

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 $\epsilon - 1$ 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 $\epsilon - 1$. 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 story 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.cm²/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 Blakett'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 σV in the above equation needs to become $3\sigma V$ 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^0 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/c².

The half width of this resonance at half maximum was 9 MeV/c². 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 $2583 \pm 26 \text{ MeV}/c^2$.’..”

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 $6.67 \cdot 10^{-8}$ in c.g.s units this gives a value of ω of $7.6 \cdot 10^{-5}$ 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 $6.97 \cdot 10^{10}$ cm, and a mass M of $1.989 \cdot 10^{33}$ 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 $3 \cdot 10^{50}$ gm.cm²/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.cm²/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.cm²/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.cm²/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 must 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 tauon 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_0 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_0 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.cm²/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_0 , 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 $144 \times 6.371 \times 10^{-11}$ 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_0 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.