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

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

The Schuster-Wilson Hypothesis

That comment above that the sun should exhibit an electric charge density in its core equal to the square root of G times the sun's mean mass density should remind any well-read cosmologist of what came to be known as 'the Schuster-Wilson hypothesis'. A. Schuster [Proc. Roy. Soc., **24**, 121-137 (1912)] and H. A. Wilson have shown that the magnetic moments and angular momenta of the sun and Earth are approximately related in a common ratio. This led to the hypothesis, the speculation that a moving element of mass as measured in gravitational units might have the same magnetic effect as an electric charge measured in electrostatic units.

It seems not to have occurred to those interested in this hypothesis that rotation of an astronomical body might entrain

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

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

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

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

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

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

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

So here was an astronomical observation of major importance but, owing to it not complying with one's hopes on the laboratory front and in spite of the related efforts of many authors, it was merely a hypothesis that had somehow to be

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buried and forgotten. The aether had not been seen as a factor involved owing to it also having been buried and forgotten for not itself complying with an assumed property that it did not possess and yet the basis of the Schuster-Wilson hypothesis was a pointer to the existence of the aether. Such is the arena of scientific endeavour, at least where cosmology is concerned.

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

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

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

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

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

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explain gravity and derive the value of G as an aether property without associating gravitation with an electrodynamic action.

Enough has now been said to show that the aether figures prominently in the process of star creation. In contrast with my earlier accounts of the theory involved, where I discussed first how the setting up of an electric charge density in a body of astronomical proportions accounted for the creation of our sun and the planets, I will, before delving into the mathematics of space domains, start here by introducing space domain theory.

Space Domains

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

The latter can be verified in the following way. Consider a region of aether in the near vicinity of Earth and the effect of the gravitational potential of Earth and sun on quons located in that region. Those quons, which define the E frame of the aether, move in circular orbits in which they are dynamically balanced by the gravitons in the G frame. Each has a mass m_0 which, subject to gravitational potential Φ, imports an amount of energy Φm_0 which is held at the seat of that quon as the thermal vibration energy of that quon. This is an energy quantum kT, owing to the quon having only two degrees of freedom, imposed by the constraint of keeping in synchronism with the orbital motion of other quons, this constraint precluding the third degree of freedom. T is the temperature in Kelvin and k is Boltzmann's constant, 1.38×10^{-16} ergs/K. This gives us the equation:

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$$\Phi m_o = kT \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8.3)$$

Now, in chapter 7, we were able to show that the mass of the quon was 0.0408 times the mass of the electron, as one can see from equation (7.25) by substituting the value we derived for r/d. It follows from this, that since we know that the electron has a mass of 9.109×10^{-28} gm, the temperature of the quon system, which we can refer to as the 'aether temperature' or 'cosmic background temperature', if it can be measured, will give us the value of Φ, the gravitational potential in the near vicinity of Earth.

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

With T as 2.7 K, equation (8.3) tells us that Φ is 1.002×10^{13} erg/gm-cm. So here we have an approximate measure of the local gravitational effect of all the matter in the universe that lies within the range of gravitational action. I say 'approximate' because one cannot rule out a small contribution to temperature from another source and because the assumption concerning the two degrees of freedom may be too rigid an assertion. However, since G is 6.67×10^{-8} cgs units, body Earth of mass 5.977×10^{27} gm and radius 6.378×10^{8} cm contributes about 6.2% of this value of Φ. Also, the sun of mass 1.989×10^{33} gm at a distance of 1.496×10^{13} cm contributes 88% of this value of Φ and so, even if the other planets plus the rest of the universe

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within gravitational range contribute nothing to this potential, we can account for 2.6 K of that temperature. This is close enough to justify my assertion that gravitation has a limited range.

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

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

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

Then on p. 170 of that book one reads:

> "In the early 1950s the Cambridge physicist Dennis Sciama suggested an interesting interpretation of Mach's principle. He argued that, when a non-inertial coordinate frame is used, the inertial forces arose because of gravitational forces exerted by distant matter. Imagine a body like the Earth which is being attracted by the Sun's gravitational field. In the frame of reference in which the Earth is at rest,

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we can argue that it is acted on by two equal and opposite forces: (1) the Sun's gravitational force of attraction and (2) the force exerted by the rest of the Universe. The latter is expected to depend on the density of distant matter and its distance from the Earth. Starting with this idea Sciama deduced from general arguments the relation:

$$\rho G T^2 = 1$$

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

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

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

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

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

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

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

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

$$\Phi m_0 = \Omega H \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8.4)$$

where H is here the angular momentum released by each unit cell of the aether. We have seen that the mass of the quon is 0.0408 times that of the electron and we know r/d is 0.3029, where r is the Compton electron wavelength 2.426×10^{-10} cm divided by 4π, and so can determine d. From this, given that each cubic cell of the aether has a volume d^3 and that electron mass is 9.109×10^{-28} gm, the mass density of the quon lattice is approximately 144 gm/cc.

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

Meanwhile we denote this 288 gm/cc mass density as ρ_0 and formulate an equation for the total angular momentum (AM) shed by a domain to form a star. Although space domains must have planar boundaries as with magnetic domains and so are likely to be cubic in form, it eases calculation to assume a

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spherical form of radius D, merely to ease calculation in estimating the scale involved.

From (8.4), bearing in mind that only half of ρ_0 is effective in interacting with the gravitational potential Ω, the total angular moment shed in forming the star is:

$$(AM) = \int_0^D (GM/R)(\rho_0/2)(4\pi R^2)(1/\Omega)dR \quad \ldots\ldots (8.5)$$

The result is:

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

and so D is given by:

$$D^2 = S\Omega/\pi G\rho_0 \quad \ldots\ldots (8.7)$$

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

We can now calculate D as it applies to the creation of the sun. At creation, prior to the sun shedding its planets, its angular momentum, as evaluated in Appendix V, was some 3.2×10^{50} cgs units and its mass 2×10^{33} gm. With ρ_0 as 288, G as 6.67×10^{-8} and Ω as 7.8×10^{-20} also in cgs units, we then find that D is 4.6×10^{20} cm or 480 light years.

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

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acute angle would prolong the lapse of gravity and involve enormous upheaval and earthquake activity.

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

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

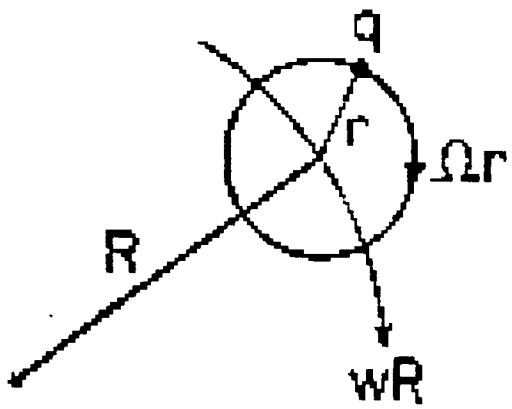


Fig. 8.1

Aether Spin

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

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Now we shall look at this picture to see what happens on an astronomical scale.

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

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

$$\pi(\sigma_s)R^2 = \pi\sigma[(1 - \omega R/\Omega r)^2 - R^2] \quad \ldots\ldots\ldots\ldots \quad (8.8)$$

Which gives:

$$\sigma_s = 2\sigma\omega/\Omega \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (8.9)$$

This is a formula for aether spin by which a charge density of σ_s is induced in the aether when it spins bodily at the angular frequency ω and, conversely, a formula giving the rate of spin produced by the presence of a charge of density σ_s. Here we have something that has eluded the efforts of generations of

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physicists who seek to understand the mechanics of the universe, whether as believers in the existence of an aether or not.

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

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

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

which, by writing ρ_0 as $2m_0(\sigma/q)$, tells us that:

$$\rho_0 = 16\pi(\sigma/\Omega)^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (8.11)$$

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

$$\sigma_s = \rho_m (G)^{1/2} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (8.12)$$

which, from (8.9) and (8.11), gives the following relationship between the angular velocity of the aether spin and the mass density of the star:

$$\omega = \rho_m (4\pi G/\rho_s)^{1/2} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (8.13)$$

Since we have, by theoretical analysis of the aether derived the numerical values of G and the mass density ρ_s of the quon-graviton system, the term in brackets is known to be 5.39×10^{-5} rad/sec per gm/cc.

The equation (8.13) is important because it tells us how fast the aether of a star spins owing to its positively charged electrical core, assuming our theory is correct. This spin is sustained by the presence of that distributed charge set up by

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gravitational forces being balanced by proton charge repulsion to cause the core mass density to be uniform at the value 1.4 gm/cc set by the K-shell electron collisions in the close contact between the star's hydrogen atoms.

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

The Creation of the Sun

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

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

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because by then the aether coextensive with the body of the sun was spinning at the speed determined by equation (8.13) above.

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

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

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

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

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

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

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

$$kQ^2/R^2 = X^2/mR^3 \quad \ldots\ldots\ldots\ldots\ldots (8.14)$$

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

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The Creation of the Planets

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

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

$$m/M = 3\omega^2/25\pi\rho_m Gk \quad \ldots\ldots\ldots\ldots\ldots\ldots (8.15)$$

This equation is derived from (8.14) given that Q is $G^{1/2}M$ and that M is $4\pi\rho_m R^3/3$, with X as $2MR^2\omega/5$.

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

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

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

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

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

The Creation of the Earth

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

In this case we find that for k =1 the Moon/Earth mass ratio given by equation (8.15) is 1.83. Here we can shout: 'Eureka' because the mass is known from astronomical measurement data to be 1/81 and that surely is close enough for us to see merit in our theory. We do seem to have a viable theory of Creation as applicable to planetary formation, but must somehow explain how k as pertaining to the sun can have the value 2.

What is the difference between the Earth in its state of crossing a space domain boundary and the sun in crossing such a boundary? In this primeval state the Earth can hardly have consolidated as a solid body. It must have condensed from an

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ionized gas and the core charge induction of $G^{1/2}$ times that mass would hold for atoms that have shed an electron as it is not restricted to protons. The problem, however, is why our Earth formed from a spread of atoms of many forms given its source in the hydrogen atmosphere of the Sun. If there were such heavy atoms in the sun, how is they were the one's expelled to form Earth along with its partner of similar form Venus? Maybe Jupiter and Saturn were created in the first domain boundary crossing by the Sun, and Uranus and Neptune in the next boundary crossing, then Earth and Venus, followed by Pluto and Mars, with Mercury and a body that broke up to form the asteroids as the final traversal that created any satellites. Maybe atomic transmutations to form heavy atoms can occur in profusion at times of traversal of space domain boundaries, particularly in smaller bodies. Whatever the answers are, one at least can see a reason for physics to operate in an unusual way during the transitions at those domain boundaries.

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

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