepton.

The governing criterion is that the relative abundance of tau-particles and g-particles must be such that the ratio of energy to charge volume is equal to the ratio of small changes of energy to small changes of volume for the g-particle alone.

Suppose that there are $2N$ g-particles for every $2n$ tau-particles, and keep in mind something one learns from the study of hydrodynamics, namely that when a spherical body is moving through a medium having the same mass density it exhibits only half its normal mass in its dynamic behaviour. Thus for every unit of energy accounting for graviton mass there will be two units of energy attributable to the system of quons in dynamic balance. So the energy source creating a $(2Ng + 2n\tau)$ combination must be:

$$6Ng + 6n\tau$$

Since the energy source is pairs of leptons, muons and g-particles, this quantity must be very nearly equal to:

$$2S\mu + 2Kg$$

Note that g/τ is determined by the ratio N/n, as was explained in Chapter 5. S and K are integers.

It is then an interesting exercise to verify that the optimum combination of values of g/τ, N, n, S and K for minimal lepton involvement and minimal energy fluctuations is $N = 1$, $n = 2$, the latter

giving $g/\tau = 1.452627$, $S = 3$ and $K = 7$. With g as 5063 the tau-particle mass-energy is 3485 times that of the electron and, since μ is approximately 207:

$$2S\mu + 2Kg = 6(207) + 14(5063) = 72124$$

which only differs by 0.1% from:

$$6Ng + 6n\tau = 6(5063) + 12(3485) = 72198$$

The aether in its early state therefore comprises virtual muons, tau-particles, g-particles and quons set in a charge continuum and having the quantum jitter motion which underpins quantum theory. It will have vast regions in which that charge continuum has one polarity and other regions in which the continuum has the opposite charge polarity and gradually these regions will emerge as large space domains separated by planar boundaries.

However, at some stage the ongoing energy fluctuations will result in the creation of matter, protons and electrons, which by dynamic interaction with the g-particles and tau-particles will become subject to gravity. Our universe will then be born. Should you wonder how electrons appear in this grand conception of our universe, I attribute this to the onset of order as the quons, owing to their mutual repulsion, took up their positions in a simple cubic array. Given their coordinated quantized motion in dynamic balance with the g-particles and tau-particles, they were conducive to an action which involved their spin as a 3x3x3 cubic array. Such spin, when in resonance with that of the quantum underworld, the cyclical motion of the whole system of quons, creates the photon energy quantum hv = m_ec^2 and results in the creation of electrons. The 1843 factor that emerged in deriving the theoretical value of the fine-structure constant, being the charge volume ratio of the quon to that of the electron, suggests that, given a background of such photon activity, a quon might transform into an electron plus 921 electron-positron pairs.

So when protons and antiprotons were created within the orderly state of the aether which had then become our quantum underworld, so electrons were also created as their partners and

atomic matter came into being. Then the stars including our Sun were born.

Such, therefore, is my picture of creation, but before I conclude this message as to the role of the aether in the evolution of the universe I need to say something about so-called neutron stars. Such stars belong to a realm of orthodox physics that has lost sight of reality by introducing notions that are manifestly absurd. Any clear-headed reader will surely see that the following statement quoted from the July 2003 issue of *Physics World*, the monthly journal issued to members of the U.K. Institute of Physics, contains a message that cannot possibly be valid:

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

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

Another quotation, one from page 598 of the book by Carroll and Ostlie entitled *An Introduction to Modern Astrophysics,* published in 1996 (Addison-Wesley) is:

> "At the density of a neutron star, all of Earth's 5.5 billion inhabitants could be crowded into a cube 1 cm on each side."

One surely must wonder how astrophysicists, in their efforts to decipher the information which their telescopes and ancillary

equipment feed to them via electrical means, can reach such conclusions, lacking as they do that answer as to what it is that determines G, the constant of gravitation.

Based on what has been disclosed in the preceding chapters of this work, I suggest that, if we are to assume that a normal star composed of hydrogen can encounter a situation in which it is destroyed, as by an abnormal encounter with a space domain boundary, possibly many of its protons will, in effect, be seen as antiprotons upon entry into an adjacent space domain. It may be that the violence of such an event can cause them to displace the quons in a confined region of space and so adopt the same structured configuration. The mass density of such a body would, however, still be no greater than the mass density of an atomic nucleus.

Under these abnormal conditions the tau-graviton and g-graviton forms cannot be expected to meet the dynamic balance requirements imposed by this concentration of matter and so it seems possible that the virtual muon form will assume the associated graviton role, in which case the effective value of $\sqrt{G}$ will be increased by a factor of the order of 100,000. Possibly the overall size of the stellar object so formed will have the same total gravitational energy as the hydrogen star from which it is formed, in which case its radius will be reduced by a factor also of the order of 100,000. Its mass, however, would be reduced by an enormous factor of the order of 100,000,000. So this relic of the original hydrogen star would have shed many, many protons whilst somehow retaining the gravitational energy.

However, though there is scope for such speculation in trying to interpret such evidence as might infer the existence of so-called neutron stars, it does seem to be a futile exercise, given the kind of data on which it is based.

Clearly, therefore, astrophysicists interested in fathoming the mysteries of neutron stars must first come to terms with the need for an aether that can account for gravitation as we experience it here on body Earth. There is so much in physics that depends upon the aether for its explanation and so I can but urge those who teach physics to

enlighten future students by restoring the aether to its proper role in the teaching curriculum.

Rather than confusing the student by speculation as to stellar phenomena seated far away in remote galaxies, there needs to be more concern for phenomena local to the solar system and the Earth especially. The periodic reversal of the Earth's magnetism is one such phenomenon, which, as has been explained, signifies motion through a structured aether medium.

Also a teaching community should be ever alert to scientific advances that are topical, one such item, as I write these concluding words, has just appeared in the August 26, 2005 issue of the English newspaper *THE TIMES*.

It is a major news item occupying a half page which begins with the words:

"The Earth's inner core is rotating faster than the rest of the planet, scientists have found."

This has been established by a team led by Professor Paul Richards, of Columbia University in New York, and Professor Xiaodong Song, of the University of Illinois at Urbana-Champaign. The Earth's 'iron and nickel core' is turning through one revolution per 900 years faster than its upper layers.

How can such a phenomenon occur? Are we to assume that the Earth's crust is subject to a retardation in its rotation? If so then why, after a period of 4 billion years since its creation, is it still rotating?

Given the fact that a 900 year period is also the rate at which the Earth's magnetic poles migrate around the geographic poles, the latter is surely an aether phenomenon involving precession owing to magnetic interaction of two rotating aether systems, as suggested at the end of Chapter 4.

The recent observations were connected with disturbances caused by earthquake activity and so one must wonder how the Earth's aether is affected by sudden large scale repositioning of matter in body Earth, besides wondering if there can be progressive slippage as between the Earth's substance and coextensive aether.

I will not dwell on this problem but will quote a few words from something I was invited to write as an addendum to *'The Radioquake Mystery'* by Richard E. Hill, which appeared in the No. 12 issue of *The Journal of the Home Office Directorate of Telecommunications* in U.K. in December 1978. My contribution was entitled *A Perspective on a New Enigma* and referred to the discovery by Mischa Markert in Switzerland that earthquake disturbances, unlike lightning, affected FM (frequency modulated) signal transmission but not AM (amplitude modulated) transmission.

> "If the FM signal is affected and not the AM signal this may mean that the interference modified the frequency slightly. For the frequency of a signal propagating from A to B, two fixed points on the Earth's surface, to be affected, leads one to suspect that the path traversed is not direct and that there is reflection at a moving boundary (the ionosphere) and/or that there is a region of varying length in the path of transmission within which the speed of propagation is different from its normal value. In other words one could suspect a kind of shock wave in the aether which affects the transmission transiently during earthquake conditions."

I do believe that research with the aether in mind could well be more enlightening as well as being much cheaper than crashing particles into one another with enormous input of energy.

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