Chapter 9. Your World, Or Mine?

In the last chapter we derived the proton as the resultant of the interaction of two Union particles of identical mass and a third particle, a weird kind of "quark." I think it should not be called a quark. Instead maybe we should call it a sQuark. Since we also have derived the mass of the proton in terms of the simple relation between the (e) force and the speed of light, we can now define the mass of the Qp (proton sQuark) by substituting that value and solving for Qp.

* (e / c)(P Ao / %) = (Qp)(e^2 Ao / As P eo G).
* Qp = P^2 eo G As / c e % = 4.817x10^-10 kg^-1.

Before we go deeper into exploring subatomic particles, let's step back again and look at physics as a discipline.

There are several levels we can work from. At the "deepest" level there is no such thing as physics. Harry Palmer wiped out physics as we know it with a single sentence. Starting from his proposition that belief and experience are perfectly mapped, he took another step that opened up the field of applied consciousness. He said,

"I call my philosophy Creativism because it is not discovered truth, it is created truth. Most philosophies are derived from some fundamental experience or understanding of the universe -- not Creativism; it is created by awareness at source."

(**Living Deliberately**, Ch. 14, "Creativism and Reality", p. 99. Quote from a 1988 lecture by Palmer.) You can download that book free from the www.AvatarEPC.com web site.

The first sentence of that quote dissolves not only all past philosophies (and *a priori* religions), it dissolves physics and all of the sciences as well -- not as belief systems, but as claimants to Ultimate Truth. Read Palmer's statement carefully. Creativism is not discovered truth. It is **CREATED** truth. Palmer created out of source awareness a set of tools for exploring awareness. Not only Palmer, but also you, and I, and anyone can create anything we like. You have a choice. You can use Palmer's tools if you like. Or you can create your own tools. You can create your own universe. And of course it will have its own laws of physics, which will be whatever you decide, as long as they are reasonably consistent. Otherwise your universe may not hold together very well.

This brings us back around to Einstein. He built his great system of general relativity on the basis of two fundamental assertions: the **equivalence principle,** and his great assumption that the core laws of the universe are **isotropic** for all observers. We have shown that the equivalence principle is really only a special case in the limit of the infinitesimal -- hardly the basis for a universal theory. Einstein got his equivalence match turned around backwards. The notion of isotropy also becomes extremely suspect in the light of quantum mechanics and observer physics. Once we become aware of the belief/experience paradox and Palmer's fundamental principle of Creativism -- that it is

possible to CREATE truth, not just discover it -- the whole ballgame shifts, and we must revise Einstein' s "special case" assumption about isotropic laws to make it more general.

There is really no reason why isotropism should hold. I don' t think Einstein had anything more than his personal intuitive preference to back it up. And he **did** have wonderful intuition most of the time and a flair for prediction. However, in the light of Palmer' s new and more general propositions, we realize that the core laws of a universe are only isotropic for that subset of observer-participants who BELIEVE they are isotropic. Furthermore, any given set of "isotropic" laws is only isotropic for the group that believes in them. Such a group and their shared set of core beliefs constitute a shared universe of experience. I say "core beliefs and laws", because a system may include metabeliefs that permit participants to hold differing sub-beliefs while holding the same core beliefs.

Our experience may be that the universe contains a multiplicity of phenomena. Physics may contain a multiplicity of theories that attempt to set in order the facts of these experiences. Isotropy is one possibility and anisotropy is another. There may be many other possibilities. Quantum mechanics predicts that if something is possible, it happens. Observer Physics predicts that anything that can be imagined is possible and will become an experience if someone decides he really wants to experience it. What any individual or group of individuals happens to experience is just the reflection of the current beliefs that he/they hold. He/they can always modify their beliefs and thereby modify their experiences. Thus physics devolves into descriptions of possible sets of beliefs held with varying intensity by various groups of individuals. Theoretical physics starts to resemble anthropology, or biology, or theoretical mathematics, or who knows what. The "specialized" boundaries of physics begin to dissolve.

"Specialization tends to shut off the wide-band tuning searches and thus to preclude further discovery of the all-powerful generalized principles." So said Bucky Fuller (**Synergetics**, xxvii). Yet some of the greatest general principles have been discovered through very specialized and focussed research. Phase Conjugation is an example that we will explore in this book.

Perhaps the pure experience of whatever is happening in the moment of NOW is about as specialized and focussed as you can get. Yet it may provide the simplest, and only, example of a truly isotropic law. Throughout all of space and time and the various possible conditions of experience in our universe or any other universe, one thing always holds -- that an experience IS just what it is. Ironically that may be all we can say about it. This undefined nature of pure experience is isotropic, but nothing else qualifies for isotropy, and there is nothing to say about something that is undefined, except perhaps -- "There it is...enjoy." It' s whatever you want it to be, whatever you choose to believe, whatever is happening for you. Thus science, and any true general theory of relativity, ends up concerning itself with a description of relative anisotropies. Sorry Einstein. Isotropy, by definition of the term and by its nature as an experience, is not relative. It is absolute and can not be discussed.

To the extent that a set of beliefs overlaps, the universes defined by them overlap. A perfect overlap would end individuality and you would have multiple selves mapped to the same set of beliefs. They would merge and lose their individuality, which would lead to a paradox that resolves only in undefined awareness. You would have isotropy. End of story.

Two selves with totally disjoint sets of beliefs would have no experiences in common and obviously would be unaware of each other as anything other than an abstract possibility -- if at all. This situation would be like a rational number (a human male?) trying to get acquainted with a non-periodic irrational number (a human female?). He might have a vague idea and could imagine such things existing. But he' d probably never meet one, even if they were neighbors. The ancients on our planet a few thousand years ago were totally disjoint from the notion of non-periodic irrational numbers and didn' t even imagine them existing. The Greeks were flummoxed when they began to encounter them in their studies of geometry. (Homosexuality was a common and accepted social experience among the Greeks.) Universes that overlap only a little would resemble ants and people sharing food at a picnic.

Einstein' s Special Relativity is so simple that an average high school student can understand it. We can also see examples of it in our daily lives and in the nuclear issues we face. Einstein' s General Relativity is so complex and abstruse that for a long time only a handful of people claimed to understand it. I have a Ph.D. from Harvard and still find it puzzling. Verification of special relativity is commonplace. Verification of general relativity is extremely subtle and difficult. General relativity is all about gravity, and we on this planet all experience gravity as a major influence in our daily lives. Yet no one has detected the gravity waves predicted by the theory. Why? Something fundamental must be wrong with a theory that is so hard to understand and verify in experience. Most people just accept general relativity on the basis of Einstein' s reputation that he established with his marvelous theory of special relativity and his profound contributions to quantum mechanics, but have no experience of general relativity at all in their lives.

According to Observer Physics, if something seems complicated, then it is not clear. Take a break, shift viewpoints, and take another, closer look. When attention is fully directed on something, then it becomes simple and clear. Why is it that, after nearly a hundred years of the best minds working on it, the general relativity theory of gravity still has not been satisfactorily integrated with the rest of physics? We need a major viewpoint shift here.

There is relativity of observer belief systems. Undefined awareness "underlies" all belief systems. Beliefs can tunnel from one universe to another via imagination that is highly imbued with undefined awareness, since undefined awareness has no preferred set of beliefs and no preferred universe. Imagination is a self' s process of preferring a new set of beliefs that do not reside in that self' s current reality. This quantum tunneling process only works well when channeling through source, the field of undefined awareness. Otherwise there may be severe distortions along the way. Palmer' s Avatar tools are

about as complete and general a system as I have seen for tunneling from one universe of beliefs to another. There probably are other approaches I haven't encountered.

You see from this how physics as we know it works. The physicists doing "physics" are simply exploring their current set(s) of core beliefs. Thus "hard physics" is all an elaborate **memory** exercise. The physicist gradually remembers the beliefs that generate his current experiences, including his creation of "mass consciousness" experiences of "reality". For that matter we might even say that "Creativism" is another form of "remembrance". It all depends on one's viewpoint.

Discovery of laws is not what I would call "real" physics. That is living in the "past", a very imaginary world. Fortunately, however, the process of exploring often opens awareness to the influx of new beliefs and experiences through the use of the imaginative function of consciousness. This gradually shifts the reality paradigm held by the community of physicists.

A "realer" type of physics, though also an imaginary one, is a "Palmer" Process of deciding how you would like things to be and then manifesting that as your reality. Such a Palmer Process is effortless if you really believe it is!!! Of course, once you have tasted your new reality, you may decide you don't like it after all. So you can decide again and change your beliefs and eventually make the universe the way you prefer it to be.

Physics is a way of defining things. But the ultimate universe is undefined, so there is no physics involved (at that level) -- by definition!!! Undefined awareness is beyond physics.

Here are some examples of how physics can be done on different levels of observer operation in consciousness.

Level 0: Using an approach like Palmer's Creativism, we manifest whatever we like from Source. This is the world of Avatars. It seems like magic to people who prefer to live their lives in default habits of thought and experience. As Avatars, or Sidhas, we decide what kind of world we would like to play in, create that world deliberately, jump in and play around in it, explore it and experience it thoroughly, and then jump out and dissolve that world back into the realm of all possibilities. When not engaged in creating and experiencing a new reality, we live fully in the moment, the NOW of undefined awareness. There are no fixed laws of physics. As Avatars we create them as we prefer and fully enjoy the experiences they generate.

Level I: We begin from a new viewpoint and build a consistent system of principles (beliefs) that describes a reality that already exists. Along the way we may have to accommodate existing systems and/or face the turbulence generated by adjusting them. My definition of the quanstants as fundamental particles stems from the core beliefs of current physics and aims to describe the world as we experience it. But the system involves some basic new shifts of viewpoint. For example, most people would find it

strange to think of (G) or (e) or (c) as elementary particles.

Level II: We come down a step from Level I and work within an existing paradigm, perhaps modifying it in some ways. For example, in this book we define the currently recognized elementary particles in terms of the fundamental constants of physics plus some new proposed constants that we must justify: e.g. Mp = P e Ru / c. To some extent we integrate our new viewpoint and system with the current paradigm, the existing system and lead it in new directions.

Level III: We come down another step and work on theories within the current paradigm that is accepted by the majority of the people, including the belief that the paradigm is not perfect and needs more work. An example might be performing experiments to detect gravitational waves and thereby confirm an aspect of general relativity, or the development of new research directions in quantum mechanics.

Level IV: We come down another step and work on applications of theories that are already established and accepted. An example would be the development and fabrication of new chips or improvements of the internal combustion engine.

The above is a general outline of the "layers" of physics that we may choose to play in.

Now let' s go into the subatomic world as it is currently understood and take a look at the leptons, baryons, mesons, and bosons. We' ll start with the stable leptons -- the electron and the electron neutrino. Anything we say about the muon neutrino and tauon neutrino is speculative because we don' t know enough about their masses (although from the ensuing discussion you can make some guesstimates.)

Our proposal is that ultimately all particles are built from tiny black holes of energy. These are like eddies that form in a stream of water. The leptons are smaller eddies of energy that can find a stable water hole to spin in. How do we find such water holes? By looking at the quanstants in the simplest ratios that generate resultant masses. We already saw an example with our derivation of the proton (Mp).

In exploring these relationships we must keep in mind that the quanstants cover a huge range. Their values are expressed in three ways: ratio (2.9979), scale (10^8), and dimension (m/s). We will note special qualities of these three values of a quanstant as we go. Here is the simplest form of mass, the smallest particle that we can make from the simplest combination of our fundamental quanstants.

* Mne = (H / c %) = 1.11..x10^-43 kg.

We will propose that this is the electron neutrino. Alternatively we could make it using Ru = 1 meter, our other constant of distance. These two values are about the same given the scale we are talking about. You could also use (h) instead of (H).

A bit earlier we discussed the Compton wavelength radius for electrons:

* Le = H / Me c.

We could use this expression to define the mass of the electron:

* Me = H / c Le.

However such a definition is circular, since we defined the radius in terms of the mass. But we can substitute (%) for (Le) since both are distances, but (%) is another constant of distance, what I call the D-shift operator. That gives us a new value for the mass in the Compton relation as shown by the expression

* (H / c %). = 1.11..x10^-43 kg.

This number is very interesting, because 1.11 happens to be the ratio value of (H) squared, but here we only have (H) in the first degree! This means that (c %) is equal to 9.487 the reciprocal of the ratio of H, i.e. (9/10)^1/2, or about .9487 with an order of magnitude shift. Since (%) is a D-shift operator, we see that this number has a fractal relationship with (c) via the D-shift operator. (H), (c), and (%) play with the ratios between 9 and 10 and create a fractal system with a fundamental tone at (1.11x10^-43 kg). We' ll ignore the 10 power scale and units right now and just look at the ratios.

* (1.054)^0 (3x3.162)^-1 = .1054.
* (1.054)^1 (3x3.162)^-1= .1111
* (1.054)^1 (3x3.162)^0 = 1.054
* (1.054)^2 (3x3.162)^0 = 1.111
* (1.054)^2 (3x3.162)^1 = 10.54
* (1.054)^3 (3x3.162)^1 = 11.11

etc.

You get the picture. It is a fractal structure that repeats itself at every scale. The Planck scale happens to be the limiting value for energy in our physical universe. The physical universe is structured from the quanstants and geometry in a fractal manner.

We propose that (H / c %), the simplest form of the "neutrino" expression using our basic physical quanstants, represents the minimal mass quantum of the electron neutrino. It is strictly a relationship between energy and the speed of light mediated by the D-shift operator. There is no electric charge involved. Hence the neutrino is chargeless. (Later we' ll take a closer look at why.) The speed of light tells us how fast the energy is going, and (H) locates it as a certain quantity of energy at a singularity, and (%) sets up a vortex so it wraps around itself and creates the possibility of scaling. Here is a variant that adds some geometry:

* H Ao / c P % = 1.111...x10^-44 kg.

This differs by one order of magnitude. If you drop out the (P), then it goes to 3.44x10^-44, the midpoint. So the value may oscillate somewhere around there, possibly also within a multiple of (2 P).

On a macroscopic scale we see a magnified version of this quantum relationship every time we observe a photon deflected by a free electron in the Compton effect. On a larger scale, we see it when a proton deflects a photon. But if you imagined the deflecting particle getting more and more massive until the photon no longer deflected but went into orbit, then you would have a neutrino. You also have a mini black hole. By the way, the electron and the proton have charge, but the photon has no charge. So when its trajectory is bent by the Compton effect, that is a GRAVITATIONAL effect governed by Einstein' s laws of general relativity. The space/time around an elementary particle is severely warped. This is just like the experiment of starlight bending as it passes by the sun or galactic gravity lenses. If you looked at that starlight closer and closer to the sun' s surface (which you can' t because of the corona' s large-scale disturbances and such problems -- but we can imagine an ideal solar-sized object), it would start to bend by the Compton effect magnified by the huge solar mass. Light that gets too close is simply sucked in and absorbed by the nearest electron black hole. It rarely gets to a proton unless we have an ionized gas where the electrons have zipped away because they are already full of absorbed photons. The solar mass is not a BH, but each of its constituent particles is!!

So the neutrino is the minimal energy BH configuration of a photon "eddy". It does not absorb photons, but it does disturb them slightly. The neutrino has no charge, so this must be a gravitational effect. As we' ll see in more detail shortly, the neutrino is made of nothing but photons so energetic that the frequency wraps around on itself, and instead of a wave with some particle qualities you get a particle with some wave properties. The particle properties, however, are quite weak, and will not hold a charge. They also tend to waver in their commitment to a fixed mass. They are also quite uncertain with regard to their position. You can not put a neutrino in a box and say exactly where it is. You can' t even catch one. This is also quite true for the electron, although it is much more defined than a neutrino, and you can put an electron more or less into a defined area. Nevertheless, under the right conditions even electrons can tunnel right through barriers that would seem to have stopped them.

As a sketch, let' s use Newton' s formula for gravity to determine the radius of a black hole event horizon (which is what our photon now defines.) An actual BH calculation is more complicated, but this is good enough for a start.

* Mx V^2 / 2 = G Mx My / R.

(Mx) is the mass of the satellite. (V) is the velocity. (My) is the core (deflecting) mass. (G) is the gravity constant. (R) is the radius.

* V = (2 G My / R)^1/2.

We can now calculate from our sketch the radius and mass that would keep the photon trapped in orbit at the event horizon, substituting (c) as the velocity (V).

* R = 2 G My / c^2.
* My = R c^2 / 2 G.
* My = H / c Ly. (Putting the Compton expression in.)
* H / c Ly = R c^2 / 2 G.
* Ly = 2 H G / R c^3.

Of course R = Ly.

* Ly^2 = 2 H G / c^3.
* Ly = 2.28x10^-35 m.

This gives us a rough idea of the size of the neutrino. Ly = R = the neutrino' s radius. This is the Planck radius. Interestingly, the mass of the photon does not matter, as is the case with any body falling in a gravitational field. But we can calculate (My), the deflecting mass, -- equivalent of the earth by analogy -- from this by substituting (Ly) back into the Compton expression.

* My = 1.54x10^-8 kg.

The Union' s mass is

* Bu = 1.86x10^-9 kg.

The Union is a boson as we' ll see when we discuss those particles. As a class I refer to them with a B in front instead of an M. Although they appear to have mass, they actually are vehicles for generating the appearance of mass. That becomes clearer when we discuss the photon (Bf) and other Bosons in their Bosonic nature and functions.

The (My) mass we just derived is less than one order of magnitude different from the (Bu)!!! The (My) particle is 8.28 times the size of a Union (Bu) particle. You' ll recall that the (Bu) (and My) are at the scale for Big Bang temperature BHs. There may be a close relationship between the (Bu) and this (My) and a ratio around 8.2 and 8.3 has significance in the leptonic system as we' ll see.

We can imagine that in the vacuum state there is a virtual shadow particle that ripples along with the neutrino. The neutrino is like a remora riding on the belly of a giant shark swimming in the vast ocean of the vacuum state. That shadow particle may well be a pair of Unions that are just barely kissing. They can balance like that and zip along at 99.99% of light speed!!!

They may be like a pair of roller bearings rolling against each other, spinning in opposite directions.

In any case we represent the neutrino portion of the complex with (H / c %) and a "rest mass" value of around 1.11x10^-43 kg. Of course, most of these neutrinos travel in relativity mode and drag along a lot of kinetic mass-energy. Their kinetic mass-energy is invisible though because they don' t interact with ordinary matter except maybe very, very, very, rarely. Their size is too small and they have no charge. Recall what we said about resistance and mass. Neutrinos have no resistance, so we really can' t detect any mass for them. If we can' t interact with them -- resist them -- even their tiny "rest mass" is invisible. Besides, they are never at rest anyway, but tend to zip at very high speeds. We can almost just call them accounting tricks if it were not for the energy water hole we have identified.

This is not just a joke. The ancients had a tradition about something they called the "akashic records." Maharishi refers to this traditional notion as RBP (Ritam Bhara Pragya.) Experiences pass and worlds pass, but the akashic records silently record everything that happens, preserving it for a long, long time, very close to forever.

Imagine a huge vacuum state with non-interacting neutrinos zipping about in it. Whenever matter decays, various fragments issue forth. They later interact with other particles and rearrange themselves. Their earlier history is forgotten in the mixing and matching. But the neutrinos that come out of the event carry a signature energy and directional momentum of the event in that tiny portion of energy that they carry off. They fly off into space carrying that information (Oh, a neutron decayed!). They remember that almost forever, until the Gnab Gib, or until a giant BH captures them. The universal neutrino gas doesn' t record everything, but it' s a start at a physical mechanism for storing very long-term records in the changing universe. Unfortunately we large bodied people can' t read those records with any physical device because of the very fact that the neutrinos don' t interact. You would have to be very much awake in neutral (undefined) attention awareness to sense them. The data field is non-local and spread throughout the cosmos. The neutrino gas in the vacuum is like the subatomic version of a noble gas. Helium gas is its macroscopic cousin by analogy as the lightest non-interacting gas.

Optional Exercise: Just for fun, imagine a vast hall full of neutrino gas!!! The neutrinos are all spread out like ghostly blobs, but have various vector values and energies. Imagine that you can "read" them. In so doing you must be fully undefined so that you do not disturb the data that they hold.

Now let' s talk about the electron. This very common lepton is quite stable unless it bumps into its antiparticle. It has one quantum unit of negative charge and plays a major role in the structure of atoms, molecules, and is a very common emitter and absorber of photons. I want to sketch out the steps by which I found one of the basic quanstant relations for (Me), the electron, because these steps bring up some interesting aspects of the electron. The proton' s mass is a very straightforward ratio of the Coulomb to the speed of light. The electron is much subtler. I' ve spent several years playing with the electron and found a lot of things about it and still have much to learn

about it. For example, recall the way we can read information about the electron from the Rydberg number. The Rydberg number is like a little book, as indeed are all the spectral lines that chemists and astronomers have learned to read. There may be much more to read there.

The mass of the electron has a funny ratio. It falls in between the neutrino and the proton, but seems closer to the proton.

Step 1. An obvious starting point is to look at the ratio between our ideal neutrino and the proton.

* Mne = H / c % = 1.111x10^-43 kg
* Mne / Mp = .666x10^-16.

If we square that, we get right about to the scale of the electron.

* (Mne / Mp) ^2 = .4444x10^-32.

That' s about 205 times smaller than an electron. The problem is that the masses all cancel out. But we have something that looks pretty natural. It is a simple ratio, it is time independent, and it almost has the correct scale.

Step 2. Next I looked at the numerical ratio.

(G) hovers around (20 / 3), (Mp) hovers around (5 / 3). So there is an obvious link between these two constants. The value of the electron' s mass (9.109534x10 ^-31 kg) is a weird number. It seems very close to 9.1111.... But that value does not seem to fit well with the other quanstant values. (Me)' s ratiosticks out like a sore thumb in the whole system.

The main similarity I came up with as a starting point was the value (1.11111) which we saw above for the neutrino, and which also comes up as the ratio for the square of (H). (1.111...x10^-68 J^2 s^2.) Since we already had (H)^2 involved, that sounded promising. Playing with that I found that (9.1111) divided by (1.111) is (8.2). That' s very close to the factor we got for the difference in size between the Union particle and the neutrino' s bubble. Further exploration revealed that (9 x 9.11111) = 82 which differs from the previous number by an order of magnitude. Now I could plug in quanstants using the D-Shift Operator to generate an equation. At this point my attention was only on exploring the ratios, and not the units or scale.

* Me %^2 / H^2 = 8.2x10^38 s^2 / kg m^2.
* Me c^2 = 8.2x10^-14 kg m^2 / s^2.

Step 3. The units of the above expressions are **energy reciprocals**, so if we multiply the two, we get a pure number!!! We can then take the square root of the whole thing multiplied together and get the following:

* Me c % / H = 8.2x10^12.

This of course is the ratio of the electron mass to the neutrino mass (Mne).

* Me / Mne = 8.2x10^12.

So now we have the following:

* Bu / Mne = 1.67x10^33. (A fractal echo of the proton.)
* Mne / Mp = 6.66x10^-15 (A fractal echo of G.)
* My / Bu ~~ 8.2
  (The "Compton" mass for a photonic BH fractally echoes this ratio.)

Step 4. We next need to find some mass for our "particle". Armed with these relations it is clear that the neutrino mass to electron ratio (Mne / Me) is in the neighborhood of the Permittivity constant (eo). So we cancel out the spatial units with a standard cube (Ru^3).

* (4 P eo Ru^3) = 1.111x10^-10 kg.
* (Me / Mne)(4 P eo Ru^3) = 911 kg.

Armed with these relations I then multiplied (Me / Mne) by (eo) (%)^3 and got a mass of 2295.9 kg.

* (Me / Mne)(eo %^3) = (Me c eo %^4) / (H) = 2295.9 kg.

Step 5. I then multiplied that by (Oo As Ao^2 / P^3 %^4 Ss) = .06, the reciprocal of the proton ratio divided by 10. That' s like dividing by a scaled "echo" version of the proton in a different dimension, but with no mass, because I wanted to keep the mass I already had generated..

* (Me c eo %^4 / H)(Oo As Ao^2 / P^3 %^4 Ss) = 137 kg.

The 137 is a magic number. It is the reciprocal of the fine structure constant (a), a pure number usually represented with a Greek letter alpha. This number is meaningful, since the (fsc) governs the electron' s emission and absorption of photons. So we just plug that in, using its derivation in terms of constants.

* (Me c eo %^4 / H)(Oo As Ao^2 / P^3 %^4 Ss) = (a) kg.

* (Me c eo %^4 / H)(Oo As Ao^2 / P^3 %^4 Ss) = (4 P eo H c / e^2) kg.

We collect and simplify.

* (Me / kg) = (H^2 / e^2) (P^4 Ss / Oo Ao^3) = 9.11x10^-31.

The second factor in the expression, (P^4 Ss / Oo Ao^3), is pure geometry. The simple ratio on the left (H^2 / e^2) is so close to the value (not the dimension) of the electron considering 31 orders of magnitude that it can not be a coincidence. By itself it comes to 4.328687x10^-31m^4, a 4-D space. This value is just under 1/2 the mass of the electron. But, unfortunately, the mass has disappeared. The factor turns out to be around 2.1. We write that value as (P^4 Ss / Oo Ao^3). But we now have a pure number that looks like the electron' s mass. So perhaps we need to take out one of the (e)' s and substitute something else equivalent that has no mass.

Step 6. By exploration we find that we get very close to the massless value of (e)^2 with the following expression:

* (Mp G) = 1.1111x10^-37 m^3 / s^2 = (10/9) x 10^-37 m^3/ s^2.

There' s our Planckian D-shift number popping up in the ratio portion. We used pure ratios here: (5/3)(20/3). So we can play the scaling game that we saw emerge from the neutrino relation by allowing this expression to interact with (H) or with (c %)^-1.

Step 7. If we replace one of the (e)' s with this expression, we still have the problem that the time dimension doesn' t balance. So we square the H^2 instead. This balances the time dimension out.

* (H^4 / e^2 Mp G) = .0433x10^-60 kg^2 m^5.

We are getting closer. This expression has the units kg^2 m^5. So we are shooting for a PAIR of electrons. This makes sense from our observation that the property called "spin" makes electrons tend to come in pairs, an up and a down. Their identical charge with light mass keeps them at a distance from each other, but they hover in paired orbits.

To make the distance dimension an even power, we divide by (%). This gives us

* (H^4 / e^2 Mp G %) = (a)^-1 (10^-4)x10^-60 kg^2 m^4.

There' s the fsc again. That sounds right. We' re getting close. We use a factor of (%^4) to shift the scale to 10^-62. We note in passing that the reciprocal of the (G) ratio (3/20) mediates between 9.11 and 1.37. Very interesting!! We now have the following:

* (H^4 a / e^2 Mp G %) = 10^-64 kg^2 m^4.
* (H^4 a %^3 / e^2 Mp G) = 10^-62 kg^2 m^8.

Step 8. We don' t worry about a few distance units, since we know how to D-shift. We have the dimension of a pair of electrons and their scale. We need the ratio, which for two of them is 83. This is nice and close to our old friend 8.2 or 82 or 8.28. This ratio comes up a lot with the electron, and leptons in general. The electron-to-neutrino

ratio is 8.2x10^12, for example. This suggests a bright idea. We looked at the electron-to-neutrino ratio and the proton-to-neutrino ratio (3/2), -- an echo of the (G) ratio reciprocal. Let' s take a look at the proton-to-electron mass ratio. Nobody makes much sense out of that, since nobody knows why the proton and electron have the masses they have. It' s just a number, right?

* Mp / Me = 1836.

This is very close to twice the ratio of the electron shifted by two magnitudes. So we throw in a simple factor from geometry to handle that and also handle the extra spatial units.

* (Mp / Me) (P Ao / Oo %^5) = (1836)(.0049673) m^-4 = 9.11 m^-4.

Step 9. So we put the whole thing together (squaring our ratio) and collect and simplify the terms:

* (Mp / Me)^2 (P Ao / Oo %^5)^2 = 83 m^-8.

* (H^4 a %^3 / e^2 Mp G) (Mp / Me)^2 (P Ao / Oo %^5)^2 = (83 m^-8) (10^-62 kg^2 m^8).

* Me^4 = (H^4 / e^2) (Mp / G) (Ao a / As %^5).

The left side comes to about 6889x10^-124 kg^4. The right side comes to around 6939.85x10^-124 kg^4. Pretty close.

You can also substitute in (e^2 Ao / As P eo H c) for the fsc (a) if you like. That is nice because then our expression for the electron contains all the basic physical quanstants in a very simple and elegant relationship, if we allow that (e) and (eo) alternate through the vehicle of the (fsc).

* Me^4 = H^3 Mp Ao^2 / G eo c P As^2 %^5.

Here the right side comes to around 6934x10^-124 kg^4. The discrepancy comes from rounding of numbers and the extreme scale differences. Interestingly, if we multiply the core physical quanstant cluster (H^3 Mp / G eo c) by (Ao^2 / As^2) = 16^-1, we get 6889 as our ratio, matching 83^2. But the spatial dimension and order of magnitude are off.

The whole expression can be viewed as a fractally expanded version of the (Me / Mp = 1 / 1836) ratio.

Using more exact values for (Me) and the other quanstants still leaves a little discrepancy. But it' s amazingly close and the fundamental physical quanstants are all in there about as neatly as they can be packed (eo and e^2 alternating via the fsc). My theory for the discrepancy at this point is that, given the various basic quanstants there is a set of possible ways of deriving a particle like the proton or electron. The value that we

observe should be the average of all those derivations taken together. To test this idea we have to figure out all the possible derivations and average them. I've done a few, and the idea seems in the right direction. But I haven't figured them all at this point.

The mass components of (G) and (eo) cancel out, so our electron system (4 interacting electrons, not just two) comes from 3 (H)'s and an (Mp) involved with light speed in a geometry relationship of a 4 (+1?) space. This is a viewpoint for viewing the electron. There are others.

To summarize some of the things we found:

** The proton-electron mass ratio is relevant to determining the electron mass. It fits our theory that the particles have fractal type relationships that echo at various scales. Also it shows that the relative masses of these particles are not random coincidence.

** We found the scale for the electron is based on the relationship (H^2 / e^2) and (H^4 Mp / e^2 G) or (H^3 Mp / G eo c). This also indicates that the electron is a manifestation of all the basic physical quanstants interacting at once.

** We have some indication of how charge is structured in the particle. Although this needs further exploration, we can see that (Mp)'s charge is determined by (e), as in (e / c), and (Me)'s charge is determined by (Mp / e^2) which comes to (c / e). This gives some idea of why the charges are opposite, proton having a net positive charge, and electron having a net negative charge, but with the SAME UNIT VALUE despite the great difference in their masses!!! Also the neutrino's structure contains no (e) charge component, which agrees with the lack of charge observed. Charge is expressed through (e), which is a "pseudo-force" of a unit of mass per second. We'll get a better handle on charge later. The key point is that charge is not really different from gravity, it just seems that way because it is operating through a different "window" of scale in the fractal cascade of space/time. They're the samething at different scales. And we have shown there is a viewpoint where the two scales converge. Charge indicates a shifting of mass in time, so it can translate into motion through space under the proper conditions. A 0-orbital electron sitting snug with a proton cancels the neutron's charge.

** We also got some suggestion in our expression of how the electrons tend to form in pairs even though they repel through having the same charge, a phenomenon noticed in the electron shell structure of atoms. The subject of quantum "spin" and how it relates to this situation we have to explore more deeply later on. Right now we're focussing on mass.

** We found that the fine structure constant (a) is involved in defining the electron mass. This should probably not be a surprise.

** Earlier we saw how we can "read" information about the electron from the Rydberg number. Here we see also how we can move into the electron's structure via the observable Compton effect, which is like a handy magnifying glass.

** We exercised the principle of describing the elementary particles in the simplest manner possible using the universal quanstants of physics and constants of geometry.

What about the other leptons?

The muon (Mm) is larger than the electron by a factor of about 206.767 -- close to the factor 210 we found with (H^2 / e^2). The ratios 2.1 and 8.2 or 8.3 are keys to the leptons.

* **(Mne / Mp)^2 (Mm / Me) ~~ (H / e)^2 (P^4 Ss / Oo Ao^3)**.

The tauon (Mt) is about 17 muon masses or 3500 electron masses. The ratio of 3500 to 210 is 16.7 or 50/3 -- the ratio of the proton appears again, echoed among the leptons: **(Mt / Me) = (P^6 %^8 Ss^2 / As^2 Ao^5)**.

Furthermore, we can go back to the neutrino, which carries the ratio (10 / 9). Since the (H^2) component of the electron also has the ratio of (10/9) we see that these two particles are scaled images of each other. The electron, however, has mixed in the (e) force. The (e) force ratio squared is slightly more than a quarter of a magnitude: 2.5664.

* (2.5664)(3.8965) = 10
* 3(3.8965) = 11.6895.

The ratio 3 is the signature of light speed, a component of both (Me) and (Mne).
Compare the above with the following, where (a) = (fine structure constant):

* (1.054)(11.1111) = (3)(1000) / (256) = 11.7 = (P % Ss / Ao As) ^3 = a^-1/2

We recall that 1.054, or (10 / 9)^1/2, is the ratio of (H). Planck' s constant resonates through the lepton family, and the proton' s signature occurs in a miniature echo, as does the gravity ratio. (See my comments in Ch. 16 on Nottale' s fractal space-time.)

We can suppose that the muon neutrino and the tauon neutrino will turn out to resonate with the electron neutrino in a way analogous to the way the muon and tauon resonate with the electron. If we get firmer observational knowledge of them, we' ll be able to tell.

Of course we can use our Unions to generate a Squark for the electron (Qe). Since I' m classing the Union particles as Bosons, I will give all of these particles a capital B to mark them.

* Me = Bu^2 Qe.
* Qe = 2.63479x10^-13 kg^-1.

Of course, the ratio (Qp / Qe) is the same as (Mp / Me). Using our derivation of (Me),

you can work out the value of Qe in quanstants as an exercise. But, as we go deeper into our study of the relation between leptons and baryons, we will discover some further secrets of the electron.

Now let' s begin to consider the other baryons. We already discussed the idea that the neutron is a proton with its energy enhanced by extra mass and charge, sucking in an electron and antineutrino' s worth of energy. Whem a proton-neutron ensemble decays, the neutron by itself doesn' t have enough charge to hold the electron in a negative orbit, so the electron pops out, and with it some additional energy transported by a neutrino vortex.

How about the other members of the hadron house: lambdas, sigmas, xis, deltas, and omegas with various charges, masses, mean lifetimes, and decay modes, not to speak of various resonant quasi particles. These have all been arranged in neat decuplets and octets, just as the mesons are arranged in nonets of kaons, pions, rhoes, etas, small omegas, and phis.

Standard theory interprets them as made of quarks. That is fine and provides a nice way of classifying them. But we should realize that all the baryons are really various resonant states of the proton. In between the stable increments of whole proton masses there are harmonics where the energy momentarily "hovers" before decaying back to a stable proton wave form. Generally the more massive the baryon, the briefer its mean life. The notable exception to that is what we call "atomic nuclei," which live stable lives at the quantum multiples of proton mass and can grow quite massive, though even they get unstable beyond a certain point. The neutron is also a notable exception, because it has an electron in its grip. So, compared to the other subatomic particles, it takes a lot longer -- relatively speaking at the tiny time scales involved -- for the electron to escape and cause the neutron to decay back to its normal proton status.

Generally baryons have less than two proton masses, but just like water can be superheated before boiling, a few baryons with charmed or bottom quarks go over the two proton mark and then decay into two protons or a proton and an array of lighter particles. The highly souped up baryons should generally cascade down through lighter baryons, possibly including a neutron, before decaying. For example, a positive sigma can decay into a positive pion plus a neutron, and the neutron will decay into a proton, electron and antineutrino. Or it can decay into a neutral pion and a proton. The pions decay into photons, muons, and neutrinos.

In general mesons decay into mesons, leptons and photons, and baryons decay into protons plus mesons, leptons, and photons. This is a key observation for our model. Even though both baryons and mesons are made from quarks according to standard theory, mesons decay only into other mesons, leptons, and photons. This tells us that even though some of the souped up mesons get up as high as almost six proton masses, and possibly even higher with more powerful equipment, they are really still souped up leptons or bosons, not souped up protons. On the other hand, souped up protons, starting even with the neutron, can contain leptonic vortices.

The meson-lepton system has a different harmonic resonating sequence with a lower fundamental than the proton. In quark theory this is explained by the notion that mesons have only two quarks: a quark and an anti-quark. The two quarks whirl about, create a tiny bubble for a moment, and then annihilate. Some Bosons have figured out how to do this dance and stick around -- for example, the (Bu) bosons (Unions) and the (Bf) bosons (photons).

According to standard theory, a baryon is made from 3 normal (non-anti) quarks or three anti-quarks. Given the close confinement of the quarks and the strong force needed to hold them confined against the force of the same charge, I do not see how it is possible to divide up a baryon' s mass into three so that the quarks are additive. The situation is far too dynamic and interactive for that. The energy fluxes inside a baryon must be amazing. The only purpose quarks serve (in my view) is to help manage accounting from the outside. Nobody has seen a quark, and I doubt if they ever will. They are just accounting tokens for keeping track of quantum numbers such as charge, spin, truth, beauty, charm, and strangeness.

A fundamental principle is that if sets of items are interacting, we use multiplication. If they are not interacting, but just coexisting, then we can use addition. For example, if I have 2 fruits and 3 vegetables and I want various dinners with one out of each set (order of the courses making no difference), I can have 6 possible dinners: f1-v1, f1-v2, f1-v3, f2-v1, f2-v2, f2-v3. If I just want to know how many items there are, I add them and get 2 + 3 = 5. Quarks are definitely found only in interacting mode. So we multiply them. Thus the notion that the three quarks making up the proton are all about the same size -- about 1 / 3 of a proton mass with the (d) quark being slightly heavier -- makes no sense to me. It is billiard ball thinking.

I believe that the mesons should be classed as fermions that behave with bosonic tendencies. Similarly the (W) and (Z) intermediate vector bosons are bosons with fermionic tendencies because of the high energy they pack. They "look" like particles, but they are more like (Bu) and (Bf) than (Mp) or (Me). Usually they are involved with leptonic decay in the weak interactions. But they can also mediate quark mixing in baryon decay. For example, a negative lambda can decay via a (W) boson into a proton and a negative pion. Sometimes even a tauon can generate some hadrons in its decay process. It is definitely "fat" enough to do so.

The leptonic resonance (~~9.1111) is governed primarily by (H)^2 --> (10/9), and secondarily by (c) --> (3) and (e) --> (1.602 ~~ 8/5). The protonic resonance (5/3) is governed by (G) --> (20/3) and (e) --> (~~8/5) and (c) --> (3). As the ratios go up and down their respective scales, there are points where protonic resonance peeks into the leptonic scale, and points where the leptonic scale peeks into the protonic scale. The leptonic scale is lower and weaker. Although the neutrinos and electrons are stable, the higher resonances are all unstable. The protonic scale is very stable until you get to very heavy masses at the high end of the periodic table. Here the very stable protonic ladder hits more and more leptonic decay tendencies and the nucleons become unstable,

though on a much slower time scale than the "in between" proton energies and all the higher leptonic resonances. Any charged lepton above an electron is unstable.

3	9.11111	1.602****	1.05409255338	1.66666666
9	83.0123456789****	2.566404	1.111111111***	2.7777777*,***
27***,#	756.334705074	4.111379208	1.17121394817	4.6296296296
81	6891.04953511	6.58642949121	1.234567890**	7.71604938263
243	62785.1179865	10.5514600449**	1.30134883127	12.8600823043
729^	572042.186099	16.9034389919****	1.37174211239^	21.433470507
2187	5211939.91779	27.079309265*,#	1.44594314582	35.7224508448
6561	47486563.6954	43.3810534425	1.52415790261	59.5374180744
19683	432655358.113	69.4964476148	1.60660349531***	99.2290301236
59049	3941971040.58	111.333309078****	1.69351878064***	165.381716872#
177147***,****	35915736147.5	178.355961142*,****	1.78511499475*,**	275.636194785

This is a short list of five ratios. The numbers are also not exact to the observed values in nature. But the patterns are easier to follow this way. You can see that they all have windows where they match more or less closely. The 9.11 and 1.66 both don' t match very much. (By the way, just for fun, turn these two numbers upside down and look at them!!)

* 9.11111111111....
* 1.66666666666....

The (e) force matches most often. The (H) column even produces a scaled value of the fine structure constant reciprocal (13.7) at the point marked (^). Light speed (3) also gets close to the (fsc) at 729. Of course with combinations of these, the values get even more complex.

Adding the proton mass ratios we get:

05/3 = 01.6666666
10/3 = 03.3333333
15/3 = 05.0000000
20/3 = 06.6666666 = G ratio
25/3 = 08.3333333
30/3 = 10 = (P %^2 / Ao).
35/3 = 11.666666 (close to 1.11111)
40/3 = 13.333333 (close to 4th and 5th items in 1.1111' s list.)
45/3 = 15.000000
50/3 = 16.666666
55/3 = 18.333333
60/3 = 20.000000
.....

See how the pattern repeats itself gradually incrementing the high digit.

When we increment the proton mass, we are building nucleons. Notice that the first

item is hydrogen and the fourth item corresponds to helium. The helium proton wave is very close to the ratio of (G), since (Mp / G) has a ratio of 1/4, ignoring scale and units. This suggests that helium is the ideal end product for fusion. This certainly seems to be the zone in which fusion scientists are working. The ratio 60/3 = 20.00000 corresponds to carbon, the atom that forms more compounds than any other atom than hydrogen, the ground state of all atoms. The first resonance below that, 10.00000, corresponds to Lithium, the lightest, and most reactive metal. LiH and NaH are both the ideal candidates as vehicles for delivering hydrogen fuel. But the building of atomic nuclei is a complex subject that needs separate treatment. Atomic nuclei include "neutrons" and other factors that skew the atomic weights away from simple proton multiples.

Let' s increment an electron' s ratio in idealized form.

09.111111111
18.22222222 (Close to 1/100 of the Mp / Me ratio.)
27.33333333 (27 comes up a lot)
36.44444444
45.55555555
54.66666666
63.77777777
72.88888888
81.99999999 = 82 (This is our magic number 82)
91.11111111 (We start repeating the cycle.)
100.2222222
109.3333333
118.4444444 (etc.)

This series alternates directions and counts in numerical order. It is a dimensional shifting operator, along with (10/9) or 1.11111, which is a kissing cousin.

Now let' s take a look at the electron' s fundamental ratio, (H / e). I' ll just use the first three significant digits so you can see the basic pattern. We get: .658, .432, .285, .187, .123, .0811, .0153, .0351, .0231, .0152, .01000, .00658, .00433 , .00285, .00187, ...

We see that on the tenth iteration (11th number) we get very close to .01. From there the cycle repeats itself with just a tiny phase shift. You can imagine that after a lot of cycles the phase shift itself will recycle. Notice also the value .123. This echoes the ratio value of (H^4): 1.234567.... It has shifted up to (H/e)^5, moved up by one power. So (H) and (H/e) come together periodically.

Finally, let' s look at one of the most commonly occurring combinations of quanstants in all of modern physics, (H c). These two quanstants form a wonderful pair. (H) represents the boundary of the smallest energy unit, and (c) is the limit of energy on a large scale. Although (c) is a velocity, it takes energy to accelerate something from rest to a given velocity. According to relativity it takes infinite energy to shift something

with rest mass from 0 velocity to (c). So these two units, (H) and (c), are like the poles of the universe defining the range of the cosmos from small to large scale.

What happens when we multiply them? We get a value that is familiar to us by now from these discussions.

* H c = 3.16227766x10^-26 kg m^3 / s^2.

Taking the ratio to increasing powers we find a surprise.

3.16227766
10
31.6227766
100
316.227766
1000
etc.

Although I perhaps have idealized the numbers, this is the pattern, a simple oscillation at shifting scales. This is the D-shift operator, (%). So (H c) is nothing but the D-shift operator at the very small scale of 10^-26. Thus (H c) is actually the D-shift operator in disguise. I have looked at many physics books, but have never seen any mention of this curious oscillation. It is the mathematical basis for the range of creation from smaller than the smallest to bigger than the biggest.

Unfortunately many physicists have blinded themselves to even being able to encounter this dynamic D-shifter by a particular convention they have adopted. I wonder sometimes if the convention was set up deliberately to hide the special properties of (H c)!!?? Physicists often use a convention called "natural units" in which they set (H) and (c) equal to 1. These two constants occur very frequently in both quantum mechanics and relativity. The use of natural units simplifies equations by eliminating all the occurrences of (H) and (c).

By choosing natural units modern physicists may have simplified equations, but they have washed out the D-shift operator. It is like they are living in Flatland. They see the world with only one eye and have lost depth perspective.

In "natural units" (H c) = 1.

In traditional units substituting pi, the D-shift, and the area of a unit circle so we can view the energy ratio from geometry, we get a visual picture of the limits of the cosmos.

* H c = 3.1622776x10^-26 J-m = (%) [(Ao / P %^2)^26 J].
* H c = (Ao / P)^26 (%^-51) J.
* (H c)^2 = 10^-51 J-m.

The physical world in all its richness is built by concatenating energy into many dimensions, folding it and refolding it. (H c) is a tool for achieving this. Using natural units is convenient in certain situations, but collapses that whole energy scaffolding so the building can' t stand up and be seen. The equations just sit there on the paper.

The Heisenberg relation allows one conjugate variable to dip down below the (h) limit as long as the other one stays properly outside that limit. This is indeed so, at least theoretically, and is a exemplified on a macroscopic scale by Hawking radiation in the case of BH' s.

* D(Mx Vx) D(X) >= H.

(Mx) is some mass. (Vx) is a velocity. (X) is a distance. (D) means a range of variation. Or you can slice it other ways.

* D(N e) D(X^2) >= H.

(N) is a dimensionless factor, (e) is unit charge, (X) is a distance. Here our variables are the charge factor and area.

* D(NkT) D(t) >= H.

Here (N) is a dimensionless factor, (k) is Boltzmann' s constant, (T) is a temperature, and (t) is time. Time and temperature are the variables. We' ll come back to this one when we go into thermodynamics and time.

* D(E) D(t) >= H.

Here (E) is energy, and (t) is time.

* D(p) D(q) >= H.

The D(p) and D(q) are two variable items with dimensions kg^1/2 m s^-1/2.

Let' s go back to our model of the neutrino.

* Mne = H / c %.

We can rearrange it as follows:

* (Mne c) (%) = H.

This is a Heisenberg relation. We know that (Mne c) (%) will be greater than or equal to (H).

Only (H) and (c) are limiting values here if we let (M) and (X) vary. (H) is a lower limit, and (c) is an upper limit, although zero velocities don't really make sense either. They cause the equation to explode. So apparently we can vary the distance and the mass as much as we like. But mass is also energy. It can not be infinite, or the universe would collapse. Nor can it be zero, because of vacuum state fluctuations. So there must be a minimum value for mass, the energy of the vacuum. There must be a maximum value for mass, one that would prohibit Big Bangs. We can calculate the vacuum state and measure it observationally. But that is only an average. Within that average the energy can vary, dipping way down, way down below the (H) threshold, perhaps as low as you like, but not to zero. The range of such energy will cause the distance variable to fluctuate over huge spaces as a superluminal phase wave. Use of this vacuum state energy, for example, with Casimir plates gives the possibility of manipulating zero point energy. It may be possible to actually generate neutrino-antineutrino pairs, or even electron-positron pairs with properly designed zero-point devices.

It is also possible to go down into that level with attention particles. Part of OP's mission is to define precisely what an attention particle is. Attention involves energy, so there must be attention particles. Palmer has mentioned their existence (**ReSurfacing**, p. 43), but gives no details as to mass. But there is a limit to how "tiny" you can get. We do know that wherever there is a stable bubble of mass possible, there must be a corresponding Compton radius that goes with it, given that we're establishing the radius with photons, the lightest "particles". Thus mass and distance are like correlated "particles." But now we "see" the limit. How can you set a Compton radius for a photon with a photon? The photon is stretched out, and not curled up, so it has no rest mass and therefore cannot bend space-time and deflect. So a photon will not interact with another photon. Photons can flow right through each other. A space full of only photons and no other particles is Euclidean, and (H) doesn't even work there, much less general relativity. There is a threshold energy (frequency) level below which photons move straight, and above which they curl in on themselves. This is leading us into our consideration of the Bosons.

It is also possible to divide attention and thereby generate "entangled" attention particles, one of which could be inside an event horizon, and the other outside it. They would be correlated, but apparently out of contact with each other. That lack of contact is a vestige of one viewpoint that has been obscured by another viewpoint, a belief covered by another belief, like a piece of paper you carelessly placed over your keys on the table while you look frantically for them. I'm sure you can think of times when you bumped into something you had set up but then totally forgot about, or you seemed to lose something. This is a case where you create a pair of correlated attention particles, then put one attention particle of the pair into a BH of awareness and then go off following the other correlated attention particle. No matter how far away you get, you are still correlated in consciousness to the forgotten or lost item. Sooner or later it will show up when you pop the quantum bubble -- i.e. shift viewpoint.

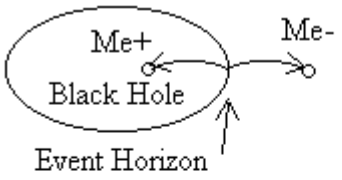
For an example from physics, when approaching an event horizon from outside, the physicist's equations explode a la Zeno's paradox of motion. So the physicist has to

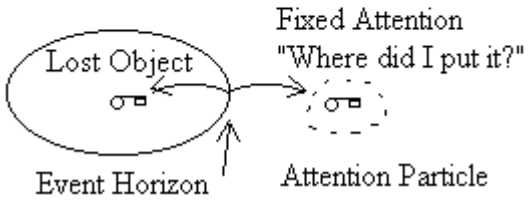
renormalize at the event horizon to continue following the evolution of a particle. This "renormalization" corresponds to what we call in ordinary speech "a shift of viewpoint." Using a Feynman diagram, you can view the event as starting at the bifurcation point on the event horizon and spreading simultaneously out away from it and into it toward the singularity. The event propagates from the horizon in two spatial directions but also oppositely in time. Then there' s no viewpoint shift needed to incorporate both segments of the trajectory. So the physicist has a challenge choosing his viewpoints.

This sort of viewpoint shifting is also how the calculus works. Ordinary people shift viewpoints all the time. It' s just good protocol to let yourself and your readers know when you do it. If not, you sometimes get into funny self-contradictory situations later on. Ah well, we often make hidden assumptions.

This is a rough cut at the leptons and hadrons with some general discussion thrown in. We' ll talk about the bosons in the next chapter.

Hawking Radiation





Memory Automaton