Postulate 1

Abstract: Modern fundamental physics theories such as the Standard Model (SM) contain many assumptions. So where do all these assumptions come from? This is not real understanding. It is curve fitting. So why bother?

This theory in contrast has only one simple postulate:

Postulate 1.

So there is *reason to be excited. The 1 in the postulate of 1 generates the 1∪1≡1+1 list-define algebra (eg.,eq.3.6) underpinning of the* rational numbers*. 1 is a real number so we can now:*

***define the real number 1** from a Cauchy sequence of* rational numbers *(Cantor) using iteration $z_{N+1}=z_Nz_N+C$ (eq.1a), δC=0 (eq.1b). In that regard solve 1a for noise C in δC=0 (eq.1b) and get $\delta(z_{N+1}-z_Nz_N)=0$ implying z_N is finite since ∞−∞ cannot equal 0. So as N→∞, C→0 then z_{N+1} (defined to be z then) has to approach **1** so eq.1a $z_{N+1}=z_Nz_N+C$ turns uniquely into z=zz+C (eq.1) (eg.,1=1X1+0) thereby **defining real#1** in the postulate of 1.*

***Solve 1a,1b for C and** z(eigenvalues,eq.3.6): So plug eq.1 into eq.1b getting Special Relativity(SR) and a* un*broken degeneracy Clifford algebra (sect.2). Equation1a explicitly defines the Mandelbrot set C_M(since z_{N+1} finite) with a fractal $(¼)^N$Mandlebulbs and $(10^{40})^N$Xcosmology. C_M turns SR into GR and* breaks *that 2D degeneracy into **4D** Clifford algebra of Mandlebulbleptons(eq.9) and associated Boson composites in the SM(sect.4).*

***Summary**: So given the fractalness, astronomers are observing from the inside of what particle physicists are studying from the outside, that ONE thing (eq.9) we postulated. So by knowing essentially nothing (i.e.,ONE) you know everything! We finally do understand.*

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Key Words

Solution iterative: Mandelbrot set $\{C_M\}$, **z-1=**C_M Fiegenbaum point, Mandlebulbs, 10^{40}Xfractal electron, cosmology. Flat Space (Asymptotic), **eigenvalues**≡(δC=0)**,** *un*broken 2D degeneracy, Special Relativity(SR)

Curved space, rotation by C_M: (of SR into GR), gravity, *broken* 2Ddegeneracy: 4D Clifford algebra, dichotomic rotation: Bosons, Standard Model(SM), **eigenvalue operator formalism**

postulate 1, natural numbers, eigenvalues, list-define algebra, eq.1**,** postulate 1

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Introduction

. We postulate 1. The 1 in the postulate of 1 generates the 1∪1≡ 1+1 list-define natural number algebra(eq.3.6) underpinning of rational numbers. Everybody knows 1 is a real number so **we define the real number 1 in the postulate of 1** from a Cauchy sequence of these rational numbers (Cantor) defined from iteration $z_{N+1}=z_Nz_N+C$ (eq.1a), δC=0 (eq.1b). In that regard solve eq.1a for noise C and substitute it in δC=0 (eq.1b) and get $\delta(z_{N+1}-z_Nz_N)=0$ implying z_N is finite since ∞−∞ cannot equal 0. So as N→∞, C→0 then

z_{N+1} (defined to be z then) has to approach **1** and so eq.1a $z_{N+1}=z_N z_N+C$ turns uniquely into z=zz+C (eq.1),(eg.,1=1X1+0) **defining 1 as a real number in the postulate of 1**! This "circular reasoning" (1→rational numbers→real numbers→1) keeps us down to **just one postulate** here. Also we have derived both theoretical physics and real number mathematics at the same time.

So just **postulate 1** (Everyone knows 1 is a real number.).
Then use Gaussian elimination on eq.1 and 1b to solve for z and C.
Notice we have derived both (rel#) mathematics and theoretical physics from the postulate of 1.
z=zz+C (eq.1)

The mundane context for this 1 in the postulate1 is that of an averaged *observed* signal X in X±ΔX, ΔX=Standard Deviation= SD≡√variance. So observation (sensor defined noise) plays a math role here, were X is a function of {observer∪signal} with random error ΔX. Then normalize X/X±ΔX/X≡1±(Δ1)' ≡1±(δ1)' ≡Generic Signal(GS)≡z'.
So then how do you easily remember this entire theory? Just Postulate 1. That's the whole theory! Ah, you say, that can't be all there is to it since "ONE" has *algebraic* properties too (eg.,1=1*1+0). My response to that statement is that this merely means you then have an equation for *algebraic* properties, equation 1.
Note this still means "Postulate 1".

Note the only way to include C noise in that 1=1*1 *algebraic* definition of 1 is to simply add it so as is usual z≡1+δz: GS+C=GS*GS or z-zz≡C (eq.**1**).
for limit C→0. Also a "postulate" is trivial unless what you postulated *exists*. Note noise δz'≡C (z'=1) cannot be infinity given δC=0 since ∞-∞≠0 and given the normalization 1 X cannot be zero since 0/0 is undefined. So signal *exists* (i.e., is not 0 and is not drowned out by noise) **if δC=0** (eq.1b).
with "**existence**", and so **δC=0** thereby is **required for eigenvalues** in eq.3.6**.** The 1 in postulate 1 itself provides the starting point for a positive integer list-define algebra (sect.3) underpinning of eq.1 without any new postulates (axioms) making this a self-contained theory.
Note this still means "Postulate 1".

Everybody knows **1** is a real number so eq.1a,1b hold.
String theory is not the only game in town

Postulate 1
Solve eq.1a,1b for the physics

Use the 1 in the postulate 1 to define the list-define natural number algebra 1U1≡1+1 underpinnings of eq.1a,1b.
So we have a self contained theory based *only* on the postulate of 1.
We then have a first principles derivation of both math and physics.

Theory: Small C

If $C \rightarrow 0$ and eq.1b implies eq.1a reduces to **$z=zz+C$** (equation1)
Eigenvalues of this z defined from eq.3.6. Appendix B.

Gaussian elimination: Thus **solve eq.1 for C**, plug into eq.1b and note we need to factor the result to **solve for z** and its eigenvalues.

Section 1 Rewrite equation 1 in $z=1+\delta z$ form

(Define $z \equiv z'+\delta z$, $z' \equiv 1$, $\delta z \equiv C$) So first rewrite eq.1:

$$z'+\delta z=(z'+\delta z)(z'+\delta z)+C,$$

So $1+\delta z=(1+\delta z)(1+\delta z)+C$ and rearranging

$1+\delta z=1+2\delta z+\delta z\delta z+C$ and canceling

$$\delta z\delta z+\delta z+C=0 \qquad (1.1)$$

Equation 1.1 is a quadratic equation with in-general complex 2D solution (eg., if large noise C)

$$\delta z=dr+idt \qquad (1.2)$$

or $\delta z=dr-idt$ for all orthogonal (90°, ⊥) dr and dt and so arbitrary dx⊥dy (eg., $\delta z=dx+idy$) (1.3)

with speed coefficient c in cdt≡dt explicitly a constant here given variation only over t (1.4)

Equation 1.2 from 1.1 constitutes the derivation of space and time (in the context of eq. 2A).

Section 2 Small C. Solve for z

Solve eq.1 for C, plug into eq.1b and factor the result to **solve for z.** By plugging the small C in equation 1 back into $\delta C=0$ (eq.1b) we get $0=\delta C=\delta(\delta z+\delta z\delta z)$ and we have

$$\delta(\delta z\delta z)=\delta[(dr+idt)(dr+idt)]=0 \qquad (2)$$

the equivalent of eq. 1a,1b. Note to 'solve for z (=1+δz) we must solve for the (linear dr±dt) factors.

2.1 Factoring Eq. 2 'solves for z'

$$\delta(\delta z\delta z)=\delta[(dr+idt)(dr+idt)]=\delta(dr^2+i(drdt+dtdr)-dt^2)=0 \qquad (2)$$

The Imaginary part of eq.2 is from the (eq.2) generic $\delta(drdt+dtdr)=0$ *(2B)*

If the dr,dt are +integers (see sect.4.2) then drdt+dtdr=0 is a minimum. Alternatively if dr is negative then drdt+dtdr=0 is again a maximum for dr-dt solutions. So all dr,dt cases imply invariant $drdt+dtdr=0$ (2B1)

Note in general if dr≠dt then 2B1 holds. Next **factor** the real part of eq.2 to get

$\delta(dr^2-dt^2)=\delta[(dr+dt)(dr-dt)]=ds^2=[[\delta(dr+dt)](dr-dt))]+[(dr+dt)[\delta(dr-dt)]]=0.$ (2A)

So $dr^2-(1)^2dt^2=ds^2$ is invariant along with 1=c from eq.1.4. So we have derived special relativity. (The later sect.4 second solution C_M just rotates $dr \rightarrow dr' \equiv dr-C_M$, $dt \rightarrow dt' \equiv dt+C_M$ making the form of 2A unchanged and giving GR). So after **factoring** eq.2A then eq.2A is satisfied by:

2AI $\delta(dr+dt)=0$; $\delta(dr-dt)=0$. +e,-e two simultaneous objects, 2D⊕2D, 1∪1, eq.9

2A11A $\delta(dr+dt)=0$, $dr+dt=0$ pinned to the $dr^2=dt^2$ light cone. ν

2AIIB δ*(dr-dt)=0, dr-dt=0* " " (note also dichotomic with 2AI)
anti ν
2AIII dr-dt=0, dr+dt=0 so dt=0,dr=0, no ds so eigenvalues=0, vacuum:the default **C_M=0 solution**
So if the variation(dx+dy)=0 i.e., δ(dx+dy)=0, then dx+dy=ds=invariant. So for invariant ds:
2AIA $dr^2+dt^2 = ds^2$ (so $\delta z=dse^{i\theta}$) ds^2 is a min at 45° (so extremum $\delta z=dse^{i\theta/2}$) and drdt is a max since 2AI dr+dt is invariant.
2AIIA dr+dt=ds, dr+dt=0
2AIIB dr-dt=ds, dr-dt =0
2AI **dr+dt=ds, dr-dt=ds**; So there are *two* simultaneous 2AIs for every eq.1.1 for 2AI. So we must write eq.1.1 as an average in the case of eq.2AI. For our positive dr&dt need 1st and 4th quadrants (given 2AIA;45°) so $dr\approx dr_1\approx dr_2$, $dt\approx dt_1\approx -dt_2$. So for average eq.1.1 $\delta z=dr+idt\approx (dr_1+dr_2)/2 + i(dt_1-(-dt_2))/2\equiv(dx_1+dx_2)_{2AI}+i(dx_3+dx_4)_{2AI})\equiv ds_{rt}+ids_{tr}$. So given eqs.1.2 and 2AI we have then the **2D *un*broken** degeneracy
$\delta z=dr'+dt'=ds_{rt}+ds_{tr}\equiv(dx_1+dx_2+dx_3+dx_4)=ds$. (2C)
and the **dr+dt** solutions for δz and so **z**.

Section 3 Eigenvalues of z formalism from equation 1b and 2AIA

Note also some invariant C exists from eq.1b (introduction). Note also C is a uncertainty so all numbers are finite precision here so can be multiplied by a large enough number (appendix A) to become integers so will then not require new axioms (postulates). Recall also from eq.1: zz=z-C = z+zδz=z-C. So δzz=C (3.1)
Also eq.1 zz+C=z and from equation 2AIA rotation at θ_o=45° implies $\delta z=dse^{i45°+\Delta\theta°}$. In eq.3.1 δzz=C we then move the $e^{i45°}$ from the δz to z and then redefine z≈1(≡s') as z" so the equality $\delta zz=C\equiv\delta z_M z$"
(3.2)
remains. So for this new z", $\delta z_M z$"=C. δz_M is a constant in eq. 3.2 so z" rotates with noise C dichotomically in the complex plane as $z"\equiv1e^{i(45°+\Delta\theta)}=1e^{i(\theta_o+\Delta\theta)}$ (3.3)
From 2AIA $ds^2=dr^2+dt^2$ and so we have a circle: $dz=dse^{i\theta}$. θ=kr+wt.
dz'z'=C. So dsz'=C. Can multiply by both sides by ds and eq.2AIA implies ds^2z'=Cds and the ds^2 are still diagonalized as $(dr^2+dt^2)dz'$. Cross terms drdt let us say are not allowed or the invariance ds fails with this new eq.3.1 method. So ds^3z'=C is not allowed. All we are allowed then is dsz'=C and ds^2z'=C were s'≈ 1>ds given 2AIA. So we can substitute 1(cosθ)≡t, 1(sinθ)≡r>>dr into:
$$z" \equiv 1e^{i\theta}\equiv e^{i(\theta_o+\Delta\theta)}\equiv s'e^{i((\cos\theta dt+\sin\theta dr)/s))+\theta_o)}\equiv s'e^{i(\omega t+kr+\theta_o)} \quad (3.4)$$
In the exponent of eq.3.4 1sinθ=r, k≡dr/s so ikz"=∂z"/∂r so
$$kz"=-i\partial z"/\partial r=(dr/s)z"=p_r z" \quad (3.5)$$
defines our 'operator' and is the reason for factoring in sect.1. So for simultaneous 2AI+2AI coming out of our **eigenvalue generator** δC=0 (gave 2AI) and 2AIA (gave eq.3.5) we define the number 2 from **operator 2z"≡**
(1∪1)z"≡(2AI+2AI)z"≡((dr+dt)+(dr-dt)/s))z"≡-i2∂z"/∂r (3.6)
=(integer)k)z" (or alternatively subtract to get (integer)ωz"). Also eq.3.6 implies $((dr+dt)^2/ds^2))z" \equiv \partial^2z"/\partial r^2+\partial^2z"/\partial t^2)$ given 2B1 gets rid of the drdt cross terms. But ds^3

does not give integer eigenvalues needed for list-define math. So from eq.3.6 we obtain the eigenvalue of **z=0,1** (3.7

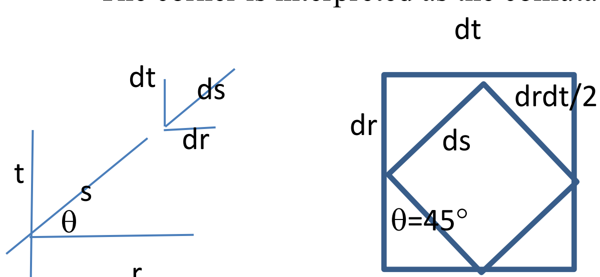
and 1+1. So eq.3.6 defines the finite +integer *list*(i.e.,$1\cup1\equiv1+1\equiv2$)--*define*(i.e.,A+B=C) math *required for* the algebraic rules underpinning eq.**1** *without* any added postulates (axioms). That Clifford algebra cross term generation (with $C_M<0$) requires we define larger numbers than 2 with this math and also implies a 130° dichotomic rotation, sect.4.3).

The integer k and ω integer changes KΔω are due to Frobenius series termination jumps in the eq.9 solutions (Ch.9) of finite countable N without resorting to ad hoc SHM. So $\Delta E \equiv K\Delta\omega \equiv \hbar N\Delta\omega$ (rename $\Delta\omega\rightarrow\omega$) and thereby subdivide all of physical reality: $E_{universe}=\Sigma_i\hbar\omega_i$. Also 2AI 45° diagonal (large noise C so 'wide slit') is a *particle* eg.,2AI. On dr axis (small C, so 'narrow slit') the 2AIA *wave* equations dominate implying wave-particle duality. So given **eigenvalue generators** eq.2AIA, or equivalently eq.3.6 operator formalism and eq.9 (sect.3)

we have derived quantum mechanics from first principles.

2.2 Goemetrical Representation Of 2AI factor: Solution 1

Since the only (ground state) solution is positive integer constant =dr+dt (2AI) first quadrant we can represent our (eq.2) solution as a square within a square of fig.1 below. Note if sides dr+dt are invariant then so is the hypotenus ds and corner areas drdt+dtdr. The corner is interpreted as the comutative ansatz drdt coefficient of section 4.3



2A1: $\delta(dr+dt)=0$ so the length of the side dr+dt of the large square is a constant. Thus from figure 1 ds in the inscribed small square is shortest at θ=45°. Thus $\delta(dr^2+dt^2)=\delta(ds^2)=0$ at 45°. So $ds^2=dr^2+dt^2$ and $dr+dt=\sqrt{2}=ds\equiv\delta z_M$ given $\delta(ds^2)=0$ at 45°.

Figure 1

Solution 1 Eq.2

$\delta(dr+dt)=0$, $\delta(drdt+dtdr)=0$ $\qquad$ $\delta ds^2=0$ at 45° given on the complex plane:

$ds^2=dr^2+dt^2$ so at around 45°: $\delta z=dse^{i\theta}$ (2A1A)

Section 4. Large C

Instead of solving eq.1 and eq.1b $ds=\sqrt{2}ds=dr\pm dt$ (eq.2AI, 2AII,2AIA) as in section 2 we solve the general case of eq.1a, 1b which thereby imply the Mandelbrot set $\{C_M\}$ on the -dr axis with $-dr=drdr+C_M$. On the next smaller (10^{40}X) fractal scale (our baseline subatomic scale) drdr<<dr and so $-dr\approx C_M$. So that to preserve the ds invariance $\sqrt{2}ds$ $=(dr-C_M)+(dt+C_M)\equiv dr'+dt'$ (4.1)

Here $C\rightarrow\pm C_M$ (dichotomic 130° rotation in eq.1 with $C=C_M$=Fiegenbaum point 1.40115..) instead of 0 in eq.4.1 and we fill in the gaps with that C. This $\pm C_M$ rotation results in composites.

4.2 Rotation of δz by C_M Creates Curved Space Two Body Eigenvalue Physics

So from 2AIA at 45°and 2AI and eq.3.6 θ can change by $\varepsilon/2\equiv C_M$:

$$\sqrt{2}ds=(dr-\varepsilon/2)+(dt+\varepsilon/2)\equiv dr'+dt' \quad (4.1)$$

$\Delta\theta \approx \varepsilon/ds$ of eq.2AI dr+dt at 45° $(dr',dt') \in$ {degenerate solutions eq.2C}) that here **break those** 2D **degeneracies** giving **4D**. Define $r \equiv dr$ and $\kappa_{rr} \equiv (dr/dr')^2 = (dr/(dr-\varepsilon/2))^2 = 1/(1-r_H/r)+rn$ (4.2)
Putting the $\kappa_{\mu\nu}$s in eq.2A1A we obtain for both of these spherical symmetry κ_{rr} metric coefficients: $ds^2 = \kappa_{rr}dr'^2 + \kappa_{oo}dt'^2$ (4.3)
Note from 2AIA drdt is invariant (at 45°) and so $dr'dt' = \sqrt{\kappa_{rr}}dr\sqrt{\kappa_{oo}}dt = drdt$ so $\kappa_{rr} = 1/\kappa_{oo}$ (4.4) i.e., the old Schwarzschild-rn result outside r_H. Use tensor dyadics to derive the other GR metrics
So we derived General Relativity *by* (the $C_M = \varepsilon$) **rotation** *of special relativity* (eqs 2A, 2AI)
Also from 2AIA and eq.4.1: $ds^2 = dr'^2 + dt'^2 = dr^2 + dt^2 + dr\varepsilon/2 - dt\varepsilon/2 - \varepsilon^2/4$ (4.5)
2AII: From eq.2AII and equation 3.5 the neutrino is defined as the particle for which $-dr' = dt$ (so can now be in 2nd quadrant dr', dt' can be negative) so $dr\varepsilon/2 - dt\varepsilon/2$ has to be zero and so ε has to be zero therefore $\varepsilon^2/4$ is 0 and so is pinned as in eq.2AII (*neutrino*).$\delta z \equiv \psi$. So $C_M = \varepsilon =$ *mdr Is uncharged and also massless in this flat space.*
2A1: Recall eq.2AI electron is defined as the particle for which $dr \approx dt$ so $dr\varepsilon/2 - dt\varepsilon/2$ cancels so ε ($=C_M$) in eq.4.5 can be small but nonzero so that the $\delta(dr+dt)=0$. Thus dr,dt in eq. 2AI are automatically both positive and so can be in the *first quadrant as positive integers*. 2A1 is *not* pinned to the diagonal so $\varepsilon^2/4$ (and so C_M) in eq.4.5 is not necessarily 0. So *the electronischarged*
If that $\pm C_M$ rotation covers 2AI or 2AII the charge on these objects (eg., charge on 2AII is 0) becomes the charge on the composite. This added intermediate white noise is not charged.

4.3 Eq.2AI Eigenvalues in equation 3.6 incorporating C_M

To remain within the set of eq.1 solutions set (allowing infinitesimal rotation within the noise) we note that the *2D **degeneracy** of eq.2C is **broken** by the solution2 **rotation** (eq.4.1)* were we use ansatz $dx_\mu \to \gamma^\mu dx_\mu$ where γ^μ may be a 4X4 matrix and commutative ansatz $dx_\mu dx_\nu = dx_\nu dx_\mu$ so that $\gamma^\mu\gamma^\nu dx_\mu dx_\nu + \gamma^\nu\gamma^\mu dx_\nu dx_\mu = (\gamma^\mu\gamma^\nu + \gamma^\nu\gamma^\mu)dx_\mu dx_\nu$ ($\mu,\nu=1,2,3,4$; $\mu\neq\nu$). So from eq.2AI and resulting eq.(2C) then $ds^2 = (\gamma^1 dx_1 + \gamma^2 dx_2 + \gamma^3 dx_3 + \gamma^4 dx_4)^2 = (\gamma^1)^2 dx_1^2 + (\gamma^2)^2 dx_2^2 + (\gamma^3)^2 dx_3^2 + (\gamma^4)^2 dx_4^2 + \Sigma_{\mu\nu}(\gamma^\mu\gamma^\nu dx_\mu dx_\nu + \gamma^\nu\gamma^\mu dx_\nu dx_\mu)$. But $\gamma^\mu\gamma^\nu dx_\mu dx_\nu + \gamma^\nu\gamma^\mu dx_\nu dx_\mu = (\gamma^\mu\gamma^\nu + \gamma^\nu\gamma^\mu)dx_\mu dx_\nu$ implying $\boldsymbol{\gamma^\mu\gamma^\nu + \gamma^\nu\gamma^\mu = 0}$ **from 2B1** and also $(\gamma^\mu)^2 = 1$ from 2AIA. So the two 2AI results and 2B1 *imply the defining relation for a 4D* Clifford algebra: we have derived our 4Dimensons) with the time component defined to be $\gamma^4 dx_4$. So with $\kappa_{\mu\nu}$ in eq.3.2 we have

$$ds = (\gamma^1\sqrt{\kappa_{11}}dx_1 + \gamma^2\sqrt{\kappa_{22}}dx_2 + \gamma^3\sqrt{\kappa_{33}}dx_3 + \gamma^4\sqrt{\kappa_{44}}dx_4) \qquad (4.6)$$

Eq.4.6 also implies we can convert the 2AI (dr+dt)z" and the 2AIA (dr^2+dt^2)z" to first and second derivatives of z" terms (z"$\equiv\psi$). For example using 4.6:
Eq.2AI $\to ds = (\gamma^1\sqrt{\kappa_{11}}dx_1 + \gamma^2\sqrt{\kappa_{22}}dx_2 + \gamma^3\sqrt{\kappa_{33}}dx_3 + \gamma^4\sqrt{\kappa_{44}}dx_4)z'' \to \gamma^\mu\sqrt{(\kappa_{\mu\mu})}\partial\psi/\partial x_\mu = (\omega/c)\psi$
(9)
(eq.9) which is our new pde, adds the C_M to equation 3.5 (electron observables). It also becomes 2AII (ν pinned to the light cone where $C_M = r_H = \varepsilon = 0$ (sect.4.1)). The 6 Clifford algebra cross term requirements imply many multiple lepton contributions giving us Boson fields around them. Note the ω/c in $E = \hbar\omega$ implies we have found the actual **eq.2AI lepton eigenvalues.**

Review: Recall eq.9 gives half integer spherical harmonics with Clebsch Gordon two body $m=m_1+m_2$, $m_i=\pm½$. m=0 singlet (S state) result of the Pauli exclusion principle. See appendix B.

4.4 Eq. 2A1A Boson Eigenvalues m_1+m_2

Start by plugging eq.1 into eq.1b. Get 2AI,2AII. Include the C_M of eq.1b. To preserve the ds invariance then $\sqrt{2}ds=(dr-C_M)+(dt+C_M)\equiv dr'+dt'$ in eq.4.1. We repeat the m1+m2 Pauli principe addition of sect.4.3. Here $C\rightarrow\pm C_M$ (dichotomic 130° rotation) instead of 0 in eq.4.1 and we fill in the gaps with that C. So we have large C_M dichotomic 130° rotation to the next Reimann surface of 2AIA $(dr^2+dt^2)z''$ from some initial angle θ. Eq.1a solutions imply complex 2D plane Stern Gerlach dichotomic rotations using noise $z''\propto C$ (4.2) using Pauli matrices σ_i algebra, which maps one-to-one to the quaternionA algebra. From sect.4.2, eq.4.11 we start at some initial angle θ and rotate by 130° the noise rotations are: $C=z''=[e_L,\nu_L]^T\equiv z'(\uparrow)+z'(\downarrow)\equiv\psi(\uparrow)+\psi(\downarrow)$ has a eq.4.5 infinitesimal unitary generator $z''\equiv U=1-(i/2)\varepsilon n*\sigma)$, $n\equiv\theta/\varepsilon$ in $ds^2=U^tU$. But in the limit $n\rightarrow\infty$ we find, using elementary calculus, the result $\exp(-(i/2)\theta*\sigma)=z''.(dr+dt)z''$ in eq.4.11 can then be replaced by $(dr^2+dt^2+..)z''=(dr^2+dt^2+..)e^{quaternionA}$Bosons because of eq.2AIA. Rotate: z'':

2AB: 2A1IA+2AIIB Dichotomic variables→Pauli matrix rotations→$z'=e^{quaternion\ A}$ →Maxwell γ
=Noise C blob. See Appendix A for the derivation of the eq.2AIA 2nd derivatives of $e^{quaternion\ A}$.

2AC: 2AI+2AI Dichotomic variables→Pauli matrix rotations→$z''=e^{quaternion\ A}$→KG Mesons.

2AD: 2A1+2A1+2A1at $r=r_H\equiv C_M$ (also stable but at high energy, including Z,W.)

2AE: 2AI+2A1+2AII Dichotomic variables→Pauli matrix rotations→$z''=e^{quaternionA}$, Proca Z,W

Ch.8,9 on baryon strong force with Nth fractal scale $r_H=2e^2/m_ec^2$. Equation 2AE is a current loop implying that the Paschen Back effect with B flux quantization $\Phi=Nh/2e$ gives very high particle mass-energy eigenvalues. So we solved the hierarchy problem. Frobenius series solution from eq.9 gave lower hadron energies. All are singlet or triplet noise C blobs(2). See davidmaker.com, part II.

We have thereby found the **eq.2A1A Boson eigenvalue solutions**.

Summary: Solved eq.1 for z. Then we found the eigenvalues of z (eg., 2AI)

Note in equation 9 the $\kappa_{oo}=1-r_H/r$. Given the $10^{40}XC_M$ fractalness in the $C_M=r_H$ of equation 9 "Astronomers are observing from the inside of what particle physicists are studying from the outside, **ONE** object, the new pde (2AI) electron", the same 'ONE' we postulated. Think about that as you look up at the star filled sky some night! Also postulating 1 gives no more and no less than the physical world. That makes this theory remarkably comprehensive (all of theoretical physics and rel# math) and the origin of this theory remarkably simple: "one*"*.

So given the fractal self-similarity, by essentially knowing nothing (i.e., ONE) *you know everything!* We finally do understand.

References

1)E.Schrodinger, Sitzber.Preuss.Akad.Wiss.Physik-Math.,24,418 (1930) At>Compton wavelength there is no zitterbewegung, just a probability density blob. So instead of

deriving Schrodinger's blob from the Dirac equation we derive the Dirac equation (and the rest of physics) from the most general stable blob, our averaged data and SD≡Δz=δz region (section 2).

2) Konstantin Batygin. Monthly Notices of the Royal Astronomical Society, Volume 475, Issue 4, 21 April 2018. He found that cosmological Schrodinger equation metric quantization actually exists in the (observational) data.
(3) davidmaker.com

Appendix A 2AB $(dr^2+dt^2+..)e^{\text{quaternion } A}$ **Derivation From Sect.4.3 and operator in eq.4.6**

180° rotation from 90°

A is the 4 potential. From 3.4 we find after taking logs of both sides that $A_o=1/A_r$ (A1)

Pretending we have a only two i,j quaternions but still use the quaternion rules we first do the r derivative: $dr^2\delta z=(\partial^2/\partial r^2)(\exp(iA_r+jA_o))=(\partial/\partial r[(i\partial A_r\partial r+\partial A_o/\partial r)(\exp(iA_r+jA_o)]$
$=\partial/\partial r[(\partial/\partial r)iA_r+(\partial/\partial r)jA_o)(\exp(iA_r+jA_o)+[i\partial A_r/\partial r+j\partial A_o/\partial r]\partial/\partial r(iA_r+jA_o)(\exp(iA_r+jA_o)+$
$(i\partial^2 Ar/\partial r^2+j\partial^2 A_o/\partial r^2)(\exp(iA_r+jA_o)+[i\partial A_r/\partial r+j\partial A_o/\partial r][i\partial A_r/\partial r+j\partial/\partial r(A_o)]\exp(iA_r+jA_o)$
(A2)

Then do the time derivative second derivative $\partial^2/\partial t^2(\exp(iA_r+jA_o)=(\partial/\partial t[(i\partial A_r\partial t+\partial A_o/\partial t)$
$(\exp(iA_r+jA_o)]=\partial/\partial t[(\partial/\partial t)iA_r+(\partial/\partial t)jA_o)(\exp(iA_r+jA_o)+$
$[i\partial A_r/\partial r+j\partial A_o/\partial t]\partial/\partial r(iA_r+jA_o)(\exp(iA_r+jA_o)+(i\partial^2 A_r/\partial t^2+j\partial^2 A_o/\partial t^2)(\exp(iA_r+jA_o)$
$+[i\partial A_r/\partial t+j\partial A_o/\partial t][i\partial A_r/\partial t+j\partial/\partial t(A_o)]\exp(iA_r+jA_o)$ (A3)

Adding eq. A2 to eq. A3 to obtain the total D'Alambertian A2+A3=
$[i\partial^2 A_r/\partial r^2+i\partial^2 A_r/\partial t^2]+[j\partial^2 A_o/\partial r^2+j\partial^2 A_o/\partial t^2]+ii(\partial Ar/\partial r)^2+ij(\partial A_r/\partial r)(\partial A_o/\partial r)$
$+ji(\partial A_o/\partial r)(\partial A_r/\partial r)+jj(\partial A_o/\partial r)^2$
$++ii(\partial Ar/\partial t)^2+ij(\partial A_r/\partial t)(\partial A_o/\partial t)+ji(\partial A_o/\partial t)(\partial A_r/\partial t)+jj(\partial A_o/\partial t)^2$. Since ii=-1, jj=-1, ij=-ji the middle terms cancel leaving $[i\partial^2 Ar/\partial r^2+i\partial^2 Ar/\partial t^2]+$
$[j\partial^2 A_o/\partial r^2+j\partial^2 A_o/\partial t^2]+ii(\partial Ar/\partial r)^2+jj(\partial A_o/\partial r)^2+ii(\partial Ar/\partial t)^2+jj(\partial A_o/\partial t)^2$

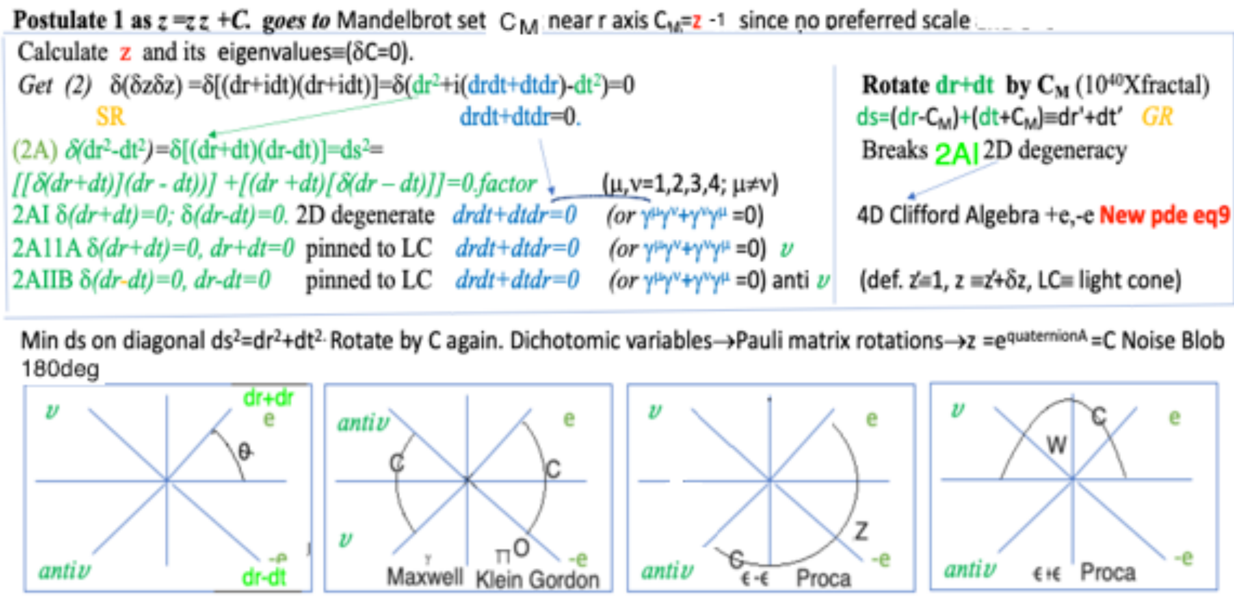
Plugging in A1 and A3 gives us cross terms $jj(\partial A_o/\partial r)^2+ii(\partial Ar/\partial t)^2=jj(\partial(-A_r)/\partial r)^2+ii(\partial Ar/\partial t)^2=0$. So $jj(\partial A_r/\partial r)^2=-jj(\partial A_o/\partial t)^2$ or taking the square root: $\partial A_r/\partial r+\partial A_o/\partial t=0$ (A4) $i[\partial^2 A_r/\partial r^2+i\partial^2 A_r/\partial t^2]=0$, $j[\partial^2 A_o/\partial r^2+i\partial^2 A_o/\partial t^2]=0$ or
$\partial^2 A_\mu/\partial r^2+\partial^2 A_\mu/\partial t^2+..=1$ (A5)

A3 and A4 are Maxwell's equations (Lorentz gauge formulation) in free space, if $\mu=1,2,3,4$.

$$\Box^2 A_\mu=1,\ \Box\bullet A_\mu=0$$

(A6)

Analogously from **2AC** we get with the eq.4.1 doublet ε±ε the Proca equ (3). We have thereby derived the field equations of the Standard electroweak Model.



Appendix B Mathematical Considerations

1st type of Fractalness $(10^{40})^N$ Mandelbrot Set Repeat Of The Universe

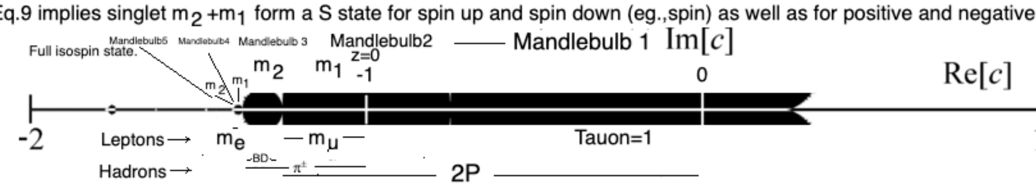
Go to the Utube HTTP with the 275 in the title to explore the Mandelbrot set. The splits are in 3 directions from the orbs. There appear to be about 2.5 splits going by each second and the next Mandelbrot set comes up in about 62 seconds. So $3^{2.7X62}=10^N$ so 172log3=N=82. So there are 10^{82} splits.
So there are about 10^{82}splits per initial split. But each of these Mandelbrot set Fiegenbaum points is a r_H in eq.9. So for each larger electron there are **10^{82} constituent electrons**. At the bifurcation point, which is also the Fiegenbaum point, the curve is a straight line and so $\delta C_M=0$. Also the scale difference between Mandelbrot sets as seen in the zoom is about **10^{40}, the scale change** between the classical electron radius and 10^{11}ly giving us our fractal universe.

2nd type of Fractalness $(1/4)^N$ Repeat Of The Mandlebulbs Correction For $1.4167=\Sigma(¼)^N.5+1.25$ And Eq.9 Singlet m_1+m_2 Limitation

We start at δz=-1 Mandlebulb2 since that is the vacuum z=0. Also eq.1.1 -δz=δzδz+C implies C<¼ if δz is a real number in $\delta z=\frac{-1\pm\sqrt{1-4C}}{2}$. Note the lack of a set scale makes the Mandlebulbs (figure below) get smaller by a approximate factor of ¼ each time on a different smaller Mandelbrot set. This is equivalent to a different Riemann surface so satisfying eq.1 again so implying one 2AI and 2AII doublet for each of the 3 surfaces: the 3 lepton families. Note also these C_M Mandlebulbs get into equation 9 through their associated equation 4.1 ψ=z"s eigenfunctions. So eq.4.1 and Eq.9 implies these Mandlebulbs are states analogous to atomic orbital states for both spin and also for charge doublets(isospin). It makes S states into singlets that act like Bosons. $m=m_1+m_2=½-½=0$ for two such spin states (spin) and two charge states (isospin). So this is all simply a Pauli principle application!

So when Mandlebulb2 and Mandlebulb4 fill up with spin up or spin down or charge + and charge minus- the state is full, no more charges are allowed (as in spin-isospin). So we must stop with Mandlebulb5 unless charge=0 from then on. Mandlebulb6 would then be the neutrino mass. This perturbation noise (field) squared C^2 is energy.
In the context of equation 9 start at z=0 $\mathbf{m_\mu \approx ¼^2}$ is m_1; Next $0=m_1+m_2$=singlet, Mandlebulb2(C_2)+Mandlebulb3(C_3) $=[(1/4)^2(1+1/4)]=.0791=\pi^\pm$.
m_1=Mandlebulb4=$[(1/64)^2]\approx\mathbf{m_e}$. Also $\delta z=-1$, the $\boldsymbol{\tau}$. Mandlebulb4 is also near the Fiegenbaum point fractal $X10^{40}$and stable since $\delta C=0$ there, so it is the ground state, with mass m_e. The fieldMandlebulb5 (1+1/4) coefficient fills the isospin state.

Eq.9 implies singlet m_2+m_1 form a S state for spin up and spin down (eg.,spin) as well as for positive and negative charge (eg.,Isospin).



All this seems nice and simple (eg.,$¼^2\approx m_u$, $(1/64)^2(1+¼)\approx m_e$, etc.,) but some subtle properties of the Mandlebrot set complicate matters. For example the Mandlebulb circle sum=1.4167=$\Sigma(1/4)^N$.5+1.25 is not quite at the Feigenbaum point 1.40115. So (1.4167-1.40115)/1.40115 =.011098 is not zero. 5.2X.011098 =.05772=Δ which acts both as a mere energy unit definition here and compensation for this difference. Also the filled ground state contains the field m_2 so add ¼ as in $(1/64)^2(1+ ¼)$ and the excited states contain this same field. So we take into account the Pauli principle (where 1+¼ adds field as m_2) and **compensate completely for this unphysical 1+Δ expansion and with these (1-Δ) coefficients in**:
$m_e= (1/64)^2(1+¼)1777(1-\Delta)$=0.510996Mev= ground state. **0.0004**%diff. 1+¼ adds that m_2 field.
$m_\mu=(1/4)^2 1777(1-\Delta)+2(.511)$=105.67Mev. **0.01**%dif. Added the 2X0.511Mevground state values
m_τ=(1)1777Mev; **0**% diff.
These residual discrepancies appear to be Δ^2 sized roundoff errors so we are getting precision answers here. These are the 3 lepton masses inserted into the eq.9 lepton equation in eq.4.1. Essentially by measuring the **widths** (squared) of these fractal Mandlebulbs we get the masses of the tauon, muon and electron in the proper context of Dirac eq.9 as 3 Riemann surface 2AI&2AII families. (m_e=.510999895.., m_μ=105.65837..)

Origin Of Mathematics

Single Postulate Of 1

eq.3.6 defines the finite +integer *list*(i.e.,$1\cup 1\equiv 1+1\equiv 2$)--*define*(i.e.,A+B=C) math *required for* the algebraic rules underpinning eq.1 ***without* any added postulates** (axioms). Also *list* 2*1=2, 1*1=1 *defines* A*B=C. Division and **rational numbers** defined from B=C/A. We repeat with the list 3*1=3, etc., with the Clifford algebra terms satisfaction keeping this going all the way up to 10^{82} and start over given the above fractal result given the r_H horizons of eq.4.2.

Note the noise C guarantees limited precision so we can multiply any number in our list with the above integer 10^{82} to obtain the integers in eq.3.6 which gives us quantization of the Boson fields

Real Numbers Defined from Our Rational Numbers

Real numbers are the core of mathematics (Try balancing your checkbook or measuring a length without them!) and physics. 1 is a real number. The key thing is that we are postulating 1, not 1 and a bunch of other stuff.

There are several equivalent ways of defining the real numbers.
One way is through Dedekind cuts. Another method is to define a number as a "real" number by defining a *Cauchy sequence of rational numbers* (Cantor's method) for which it is a limit.
For example it is easy to define π as a real number. You can use the Cauchy sequence $4(-1)^N/(2N+1)$ resulting in the series sum $4(1-1/3+1/5-1/7+...)=\pi$.
Note this is a sequence of *rational* numbers adding up to an *irrational* number sum ('summability' in the parlance of 'real analysis'). The union of the set of irrational and rational numbers is the "real " numbers by the way. Note this real number definition *required* that Cauchy sequence of rational numbers.
In contrast the rational number sequence defined by the iteration
$z_{N+1}=z_Nz_N+C$ (eq.1a); $\delta C=0$ (eq.1b); $N\to\infty$, noise $C\to0$ defines 1 (and not π) as a real number. Solve for C in eq.1a and plug that into eq.1b and get $\delta(z_{N+1}-z_Nz_N)=0$. Note the variation of $\infty-\infty$ cannot be zero so z_{N+1} has to be a *finite* number. So the resulting series has to be summable. Thus given $C\to0$ and $N\to\infty$ we *cannot* start the sequence with a number that ends up with a divergent sequence. We are thereby finally left with a sequence beginning with $z_0=1$ or 0 (N=0) as $C\to0$ and $N\to\infty$. Defining $z_{N+1}=z$ for $N\to\infty$ eq.1a then becomes $z=zz+C$ (eq.1) (Recall 1=1X1+0), our algebraic definition of 1.
You need an infinite series of rational numbers that do this: so you have to plug $z_{N+1}=z_Nz_N+C$ back into z_N in eq.1a and keep doing this as $N\to\infty$. Also take $C\to0$ and you see this simple iteration formula expand (as $N\to\infty$) into a series of rational numbers with a sumability analogous to what we found for π (We have also thereby imbedded the eq.1a fractalness into the definition of the real numbers!)
So you have defined 1 in terms of a Cauchy sequence of rational numbers in the context of this $C\to0$ so you have defined 1 as a real number. This is a **unique** method (**just giving us 1**,0) given the existence of noise C since we required equation 1a to generate equation 1 in that case, which gave us our algebraic definition of 1 in the end. Note we have also *defined set theory* and also arithmetic in operator equation 3.6 with simultaneous eq.(2AI+2AI) and its $1\cup1\equiv1+1$ eigenvalues. In that regard note also on this fundamental 'set theoretical' level (1U1) zero behaves like the null set $\varnothing$ and we all know the null set is an element of every set *anyway*. So we really **have just postulated 1** with the 0 merely coming along for the ride.

With that 'uniqueness' there are no other equations besides 1a, 1b (at least not ones that give us 1,0 since requiring that Cauchy sequence of rational numbers limit of 1 severely restricts our choices) that do this. Everybody knows 1 is a real number so it obeys eq.1a, 1b.

Postulate 1

So get all of physics from eq. 1a,1b.

Use the 1 in the postulate of 1 to define the list-define algebra $1\cup 1\equiv 1+1$ underpinnings of eq.1a

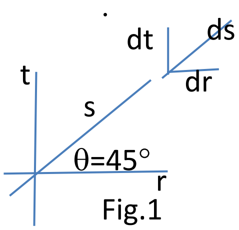
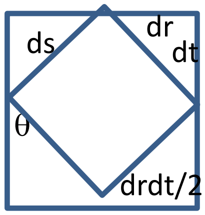
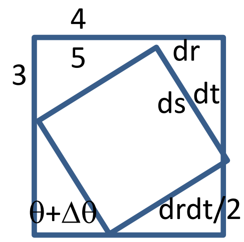


Fig.1



Solution 1 Eq.2



$\Delta\theta=C_M$ rotation of Solution1: called solution 2

2AI is 2 simultaneous equations $|C_M|>0$

$\delta(dr+dt)=0$, $\delta(drdt+dtdr)=0$

2AIA $\delta ds^2=0$, $ds^2=dr^2+dt^2$

$\varepsilon/2$ is still integer

$dr\rightarrow dr-C_M\equiv dr'$; $dt\rightarrow dt+C_M\equiv dt'$

$\kappa_{rr}\equiv(dr/dr')^2$, $ds^2=\kappa_{rr}dr'^2+\kappa_{oo}dt'^2$

4.6 Rotation of δz by C_M Creates Curved Space Two Body Eigenvalue Physics

So from 2AIA at 45°and 2AI and eq.3.6 θ can change by $\varepsilon/2\equiv C_M$:

$\sqrt{2}ds=(dr-\varepsilon/2)+(dt+\varepsilon/2)\equiv dr'+dt'$ (4.1)

$\Delta\theta\approx\varepsilon/ds$ of eq.2AI dr+dt at 45° $(dr',dt')\in$ {degenerate solutions eq.2C}) that here **break those 2D degeneracies**. Define $r\equiv dr$ and $\kappa_{rr}\equiv(dr/dr')^2=(dr/(dr-\varepsilon/2))^2=1/(1-r_H/r)+rn$ (4.2) Putting the $\kappa_{\mu\nu}$s in eq.2A1A we obtain for both of these spherical symmetry κ_{rr} metric coefficients: $ds^2=\kappa_{rr}dr'^2+\kappa_{oo}dt'^2$ (4.3)

Note from 2AIA drdt is invariant (at 45°) and so $dr'dt'=\sqrt{\kappa_{rr}}dr\sqrt{\kappa_{oo}}dt=drdt$ so $\kappa_{rr}=1/\kappa_{oo}$ (4.4) i.e., the old Schwarzschild-rn result outside r_H. Use tensor dyadics to derive the other GR metrics

So we derived General Relativity *by* (the $C_M=\varepsilon$) **rotation** *of special relativity* (eqs 2A, 2AI)

Also from 2AIA and eq.4.1: $ds^2=dr'^2+dt'^2=dr^2+dt^2+dr\varepsilon/2-dt\varepsilon/2-\varepsilon^2/4$ (4.5)

2AII: From eq.2AII and equation 3.5 the neutrino is defined as the particle for which $-dr'=dt$ (so can now be in 2nd quadrant dr', dt' can be negative) so $dr\varepsilon/2-dt\varepsilon/2$ has to be zero and so ε has to be zero therefore $\varepsilon^2/4$ is 0 and so is pinned as in eq.2AII (*neutrino*).$\delta z\equiv\psi$. So $C_M=\varepsilon=$*mdr Is uncharged and also massless in this flat space.*

2A1: Recall eq.2AI electron is defined as the particle for which $dr\approx dt$ so $dr\varepsilon/2-dt\varepsilon/2$ cancels so ε ($=C_M$) in eq.4.5 can be small but nonzero so that the $\delta(dr+dt)=0$. Thus dr,dt in eq. 2AI are automatically both positive and so can be in the *first quadrant as positive integers*. 2A1 is *not* pinned to the diagonal so $\varepsilon^2/4$ (and so C_M) in eq.4.5 is not necessarily 0. So *the electronischarged*

4.9 Alternative ξdr=ε Ansatz In 4.5 On Nth Fractal Scale: ξ=mass Definition

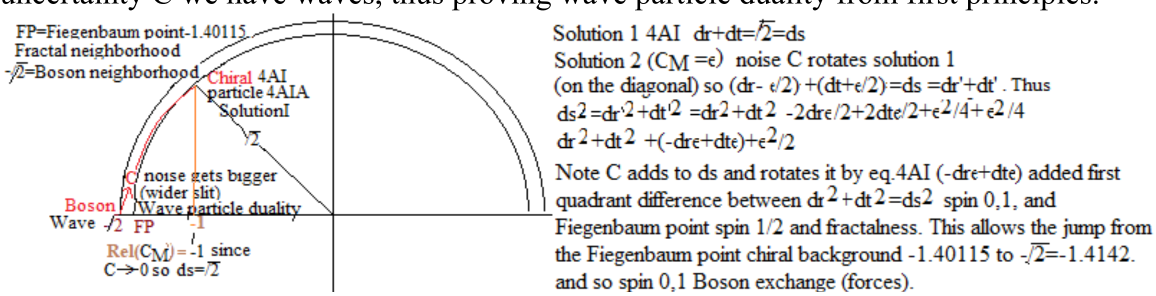
If you substitute dt for dr instead you get nothing new at (eq. 2AI) θ=45°since $dr\approx dt$ there. Clearly ξdr ($\xi\equiv\varepsilon/dr$, dr= DeBroglie λ because of 2AIA) also works in the same way as ε on the diagonals in changing the angle (see sect. 4.1). Note this 4A1 electron has the only nonzero mass C_M in free space making it the only fractal solution. In that regard exactly on the diagonals (light cone) $\xi=0$ in 2AII. So we then identify the ξ with mass (see also sect.6.3,6.4 for derivation of the magnitude of ξ from distance of object B). Since $m_e=\xi$ is the only nonzero proper mass here we can define $r_H=C_M\equiv 2e^2/m_ec^2$ then $m_ec^2r_H=\xi dr=\varepsilon=ke^2=\varepsilon$ as well, merely redefing our length units again. So set $m_e=1$ and then $C_M=1dr=(1)C_M$. Also in the time domain: energy=h/dt (eq.4.6) thereby defining h. Note the C_M distance units are arbitrary, we have only single mass m_e, which is a mere constant unit multiplier redefining distance units with ke^2/r then initializing the arbitrary energy units with h merely transforming 1/time to some energy or the other. So we avoided any free parameters here in this mass definition. See sect.7.12 for implications.

4.10 Bra-ket Notation

Note $e^{i(45°+\Delta\theta)}$ went from δz over to z" in eq. 4.1 (see eq.4.2) so equation 2A1A also implies $\int z"^*z"dV=1$ with $1/s'^2$ normalization. So from eq.4.6 $\int z"^*\delta z_M z"dV=<\delta z_M>$ $=<\delta z_M>\int z"^*z"dV=<\delta z_M>$ equivalent to bra-ket $<a|\delta z_M|a>$ with 'a' the eigenstates of eq.9,eg., half integer spherical harmonics (given 2AI is the only solution).

4.11 Uniqueness Of These Operator Solutions: Note the invariant operator $\sqrt{2}$=ds here. So the eq.2AIA operator invariant ds^2 and eq. 2AI, 2AII $\sqrt{2}ds\equiv\delta z_M=dr\pm dt$ is the **operator** (eq.4.6) solution δz_M (so *not* others such as ds^3 ,ds^4, etc.,which would then imply higher derivatives, hence a functionally different operator.).

4.12 C_θ<45° Boundary Conditions On E=Nħω Note finite energy E=Nħω (N=1) can be a spread out with low energy density or a localized at high energy density thereby implying equation 2AI and 2AII (and entangled states) are indeed equations for a particle Also for 45°, 135°, 225° and 315° the ds is invariant (sect.2) and so therefore dr and dt are constants with these integer values, particles. But as $C\to 0$, in $z"=s'e^{i\omega t}$, $s'\to 0$ so amplitude s' in $s'e^{i\omega t}$ flattens it out with also the ds then no longer invariant (for θ<45°) making the dr and dt non constant introducing some ambiguity into their characterization as the integer N=1, (i.e., it's not a particle.). We then have a wave (eq.7 &eq.1.1.4) with unknown N. So we have only low energy density plane waves for $C\to 0$. So for a wide single slit with large uncertainty C we have particles and for a narrow slit with small uncertainty C we have waves, thus proving wave particle duality from first principles.



$C\to 0$ implies we are in the neighborhood of the real axis so Rel C_M is what we must use. So $RelC_M=Rel(z_{n+1}-z_nz_n)=-1$ being an element of both the Mandelbrot set and satisfying equation 2 all at once. Thus at 135° then ds=$\sqrt{2}$. So ε is imaginary since ε^2 thereby moves the $\sqrt{2}$ solution inward to the Fiegenbaum point radius and provides the added noise C needed to do that.

Summary: Solved eq.1 for z. Then we found the eigenvalues of z (eg., 2AI)

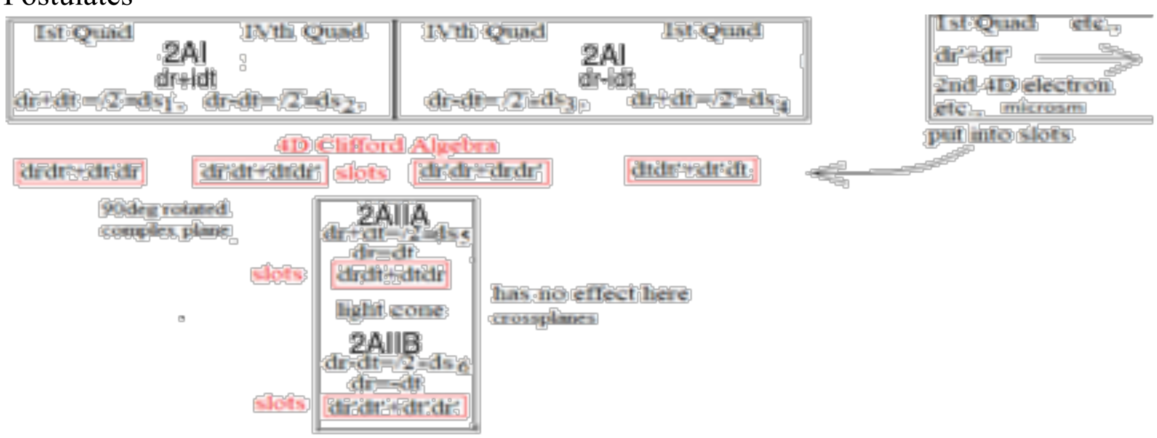
Note in equation 9 the $\kappa_{oo}=1-r_H/r$. Given the $10^{40}XC_M$ fractalness in the $C_M=r_H$ of

equation 9 “Astronomers are observing from the inside of what particle physicists are studying from the outside, **ONE** object, the new pde (2AI) electron”, the same ‘ONE’ we postulated. Think about that as you look up at the star filled sky some night! Also postulating 1 gives no more and no less than the physical world. That makes this theory remarkably comprehensive (all of theoretical physics and rel# math) and the origin of this theory remarkably simple: “one”.
So given the fractal self-similarity, by essentially knowing nothing (i.e., ONE) *you know everything!*   We finally do understand.

References

1)E.Schrodinger, Sitzber.Preuss.Akad.Wiss.Physik-Math.,24,418 (1930) At>Compton wavelength there is no zitterbewegung, just a probability density blob. So instead of deriving Schrodinger’s blob from the Dirac equation we derive the Dirac equation (and the rest of physics) from the most general stable blob, our averaged data and $SD\equiv\Delta z=\delta z$ region (section 2).
2) Konstantin Batygin. Monthly Notices of the Royal Astronomical Society, Volume 475, Issue 4, 21 April 2018. He found that cosmological Schrodinger equation metric quantization actually exists in the (observational) data.
(3) davidmaker.com

Appendix D List-define, List-Define, 10^{82} Derivation Of Mathematics Without Extra Postulates



These added cross term eq.9 objects (2AI) extend eigenvalue equation 4.6 from merely saying 1+1=2 all the way to the number10^{82}. Recall our first principles derivation means we postulate 1 as two definitions and we solve these two equation (1) for their two unknowns: that is the whole shebang.
From section 4.4 we generate 6 cross terms directly from one application of eq,1a that may or may not be the ones required for our 4D Clifford algebra. To get precisely the 6 cross terms of a 4D Clifford algebra we had to repeatedly plug into eq.2a the associated dr,dt of the required cross term drdt+dtdr. But in this process we thereby create other 4AI terms for other electrons and so build other 4D electrons and so a sequence of electrons We thereby generate the universe! Thus we have derived the below progressive generation of list- define microcosms. We then plug that into 4.11 as sequence of electrons. This allows us to use 4.11 to go beyond 1U1, beyond 2 to 3 let’s say. So we can then define $1\cup 1$ from equation 4.11 δz_M just like postulate 1 was defined from eq.1

and eq.2. So consistent with 4.11 and eq.1b we can then develop +integer mathematics from 1U1 beyond 2 because of these repeated substitutions into eq.1b using a list-define method so as not to require other postulates. So by deriving the 6 crossterms of one 4D electron we get all 10^{82} of them! So just multiply any number (given our limited preicion) by 10^{82} and it becomes an integer implying all integers here. Given the ψs of equation 9 for $r<r_c$ (So a allowed zitterbewegung oscillation thus SHM analogy) we can then redefine this integer N-1 also as an eigenvalue of a coherent state Fock space $|\alpha>$ for which $a|\alpha>=(N-1)|\alpha>$. Also recall eigenvalue 1∪1 is defined from equation 4.6. Note 10^{82} limit from section 6.1. Any larger and it's back to one again.

The Progessive "List" Origin Of Mathematics

Microcosm Math 3 Numbers (allowed by finite precision)		**Cosmic Math 10^{82} Numbers**
1 U 1≡1+1≡2	1+1≡1*2	
1 U 2≡1+2≡3	2+2≡2*2	
Defines A+B≡C	Defines A*B≡C That being eq.2 Finite precision ≡ noise > 0	

Eq.2 can now define 0 with 0*0=0
Use 0 to define subtraction with
1-1≡0
2-2≡0
3-3≡0
Defines δC=0 That being Eq.1 in this particular microcosm.
Note there are no axioms for defining relations A+B=C or A*B=C, just the list above those relations. in that particular microcosm. There are no postulated rings or fields here either.

We use 3 number math to progressively develop the 4 number math etc., eg.,2+2≡4., so yet another list. Go on to define division from A*B≡C then A≡B/C. So the method is List-define, list-define, list-define, etc., as we proceed into larger and larger microcosms. There are no new postulates (axioms) in doing that. It follows from our generation of those 6 Clifford algebra cross terms one after the other and that sequence of 4D electrons, the objects we are counting. We require integers and so no new axoms. Note C implies finite precision and we can always multiply a finite precision number by a large enough integer to make a finite precision number an integer in any case. So we also have our required integers here. So we don't need any more axioms such as Peano's mathematical induction or ring and field axioms. We generate each microsm number and algebra with this list define method until we reach 10^{82} (sect.4.1).

Everybody knows that **1** is a real number so obeys eq.1a,1b which also imply fractalness. String theory isn't the only game in town.

Postulate 1
Solve 1a, 1b for the physics.

Use the 1 in the postulate of 1 to define the list define mathematics 1∪1≡1+1 underlying eq..1a,1b. You have come full circle here and so *do not require any more postulates*.

You then have a 'first principles' derivation of both real number mathematics and physics.

Part I

Ch.1 1 is a real number so it obeys eq.1a, eq.1b. So **postulate 1** and solve eq.1a and eq.1b. Use the 1 in the postulate of 1 to define the list define mathematics 1∪1≡1+1 underlying eq..1a,1b. You have come full circle here and so *do not require any more postulates*. You then have a 'first principles' derivation of both real number mathematics and physics.

We note that in the neighborhood of z=1,0 that the real z constraint (given noise C) implies our solution set (to eq.1,2) is the Mandelbrot set $\{C_M\}$(sect.3, 10^{40}X fractal cosmology).

Plug the C in eq.1 into the eigenvalue definition(see introduction) δC=0 and you get special relativity (eq.2A) and a unbroken 2Ddegeneracy (eq.2C) and Clifford algebra and dr+dt=√2ds invariance. $\{C_M\}$ implies we must then rotate $ds=(dr-C_M)+(dt+C_M)=dr'+dt'$(eq.3.1) giving general relativity and broken degeneracy **4D** Clifford algebra SM leptons (eq.9). This same rotation (sect.4.3) also generates the SM Bosons(γ,W,Z) and with eq.2AIA their **eigenvalue operators** eq.4.11.

Ch.2 Details of **Fractalness** 10^{40}X cosmological fractal scale C_M jumps

Ch.3 Eq.2 **2D** isotropic-homogenus Space-Time gives 0 vacuum energy density G_{oo}.

Ch.4 **Solution2** breaks eq.1a 2D degeneracy generating 4D Clifford Algebra for eq.4AI

Ch.5 Nearby object B **fractal** object (and Object C) creating the proton we are inside

Ch.6 Particle mass from object B and A separation. $U=e^{iHt}$ used to derive metric quantizat

Ch.7 Comoving coordinate transformation with object A: Cosmological observables, G

Part II

Ch.8 2AI+2AI+2AI at $r=r_H$.Paschen Back, Φ=2e/h,high mass particles Separation Of Variables Of Eq.9

Ch.9 Frobenius Solution To New PDE Getting Hyperons

Part III

Ch.10 Metric Quantization from $U=e^{iHt}$, replacing need for dark matter

Ch.1 Postulate 1 (as z'=z'z'+C) The rest is trivial math

Trivial math: solve for z' and get eigenvalues≡(δC=0, Don't assume preferred scale)

Trivial Math: Solve for C in eq.**1**. Plug 2 into eq.**1** to get eq.4, first solution. Split C in eq.**1**, get fractalness from the Mandelbrot set given limitations on C_M in eq.**1**, our 2nd solution. C_M rotates SR int GR and breaks 2D degeneracy, creating 4D new pde.

Definitions SR≡Special relativity, GR≡General relativity, SM≡Standard model, FP=Fiegenbaum point. QM=Quantum Mechanics, PDE=Generally covariant generalization of Dirac eq.4AI, eq.9, z=1

Note Δz≡C=random noise=SD error in z so variation(z)≡δz≡Δz. See introduction for explanation

Section 1 Solve eq.**1**. To get eq.2 *δ(δzδz)=0* So rewrite eq.1 as eq.1a. Plug eq.1a into eq.1 (our 1st **GE** step) to get eq.2 *δ(δzδz)=0,*. Factor eq.4 to get eq.4A SR, *4AI (dr+dt=ds) degenerate 2D*, 4AIA 45°$\delta z=dse^{i\theta}$, 4AII & 4B1.

Section 2 Solve eq.**1** to get constant C_M. So rewrite eq. 1a δz=δzδz+C as $\delta z+C_1=\delta z\delta z+C_M\equiv\delta z_1=\delta z\delta z+C_M$. Eq.1 restricts C and so $\delta z_1<\infty$ & gives us a $r_H\equiv C_M$ FP subset of the Mandelbrot set (our 2nd **GE** step),$10^{40}r_H$ **fractal** cosmology

Section 3 A **rotation** of SR into GR) $(dr-C_M)+(dt+C_M)=ds\equiv dr'+dt'$is **rotation** at 45°of (dr&dt) SR to GR $\kappa_{rr}\equiv(dr/dr')^2$in 2AIA $ds^2=\kappa_{rr}dr'^2+\kappa_{oo}dt'^2$. *Breaks the 2D degeneracy to get 4D* Clifford algebra (using 2B1) PDE, SM leptons & dichotomic Bosons.

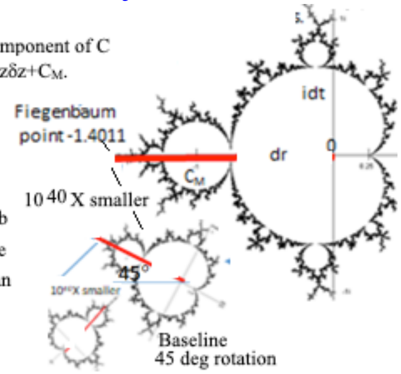
Section 4 Use the postu1ated ONE to derive the list-define algebra required by eq.**1**. Also generates QM from that eq.4AIA operator. Our list-define1∪1≡1+1≡2 numbers then are eigenvalues.

Ch.2 Details Of The Fractalness

2.1 The Mandelbrot Set Along The -dr Axis As Required By C→0

Recall section 1.2.1 on the Mandelbrot set. Note equation 2 appears to imply that only the -dr axis objects come out of the postulate since $C \rightarrow 0$ there. On smaller and smaller scales separated by 10^{40}X however this general Mandelbrot set structure is duplicated and rotated by 45° through that branch cut at $r<0$ line. Thus our complex plane 2AI and 2AII. 45° particles are then on the new –dr line and thereby also come out of the postulate. We then have a whole new Reimann surface "universe" in this complex plane but oriented diagonally. See youtube HTTP http://www.youtube.com/watch?v=0jGaio87u3A

Eq.1.2 $-\delta z=\delta z\delta z+C$. In equation 1 let $C=C_M+C_1$ where C_M is defined to be the constant component of C so that C_1 carries this noise ΔC_1. Define $\varepsilon=C_M=r_H$. Then rewrite $-\delta z=\delta z\delta z+C$ as $\delta z- C_1=\delta z\delta z+C_M$.
Start out our iterations with $C_M=-1$ so the $C_1=1$ with noise ΔC_1 (and do δz in-between those two numbers.) So $\delta z+\Delta C_1-C_1=\delta z\delta z+C_M$. (3.1)
Rewrite eq. 3.1 as $0-1=(0)(0)-1$ with small ΔC_1 and then simplify
$-1=0*0-1$ and iterate $(1+\delta z)=(1+\delta z)(1+\delta z)+C$ so **z=0 solution to eq.1** (3.2)
$0=(-1)*(-1)-1$ $(1+\delta z)=(1+\delta z)(1+\delta z)+C$ so **z=1 solution to eq.1**
and repeat iteratively from eq.1.1. Then allow ΔC_M to be larger and larger. In that way perturb C_M around -1 with ΔC_M so that δz is not a complex number. Eg., $\delta z=\frac{-1\pm\sqrt{1-4C}}{2}$ so $C\leq 1/4$ (the head of the Mandelbrot set) for Realδz generating $\delta z=-1/2$ implying $\delta z\delta z<\|C_M\|$. So there is an independent convergence at each of the two steps of eq.3.2 (only in the neighborhood of $C_M=-1\rightarrow -1.4$) equivalent to the iteration steps creating the Mandelbrot set: $z_{N+1}=z_N z_N+C_M$. C_M defined if z_N finite for $N+1=\infty$ (3.4)



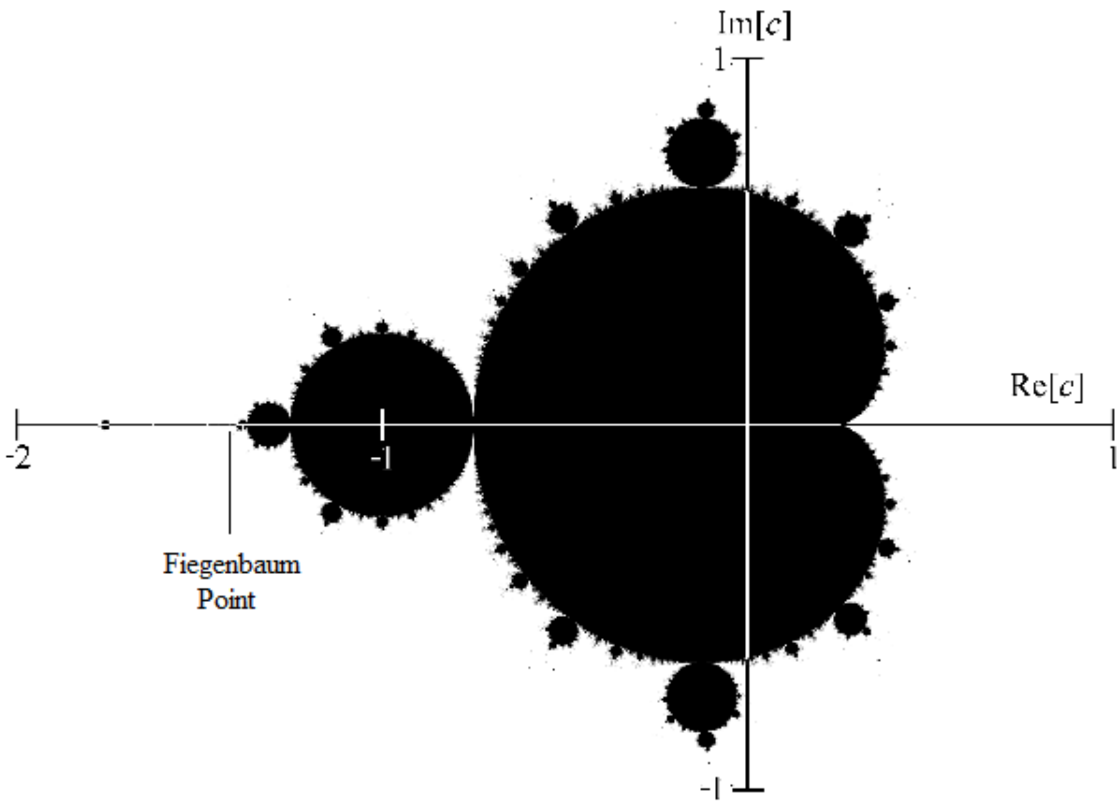


Fig.5
Note also $dt'^2=(1-r_H/r)dt^2$. So $r=r_H$ implies $dt'=0$ so that $C=0$ (in eq.1) and therefore we are again on the –dr axis making the entangled state 2AI+2AI+2AI also come out of our postulate. (See Chapter 8,9,10). The rest of the Mandelbrot set is completely irrelevant.

So astronomers are observing from the inside of what particle physicists are studying from the outside, the ONE solution to ground state eq.2AI, equation 9, new pde object. Go to the Utube HTTP with the 275 in the title. The splits are in 3 directions from the orbs. There appear to be about 2.5 splits going by each second and the next Mandelbrot set comes up in about 62seconds. So
$3^{2.5X62} = 10^N$ so 172log3=N=82. So there are 10^{82} splits.
So there are about 10^{82}splits per initial split. But each of these Mandelbrot set Fiegenbaum points is a r_H in eq.9. So for each electron there are 10^{82} constituent electrons. At the the bifurcation point, which is also the Fiegenbaum point, the curve is a straight line and so $\delta C_M=0$. But the maximum noise C that still keeps z from being complex is .25 so that thermal noise energy is ¼ mass energy which is about what a core 20MK of a average star is. So we have explained the stars.

2.2 Fractal Invariants
Speed of light c is a fractal invariant, stays the same in going from one fractal scale to another since dr and dt (in c=dr/dt) change the same as you go through r_H branch cut . ε is a constant at a single fractal scale so $r_H=2e^2/m_ec^2 =\varepsilon$. But going through the horizon r_H makes ε 10^{40}X larger $=2GM/c^2$ so that GM is also constant on a given scale. So if G is increasing M is decreasing (Sect.1.7.3). The Bg fractal dipole is responsibke for the fine structure constant diple (See Webb..Electron has a dipole moment then so does object A

2.3 C_M Fractal Consequences
Recall our two sect.I.1 equation i.e.,(eq.1) and two unknowns derivation of second unknown C_M, our Mandelbrot set along the –dr axis branch cut horizon. Note also measurements are confined inside time-like geodesics inside r_H event horizon boundaries in eq.9 so the measured δδ1=0 can then be postulated all over again, given branch cut horizon r_H, for $r<r_H$. So on the next higher fractal scale (Ch.2) a second ε can then be rewritten as a 10^{40} X larger source. Recall the ξdr mass term in section 1.2.12. Also for the (sect.II just below) fractal $\Delta r=10^{40}$X scale jump in $\varepsilon\Delta r^2=(k/\Delta r)\Delta r^2=k\Delta r$ (recall $\varepsilon\equiv 2e^2/m_ec^2$) implying a new mass term kΔr (instead of ξdr). So ε goes up by $\Delta r^2 =(10^{40})^2=10^{80}$. Δr^2 becomes the contravariant tensor dyadic Z multiplier in sect 7.4. Note GM then is invariant (constant) as well since ε is. It is well known that information is stored as horizon r_H surface area$=4\pi r_H^2=4\pi(10^{40})^2 \approx 10^{81}$ thus giving us our appendix A counting limit. So for single source $((2GM/c^2)/10^{81}) =(10^{40}/10^{81})\varepsilon\approx(1/10^{40})\varepsilon$ is an added source term of inverse square law force on each electron(2), hence the gravity in fig.3. Ch.7. So the radial rate of change of electric field on our own fractal (expanding) scale is the gravity on the next larger fractal scale (fig.3), *one unified* field! Note also we derived the standard model (eq.2AI) gets the strong force section 2A1+2AI+2AI of Ch.9). See note reference 4 below for the underlying theory. The fractal metric quantization (due to object B) also gives a ε,Δε (fractal) metric quantization entanglement that replaces the need of dark matter (Ch.6,11).
Alternatively Noise C Generates A New δz Which Generates New Noise C, etc.,
So another way of using equation 1 is instead to define noise: $-\delta z-\delta z\delta z\equiv C_1$

Let B_o=1 in $-B_o\delta z=\delta z\delta z$ with C_o=0. New noise C generates new δz in: $\delta z = \frac{-1\pm\sqrt{1-4C}}{2}$.
for δz not imaginary so C_1=¼ in sect.6.13: $C^2=1=\tau$ quadratic equation C scaled:

$-B_o\delta z=\delta z\delta z+C_1$. ¼=$C_1$=$B_1$=noise. $C_1^2=E_\mu=1/16\equiv\varepsilon$ ¼ head

$-B_1\delta z=\delta z\delta z+C_2$. 1/64=$C_2$=$B_2$=noise. $C_2^2=E_e=1/4096\equiv\Delta\varepsilon$ 1/16 hat

$-B_2\delta z=\delta z\delta z+C_3$. 1/4096=$C_3$=$B_3$=noise. $C_3^2=E_\nu=1/1677216$ 1/64 beanie

The first column gets us the lepton masses and the last column derives the individual pieces of the Mandelbrot set along the -dr axis showing we actually did derive it.
Note the electron m_e is right over the Fiegenbaum point period doubling where δC=0 so there is both stability and the fractalness so it has the i in front of the mass below.
Note from Ch.9 that Energy= $1/\sqrt{\kappa_{oo}}= e^{-i(\varepsilon+i\Delta\varepsilon)-\varepsilon}=1-\varepsilon-i\Delta\varepsilon+(\varepsilon-i\Delta\varepsilon)^2/2+..=1-(\varepsilon-\varepsilon^2/2)+(i(\Delta\varepsilon+\varepsilon\Delta\varepsilon+\varepsilon^3/6)+..=m_\tau+m_\mu+m_e$
Note when C gets large the z crosses the branch cut on the baseline fractal Nth fractal scale and we have our same 2D complex plane and so electron and electron neutrino family. Next C rotation the muon and muon neutrino family thereby explaining the 3 Lepton families.

2.3 {{neighborhoodC_M}∩{-r axis}} –dr Fractal Branch Cut

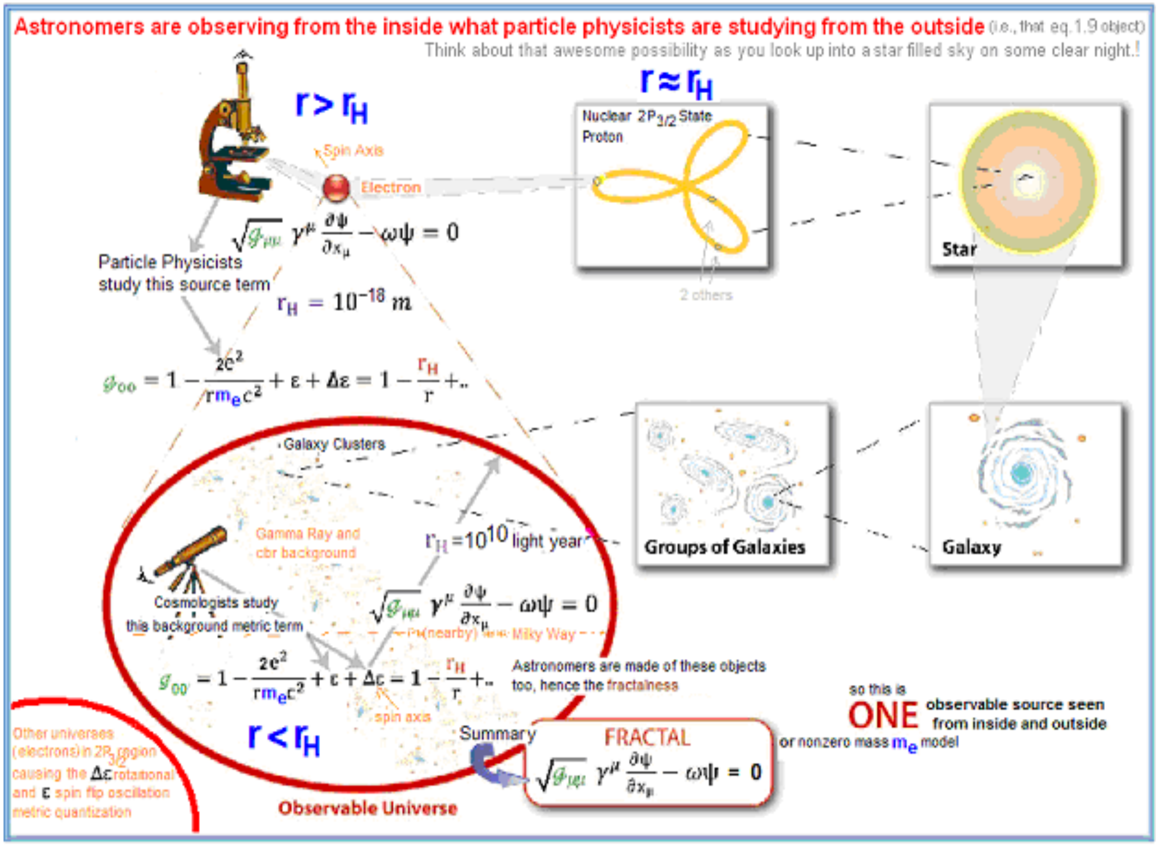
Recall section 1.2 and the derivation of the fractal space time. So there is more to these 2D complex number solutions to eq.2a than just irrational and rational numbers, there is also this underlying space-time fractal structure
{neighborhood{C_M}∩{-r axis}} that contains even fewer elements than the rational numbers and which only "exists" when the "fog" is not thick, i.e. when C goes to 0. It permeates all of space and yet has zero density. It is a very mysterious subset of the complex plane indeed.
Note to be a part of what is postulated (eq.2) C→0 we must be in the neighborhood of the horizontal Mandelbrot set dr axis. But from the perspective (scale) of this N+1 th scale observer one of the 10^{40}X smaller (Nth fractal scale) 45° rotated Mandelbrot sets (fig5) is still near his own dr axis putting it within the ε, δ limit neighborhoods of C→0 of eq.2. Thus in this narrow context we are allowed the 45° rotations to the extremum directions of the solutions of equation 2. Our C increases (eg., C→0) discussed later sections are also all in this Nth fractal scale context. For example eq. 2AI is then reachable on the Nth fractal scale ($r>r_H$) as a noise object (C>0).
So 2AII at 135° must then also result from noise (C>0) introduction and so from that first fractal jump rotation in the 2D plane. Later we even note a limit on C (sect.4.3.1).

2.4 Fourier Series Interpretation Of C_M Solution

Recall from equation 2 that on the diagonals we have particles (and waves) and on the dr axis where C=0 only waves, see 2AIA. Recall 2AC solution dr=dt, dr=-dt gives 0 as a solution and so C=0. But in equation 2 for C→0 δz=0,-1. So 2AC implies the two points δz=0,-1. So for waves to give points implies a Fourier superposition of an infinite number of sine waves and so wave lengths. In terms of eq.2AI these are solutions to the Dirac equation and so represent fractalness, smaller wave lengths inside smaller wavelengths. So it is fractal.

2.5 Observer < r_H Interpretation Of C_M Solution

Since equation 9 is essentially all there is there is then also anthropomorphic (i.e., observer) based derivation of that fractalness using equation 9 there is even a powerful ethics lesson that comes out of this result in partV). Recall that eq.2AI has two solution planes and associated two points one of which we define as the observer. In the new pde: $\sqrt{\kappa_{\mu\mu}}\gamma^{\mu}\partial\psi/\partial x_{\mu}=(\omega/c)\psi$ 2AI, (given that it requires these two points), we *allow the observer to be anywhere*. So just put the observer at $r<r_H$ and you have derived your fractal universe in one step. In that regard the new pde metric
Note from equations 3.4 we have the Schwarzschild metric event horizon of radius $R\equiv 2Gm/c^2$ in the M+1 fractal scale where m is the mass of a point source. Also define the null geodesic tangent vector K^m to be the vector tangent to geodesic curves for light rays. Let R be the Schwarzschild radius or event horizon for $r_H=2e^2/m_ec^2$. Thus (Hawking, pp.200) in the case that equation applies we have: $R_{mn}K^mK^n>0$ for $r<R$ in the Raychaudhuri (K_n=null geodesic tangent vector) (3.3) equation. Then if there is small vorticity and shear there is a closed trapped surface (at horizon distance "R" from x) for null geodesics. No observation can be made through such a closed trapped surface. Also from S.Hawking, *Large Scale Structure of Space Time*, pp.309...instead he will see O's watch apparently slow down and asymptotically (during collapse) approach 1 o'clock...". So $g_{rr}=1/(1-r_H/r)$ in practical terms never quite becomes singular and so we cannot observe through r_H either from the inside or the outside (space like interval, not time like). Note we live in between fractal scale horizon $r_H=r_{M+1}$ (cosmological) and $r_H=r_M$ (electron). Thus we can list only two observable (Dirac) vacuum Hamiltonian sources (also see section 1.1). H_{M+1} and H_M
But we are still entitled to say that we are made of only ONE "observable" source i.e., H_M of equation 9 (which we can also view from the inside (cosmology) and the outside (particle physics). Thus this is a Ockam's razor optimized unified field theory using:
ONE "observable" source
of nonzero proper mass which is equivalent to our fundamental postulate of equation 1.
Metric coefficient $\kappa_{rr}=1/(1-r_H/r)$ near $r=r_H$ (given $dr'^2=\kappa_{rr}dr^2$) makes these tiny dr observers just as big as us viewed from their frame of reference dr'. Then as observers they must have their own r_Hs, etc. . You might also say that the fundamental Riemann surface, and Fourier superposition are therefore the *source* of the "observer". See end of PART III (of davidmaker.com) for the powerful ethics implication of that result (eg.,negation of solipsism since *two* "observers" are implied by the eq.4AI two simultaneous solutions).
Illustration Of The fractalness: Recall our mantra implied by this fractal space time that "Astronomers are observing from the inside of what particle physicsts are studying from the outside, ONE thing: the new pde (rotated 2AI = eq.9) electron."; Think about that as you gaze up into a star filled sky some evening!
Below is an illustration:



Ch.3 Equation 1b, **2D** Isotropic and Homogenous Space-Time vs A NONhomogeneous and NONisotropic Space-Time

From equation 1a solution 1b we note that this theory is fundamentally 2D. So what consequences does a 2D theory have?

We break the 2D degeneracy of eq. (2C) at the end by rotating by C_M (3.5) and get a 4D Clifford algebra.

Recall 2AI and 2AII are dichotomic variables with the noise rotation C going from 4AI at 45° to 2AII at 135°.

Recall eq.2AI implies simultaneous eq.2AI+2AI are 2D⊕2D=4D. But single 2AI plus single 2AII are *not* simultaneous so are still 2D. So this theory is still 2D complex Z then.

Recall the $\kappa_{\mu\nu}$, $g_{\mu\nu}$ metrics (and so R_{ij} and R) were generated in section 341.

In that regard for 2D for a homogenous and isotropic g_{ij} we have identically $R_{\mu\mu}-\frac{1}{2}g_{\mu\mu}R=0 \equiv$ source $=G_{oo}$ since in 2D $R_{\mu\mu}=\frac{1}{2}g_{\mu\mu}R$ identically (Weinberg, pp.394) with $\mu=0, 1$...

Note the 0 (=E_{total} the energy density source) and we have thereby proven the existence of a net zero energy density vacuum. Thus our 2D theory implies the vacuum is really a vacuum! It is then the result of the fractal and 2D nature of space time!

A ultrarelativistic electron is essentially a tranverse wave 2D object (eg., the $2P_{3/2}$ electron in the neutron). Also a non isotropic homogenous N+1 th fractal scale space time makes the above source nonzero so gives this particle a small imaginary mass since $r<r_H$ in that square root. From sect.2 and Clifford algebrathe cross term appendixA the electron and 2 neutrinos are part of the same object so 2A1+2AII is $G_{oo}=E_e+\sigma\bullet p_r=0$ so $E_e=-\sigma\bullet p_r$

So given the negative sign in the above relation the neutrino chirality is left handed. Recall dz=ds$e^{i\theta}$ circle from eq.6 and the resulting trivially fractal Riemann surfaces making the fractalness of this theory ideal. Note from that eq.9 and neutrino equations coming out of that square in a square analysis waves apply at the r axis (recall wave particle duality argument). Here the circle also intersects the nonzero part of the Mandelbrot at -√2. But the Fiegenbaum point is close to this value so we must slightly inflate the Mandelbrot set by some ε as in:
$ds^2=(dr-\varepsilon/2)^2+dt^2=dr^2-\varepsilon dr+dt^2$. But $dr^2=\varepsilon dt$ (waves, sect.4.1) so $\varepsilon dt-\varepsilon dr=ds^2=(-\sqrt{2})^2=2$ which is a eq.4 spin ½ solution, neutrino and electron (fig5, lowest energy). Thus the 2D vacuum ambient metric is chiral and contains the electron and neutrino.
Thus the zero energy vacuum and left handedness of the neutrino in the weak interaction are only possible in this 2D equation 1 Z plane. If the space-time is not isotropic and homogenous the neutrino must then gain mass m_o (see section 3.3.4 for what happens to this mass) and it becomes an electron at the horizon r_H if it had enough kinetic energy to begin with. It changes to an electron by scattering off a neutron with at W- and e- resulting along with a proton. So the neutrino transformed into an electron with other decay products. Recall that the electron and the neutrino are dichotomic variables (one can transform into the other,sect.4.3) and can share the same spinor as we assumed in section 4.3. The neutrino in this situation is left handed. γ^5 is the parity operator part of the Cabibbo angle calculation.

3.2 Helicity Implications 2D Isotropic And Homogenous State

From Ch.10 $p_x\psi = -ih\partial\psi/\partial x$. We multiply equation $p_x\psi = -ih\partial\psi/\partial x$ in section 4.2 by normalized ψ* and integrate over the volume to *define* the expectation value of operator p_x for this *observer representation*:

$$< p,t \mid p \mid p,t > \equiv \int \psi^t p \psi dV$$

(implies Hilbert space if ψ is normalizable). Or for any given operator 'A' we write in general as a definition of the expectation value: $< A > = < a,t \mid A \mid a,t >$ (3.2.1)
The time development of equation 9 is given by the Heisenberg equations of motion (for equation 9. We can even define the expectation value of the (charge) chirality in terms of a generalization of eq.9 for ψ_e spin ½ particle creation ψ_e from a spin 0 vacuum χ_e. In that regard let χ_e be the spin0 Klein Gordon vacuum state in zero ambient field and so ½ $(1\pm\gamma^5)\psi_e = \chi_e$. Thus the overlap integral of a spin ½ and spin zero field is:

$$\text{<vacuum helicity of charge>} \equiv \int \psi_e^t \chi_e dV = \int \psi_e^t 1/2(1\pm\gamma^5)\psi_e dV \qquad (3.2.2)$$

So $1/2(1\pm\gamma^5)$=helicity creation operator for spin ½ Dirac particle: This helicity is the origin of charge as well for a spin ½ Dirac particle. See additional discussion of the nature of charge near the end of 3.1 Alternatively, in a second quantization context, equation 3.3.2 is the equivalent to the helicity coming out of the spin 0 vacuum χ_e and becoming spin½ source charge with $½(1\pm\gamma^5)\equiv a^t$ being the charge helicity creation operator.
The expectation value of γ^5 is also the velocity. Also γ^i (i=x,y,z) is the charge conjugation operator. 3.1.3 Note from section 3.1.1 the field and the wavefunction of the entangled state are related through $e^{i\text{field}}$=ψ=wavefunction. $\gamma^r\sqrt{(\kappa_{rr})}\partial/\partial r(\gamma^r\sqrt{(\kappa_{rr})}\partial\chi/\partial r = 0$ where ψ= $(\gamma^r\sqrt{(\kappa_{rr})}\partial\chi/\partial r$ and $½(1\pm\gamma^5)\psi=\chi$. $\langle\gamma^5\rangle = v = \langle c/2\rangle = c/4$ So $1\pm\gamma^5$ =cos13.04±sin13.04,

θ=13.04=Cabbibo angle.
Here we can then normalize the Cabibbo angle $1+\gamma^5$ term on that 100km/sec object B component of the metric quantization. We then add that CP violating object C 1km/sec as a $\gamma^5 X\gamma^i$ component.
You then get a normalized value of .01 for CKM(1,3) and CKM(3,1).
The measured value is .008.

Vacuum

Recall eq.2AIII gives us a vacuum solution as well. Also recall eq.1abis 2D. Recall the $\kappa_{\mu\nu}$, $g_{\mu\nu}$ metrics (and so R_{ij} and R) were generated in above section 1.2.5. In that regard for 2D for a homogenous and isotropic g_{ij} we have identically $R_{\mu\mu}-\frac{1}{2}g_{\mu\mu}R=0 \equiv$ source $=G_{oo}$ since in 2D $R_{\mu\mu}=\frac{1}{2}g_{\mu\mu}R$ identically (Weinberg, pp.394) with μ=0,... Note the 0 ($G_{oo}=E_{total}$ the energy density source) and we have thereby proven the existence of a net zero energy density eq.2AIII vacuum. Thus our 2D theory implies the **vacuum is really a vacuum.**

Left handedness

From sect.1.1.4 2AI and 2AIIA and 2AIIB are combined. Note also from section 4.3 C rotation in a homogenous isotropic space-time. So 2A1+2AII = $G_{oo}=E_e+\sigma\bullet p_r=0$ so $E_e=-\sigma\bullet p_r$. So given a positive E_e (AppendixB) and the negative sign in the above relation implies the neutrino chirality $\sigma\bullet p$ is negative and therefore is left handed.

3.3 Nonhomogenous NonIsotropic Mass Increase For 4AII

But a free falling coordinate system in a large scale gravity field is equivalent to a isotropic and homogenous space-time and so even in a spatially large scale field the neutrino has negligible mass if it is free falling.
To examine the effect of all three ambient metric states 1, ε, $\Delta\varepsilon$ we again start out with a set of initial condition lines on our figure 4. In this case recall that in the presence of a nonisotropic non homogenous space time we can raise the neutrino energy to the ε and repeat and get the muon neutrino with mass $m_{o\nu}$=(3km/1AU)m_e=.01eV (for solar metric inhomogeneity. See Ch.3 section on homogenous isotropic space time). So start with eq. 2AII singlet filled 135° state $1S_{1/2}$. In that well known case $E=\sqrt{(p^2c^2+m_o^2c^4)}=E=E(1+(m_o^2c^4/2E'))$. $E'\approx E\approx pc>>m_oc^2$; $\psi=e^{i(\omega t-kx)}$ with $k=p/h=E/(hc)$. Set $\hbar$=1,c=1 so $\psi=e^{i(\omega t-kx)}e^{ixmo\text{^}2/2E'}$. So we transition through the given $\psi_{e\nu}$,$\psi_{\varepsilon\nu}$, $\psi_{1\nu}$ masses (fig.6,section 6.7) as we move into a stronger and stronger metric gradient. (strong gravitational field) =ψ electron neutrinos can then transform into muon neutrinos. Starting with a isotropic homogenous space time in the ground state we then we go into steeper metric gradients in a inertial frame as seen from at constant metric gradient and higher energies thereby the rest of the states fill consecutively. We apply this result to the derivation of the 2AI+2AI+2AI proton in section 8.1, starting out with infinitismal 2AII+2AII+42II mass and going into the region of high nonisotropy, non homogeneity close to object B, thereby gaining mass in the above way. This process is equivalent to adding noise C to 4AII.

Chapter 4 Simultaneous (union) Broken 2D Degeneracy C_M rotation of eq. 2AI Implies 2D$\oplus$2D=4D

4.1 2D⊕2D formulation of 2AI+2AI

To stay within the solutions 1 we note that the *2D degeneracy of eq.2C is* ***broken*** *by the* 2 rotation (eq.3.1) were we use ansatz $dx_\mu \to \gamma^\mu dx_\mu$ where γ^μ may be a 4X4 matrix and commutative ansatz $dx_\mu dx_\nu = dx_\nu dx_\mu$ so that $\gamma^\mu\gamma^\nu dx_\mu dx_\nu + \gamma^\nu\gamma^\mu dx_\nu dx_\mu = (\gamma^\mu\gamma^\nu + \gamma^\nu\gamma^\mu) dx_\mu dx_\nu$ (μ,ν=1,2,3,4; $\mu \neq \nu$). So from eq.(2C) $ds^2 = (\gamma^1 dx_1 + \gamma^2 dx_2 + \gamma^3 dx_3 + \gamma^4 dx_4)^2 = (\gamma^1)^2 dx_1^2 + (\gamma^2)^2 dx_2^2 + (\gamma^3)^2 dx_3^2 + (\gamma^4)^2 dx_4^2 + \Sigma_{\mu\nu}(\gamma^\mu\gamma^\nu dx_\mu dx_\nu + \gamma^\nu\gamma^\mu dx_\nu dx_\mu)$. But $\gamma^\mu\gamma^\nu dx_\mu dx_\nu + \gamma^\nu\gamma^\mu dx_\nu dx_\mu = (\gamma^\mu\gamma^\nu + \gamma^\nu\gamma^\mu) dx_\mu dx_\nu$ implying **$\gamma^\mu\gamma^\nu + \gamma^\nu\gamma^\mu = 0$ from 2B1** and also $(\gamma^\mu)^2 = 1$ from 2AIA. So the two 2AI results and 2B1 imply the defining rolation for a 4D Clifford algebra.

So the solution 2 rotation by C_M at 45° (eq.2AIA) causes the two simultaneous 2AI electron terms to have different dr,dt.since the random C can be different in each case. These 2new degrees of freedom for the only particle with nonzero proper mass in this theory are what create the 4D we observe.

The two 2D plane simultaneous solutions of eq.2AI then imply 2D+2D=4D thereby allowing for a imbedded 3D spherical symmetry. So we can without loss of generality use the Cartesian product (dr,dt)X(dr',dt')=(dr,dt)X(dϕ,dθ) to replace $r\sin\theta d\phi$ with dy, $rd\theta$ with dz, cdt with dt"as in $ds^2 = -dr^2 - r^2\sin^2\theta d^2\phi - r^2 d^2\theta + c^2dt^2 \equiv -dx^2 - dy^2 - dz^2 + dt''^2$. Note the two r,t and θ,ϕ, sets of coordinates are written self consistently as a Cartesian product (AXB)= (r,t,ϕ,θ) space.where $r,t \in A$ and $\phi,\theta \in B$. Note the orthogonal space of θ,ϕ with the ϕ=wt' carrying the second time dependence (note there are two time dependent parameters in (dr,dt)X(dr',dt')). Given the intrinsic 2D applied twice in the Cartesian product the covariant derivative is equal to the ordinary derivative in the operator formalism. Thus here $[\sqrt{(\kappa_{rr})}dr]\psi = -i[\sqrt{(\kappa_{rr})}(d\psi/dr)]$ replaces the old operator formalism result $(dr)\psi = -id\psi/dr$ in the old Dirac equation allowing us to then multiply by the same γ in $\gamma^r[\sqrt{(\kappa_{rr})}dr]\psi = -i\gamma^r[\sqrt{(\kappa_{rr})}(d\psi/dr)]$. So using this substitution we can use the same Dirac $\gamma^x, \gamma^y, \gamma^z, \gamma^t$ s that are in the old Dirac equation.

4.2 $ds^2 = \kappa_{xx}dx^2 + \kappa_{yy}dy^2 + \kappa_{zz}dz^2 + \kappa_{tt}dt^2$ For spherical Symmetry From Eq.3.3

Here we easily show that our new pde(eq.9) is generally covariant since it comes out of this 4D Pythagorean Theorem equation 83.3

$\kappa_{xx} = \kappa_{yy} = \kappa_{zz} = -1, \kappa_{tt} = 1$ in Minkowski flat space, Next divide by ds^2, define $p_x \equiv dx/ds$, so get

$$\kappa_{xx}p'^2_x + \kappa_{yy}p'^2_y + \kappa_{zz}p'^2_z + \kappa_{tt}p'^2_t = 1$$

To get eq.2.1.3 we can then linearize like Dirac did (however we leave the κ_{ij} in. He dropped it). So:

$$(\gamma^x\sqrt{\kappa_{xx}}p_x + \gamma^y\sqrt{\kappa_{yy}}p_y + \gamma^z\sqrt{\kappa_{zz}}p_z + i\gamma^t\sqrt{\kappa_{tt}}p_t)^2 = \kappa_{xx}p_x^2 + \kappa_{yy}p_y^2 + \kappa_{zz}p_z^2 + \kappa_{tt}p_t^2 \quad (4.2.1)$$

So just pull the term out of between the two ( ) lines in equation 2.1.3 and setit equal to 1 (given 1*1=1 in eq.1) to get eq.9 in 4D and divide by ds

$$\gamma^x\sqrt{\kappa_{xx}}p_x + \gamma^y\sqrt{\kappa_{yy}}p_y + \gamma^z\sqrt{\kappa_{zz}}p_z + i\gamma^t\sqrt{\kappa_{tt}}p_t = 1$$

and multiply both sides of that result by the ψ and write this linear form of equation 1.1.3 as its own equation: $\gamma^x\sqrt{\kappa_{xx}}p_x\psi + \gamma^y\sqrt{\kappa_{yy}}p_y\psi + \gamma^z\sqrt{\kappa_{zz}}p_z\psi + i\gamma^t\sqrt{\kappa_{tt}}p_t\psi = \psi$

Then use eq.4.6. This proves that the new pde (eq.9) is covariant since it comes out of the Minkowski metric for the case of $r \to \infty$.

4.3 2 Simultaneous Equations 2AI: 2D⊕2D Cartesian Product, Spherical Coordinates and Second Solution $\sqrt{\kappa_{\mu\nu}}$

Note from eq.2AI the (dr,dt;dr'dt') has two times in it so can be rewritten as (dr,rdθ,rsinθωdt,cdt)≡ (dr,rdθ,rsinθdϕ,cdt)

dr=dr gives $\gamma^r[\sqrt{(\kappa_{rr})}dr]\psi = -i\gamma^r[\sqrt{(\kappa_{rr})}(d\psi/dr)] = -i\gamma^x[\sqrt{(\kappa_{rr})}(d\psi/dr)]$

rdθ=dy gives $\gamma^\theta[\sqrt{(\kappa_{\theta\theta})}dy]\psi = -i\gamma^\theta[\sqrt{(\kappa_{\theta\theta})}(d\psi/dy)] = -i\gamma^y[\sqrt{(\kappa_{\theta\theta})}(d\psi/dy)]$

rsinθdϕ=dz gives $\gamma^\phi[\sqrt{(\kappa_{\phi\phi})}dz]\psi = -i\gamma^\phi[\sqrt{(\kappa_{\phi\phi})}(d\psi/dz)] = -i\gamma^z[\sqrt{(\kappa_{\phi\phi})}(d\psi/dz)]$

cdt=dt" gives $\gamma^t[\sqrt{(\kappa_{tt})}dt'']\psi = -i\gamma^t[\sqrt{(\kappa_{tt})}(d\psi/dt'')] = -i\gamma^t[\sqrt{(\kappa_{tt})}(d\psi/dt'')]$ (4.3.1)

For example for the old method (without the $\sqrt{\kappa_{ii}}$ for a spherically symmetric diagonalizable metric):

$ds^2=\{\gamma^x dx+\gamma^y dy+\gamma^z dz+\gamma^t cdt\}^2=dx^2+dy^2+dz^2+c^2dt^2$ then goes to

$ds^2=\{\gamma^x[\sqrt{(\kappa_{xx})}dx]+\gamma^y[\sqrt{(\kappa_{yy})}dy]+\gamma^z[\sqrt{(\kappa_{zz})}dz]+\gamma^t[\sqrt{(\kappa_{tt})}dt]\}^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2+c^2\kappa_{tt}dt^2$

and so we can then derive the same Clifford algebra (of the γ s) as for the old Dirac equation with the terms in the square brackets (eg.,$[\sqrt{(\kappa_{xx})}dx]\equiv p'_x$) replacing the old dx in that derivation.

Also here there is a spherical symmetry so there is no loss in generality in picking the x direction to be r at any given time since there is no θ or ϕ dependence on the metrics like there is for r.

If the two body equation 9 is solved at $r\approx r_H$ (i.e.,our –dr axis, C→0 of eq.1) using the separation of variables and the Frobenius series solution method we get the hyperon energy-charge eigenvalues but here from first principles (i.e.,our postulate) and not from assuming those usual adhoc qcd gauges, gluons, colors, etc. See Ch.8-10 for this Frobenius series method and also see Ch.9. Also $E_n=Rel(1/\sqrt{g_{oo}})=Rel(e^{i(2\varepsilon+\Delta\varepsilon)})=1-4\varepsilon^{2/}4+..$ $=1-2\varepsilon^2/2\equiv 1-\frac{1}{2}\alpha$. Multiply both sides by ħc/r (for 2 body S state λ=r, sec.16.2), use reduced mass (two body m/2) to get E= ħc/r +(αħc/(2r))= ħc/r +($ke^2/2r$)= QM(r=λ/2, 2 body S state)+E&M where we have then derived the fine structure constant α.

4.4 Single 3AI Source Implies Equivalence Principle And So Allows You To Use Metric $\kappa_{\mu\nu}$ Formalism

Recall that the electrostatic force Eq=F=ma so E(q/m)=a. Thus there are different accelerations 'a' for different charges 'q' in an ambient electrostatic field 'E'. In contrast with gravity there is a single acceleration for two different masses as Galileo discovered in his tower of Pisa experiment. Thus gravity (mass) obeys the equivalence principle and so (in the standard result) the metric formalism $g_{ij\ (eq.7)}$ can apply to gravity.

Note that E&M can also obey the equivalence principle but in only one case: if there is a *single e* and Dirac particle m_e in Eq=ma and therefore (to get the correct geodesics,): Given an equivalence principle we can the write E&M metrics such as rewriting 3.2:

$$\kappa_{oo} = g_{oo}=1-2e^2/rm_ec^2 =1-r_H/r \qquad (4.4.1)$$

(with $\kappa_{rr}=1/\kappa_{oo}$, in section 1.2.5) and so then trivially all charges will have the same acceleration in the same E field. This then allows us to insert this metric g_{ij} formalism into the standard Dirac equation derivation instead of the usual Minkowski flat space-time g_{ij} s(below). Thus by noting E&M obeys the equivalence principle you force it to have ONE nonzero mass with charge. Thus you force a unified field theory on theoretical physics!

4.5 Implications of g_{oo} =1-2e²/rm$_e$c² =1-eA$_o$/mc²v^o) In Low Temperature Limit

Recall equation 4.3. $g_{oo}=1-2e^2/rm_ec^2 \equiv 1-eA_o/mc^2v^o$). We determined A_o,(andA_1,A_2,A_3)

in section 4.1 We plug this A_i into the geodesics

$$\frac{d^2x^\mu}{ds^2}=-\Gamma^\mu_{\nu\lambda}\frac{dx^\nu}{ds}\frac{dx^\lambda}{ds} \qquad (4.5.1)$$

where $\Gamma^m_{ij}\equiv(g^{km}/2)(\partial g_{ik}/\partial x^j+\partial g_{jk}/\partial x^i-\partial g_{ij}/\partial x^k)$

So in general
$$g_{ii}\equiv\eta_{ii}+h_{ii}=1-\frac{eA_i(x,t)}{m_\tau c^2 v^i},\ i\neq 0, \qquad (4.5.2)$$

$A'_0\equiv e\phi/m_\tau c^2$, $g_{00}\equiv 1-\frac{e\phi(x,t)}{m_\tau c^2}=1-A'_0$, and define $g'_{\alpha\alpha}\equiv 1-A'_\alpha/v_\alpha$, ($\alpha\neq 0$) and $g''_{\alpha\alpha}\equiv g'_{\alpha\alpha}/2$ for large and near constant v,,see eq. 4.2 also . In the weak field $g^{ii}\approx 1$. Note e=0 for the photon so it is not deflected by these geodesics whereas a gravity field does deflect them. The photon moves in a straight line through a electric or magnetic field. Also use the total differential $\frac{\partial g_{11}}{\partial x^\alpha}dx^\alpha=dg_{11}$ so that using the chain rule gives us:

$$\frac{\partial g_{11}}{\partial x^\alpha}\frac{dx^\alpha}{dx^0}=\frac{\partial g_{11}}{\partial x^\alpha}v^\alpha=\frac{dg_{11}}{dx^0}\approx\frac{\partial g_{11}}{\partial x^0}.$$

gives a new $A(1/v^2)dv/dt$ force term added to the first order Lorentz force result in these geodesic equations (Sokolnikoff, pp.304). So plugging equation 4.5.2 into equation 4.5.1, the geodesic equations gives:

$$-\frac{d^2x^1}{ds^2}=\Gamma^1_{11}v_1v_1+\Gamma^1_{12}v_1v_2+\Gamma^1_{13}v_1v_3+\Gamma^1_{10}v_0v_1+\Gamma^1_{21}v_2v_1+\Gamma^1_{22}v_2v_2+\Gamma^1_{23}v_2v_3+\Gamma^1_{20}v_2v_0+$$
$$\Gamma^1_{31}v_3v_1+\Gamma^1_{32}v_3v_2+\Gamma^1_{33}v_3v_3+\Gamma^1_{30}v_3v_0+\Gamma^1_{01}v_0v_1+\Gamma^1_{02}v_0v_2+\Gamma^1_{03}v_0v_3+\Gamma^1_{00}v_0v_0=$$
$$\frac{g^{11}}{2}\left(\frac{\partial g'_{11}}{\partial x^1}\right)v_1+\frac{g^{11}}{2}\left(\frac{\partial g'_{11}}{\partial x^2}\right)v_2+\frac{g^{11}}{2}\left(\frac{\partial g'_{11}}{\partial x^3}\right)v_3+\frac{g^{11}}{2}\left(\frac{\partial g'_{11}}{\partial x^0}\right)v_0+$$
$$\frac{g^{11}}{2}\left(\frac{\partial g'_{11}}{\partial x^2}\right)v_2-\frac{g^{11}}{2}\left(\frac{\partial g'_{22}}{\partial x^1}\right)v_2+0+0+\frac{g^{11}}{2}\left(\frac{\partial g'_{11}}{\partial x^3}\right)v_3+0-\frac{g^{11}}{2}\left(\frac{\partial g'_{33}}{\partial x^1}\right)v_3+0+$$
$$\frac{g^{11}}{2}\left(\frac{\partial g'_{11}}{\partial x^0}\right)v_0+0+0-\frac{g^{11}}{2}\left(\frac{\partial g'_{00}}{\partial x^1}\right)v_0+O\left(\frac{A_idv}{v^2dt}\right)=v_2\left(\frac{\partial g''_{11}}{\partial x^2}-\frac{\partial g''_{22}}{\partial x^1}\right)+v_3\left(\frac{\partial g''_{11}}{\partial x^3}-\frac{\partial g''_{33}}{\partial x^1}\right)+$$
$$\left(\frac{\partial g''_{11}}{\partial x^\alpha}v_\alpha+\frac{\partial g''_{11}}{\partial x^0}v_0\right)-\left(\frac{\partial g''_{00}}{\partial x^1}\right)v_0+O\left(\frac{A_idv}{v^2dx}\right)\approx-\left(\frac{\partial g''_{00}}{\partial x^1}\right)v_0+v_2\left(\frac{\partial g''_{11}}{\partial x^2}-\frac{\partial g''_{22}}{\partial x^1}\right)+$$
$$v_3\left(\frac{\partial g''_{11}}{\partial x^3}-\frac{\partial g''_{33}}{\partial x^1}\right)+O\left(\frac{A_idv}{v^2dt}\right)\approx\frac{e}{m_\tau c^2}\left(-\vec{\nabla}\phi+\vec{v}X\left(\vec{\nabla}X\vec{A}\right)\right)_x+O\left(\frac{A_idv}{v^2dr}\right).$$

Thus we have the *Lorentz force equation* form $\left(-\left(\frac{e}{m_\tau c^2}\right)\left(\vec{\nabla}\phi+\vec{v}X\left(\vec{\nabla}X\vec{A}\right)\right)\right)_x$ plus the derivatives of 1/v which are of the form: $\mathbf{A_i(dv/dr)_{av}/v^2}$. This new term $A(1/v^2)dv/dr$ is the pairing interaction (4.5.3). This approximation holds well for nonrelativistic and nearly constant velocities and low B fields but fails at extremely low velocities so it works when v>>(dv/dA)A. This constraint also applies to this ansatz if it is put into our Maxwell equations in the next section. Recall at the

beginning of the BCS paper abstract the authors say that superconductivity results if the phonon attraction interaction is larger than the electrical repulsion interaction
Given a stiff crystal lattice structure (so dv/dr is large also implying that lattice harmonic oscillation isotope effect in which the period varies with the (isotopic) mass.) this makes the pairing interaction force $A_i(dv/dr)_{av}/v^2$. The relative velocity "v" will then be small in the denominator in some of the above perturbative spatial derivatives of the metric $g_{\alpha\alpha}$ (e.g., the 1/v derivative of H2 $(A/v^2)(dv/dr)_{av}$. This fact is highly suggestive for the velocity component "v" because it implies that at cryogenic temperatures (extremely low relative velocities in normal mode antisymmetric motion) new forces (pairing interactions?) arise from the above general relativity and its spin 0 (BCS) and spin 2 states[i] (D states for CuO_4 structure). For example the mass of 4 oxygens (4X16=64) is nearly the same as the mass of a Cu (64) so that the SHM dynamics symmetric mode (at the same or commensurate frequencies) would allow the conduction electrons to oscillate in neighboring lattices at a relative velocity of near zero (e.g.,$v \approx 0$ in $(A/v^2)(dv/dr)_{av}$ making a large contribution to the force), thus creating a large BCS (or D state) type pairing interaction using the above mechanism. Note from the dv/dt there must be accelerated motion (here centripetal acceleration in BCS or linear SHM as in the D states) as in pair rotation but it must be of very high frequency for $(dv/dr)_{av}$ (lattice vibration) to be large in the numerator also so that v, the velocity, remain small in the denominator with the phase of "A" such that $A(dv/dr)_{av}$ remain the same sign so the polarity giving the A is changing rapidly as well. This explains the requirement of the high frequency lattice vibrations (and also the sensitivity to valence values giving the polarity) in creating that pairing interaction force. Note there should be very few surrounding CuO_4 complexes, just the ones forming a line of such complexes since their own motion will disrupt a given CuO_4 resonance, these waves come in at a filamentary isolated sequence of CuO_4 complexes passing the electrons from one complex to another would be most efficient. Chern Simons developed a similar looking formula to $A_i(dv/dr)_{av}/v^2$ by trial and error. This pairing interaction force $A(dv/dt)/v^2$ drops the flat horizontal energy band (with very tiny variation in energy).saddle point (normally at high energy) associated with a particular layer down to the Fermi level making these energies (band gaps) accellible and so allowing superconducitivity to occur.

Twisted Graphene

Monolayer graphene is not superconductor by the way.
But what about two layers? For example a graphene bilayer twisted by 1.1deg rotation creates a quasi Moire' pattern with periodic hexagonal lattice.
It is amazing that in this Moire pattern for each hexagonal structure there are carbons far apart inside the hexagon and carbons close together around the edge of the hexagon making these two groups of carbon atoms distinguishable in terms of their bonding lengths.
So how many high density carbons are in the less dense region of the hexagon?
3+4+5+6+5+4+3=30. How many carbons are in the more dense region of the Moire pattern hexagon boundary? 5*6=30 again. So these two groups have the same aggregate mass (but are distinguishable) just like the 4 Os and one Cu in the cuprates.
So if you twist one layer of graphene that is on top of another layer by 1.1deg it should become a superconductor. And it is.
This pairing interaction force also lowers the energy gap to near the Fermi level.
$\delta z=[-1\pm\sqrt{(1-4C)}]/2$. If C<1/4 there is no time and the and so dt/ds=0 and so the scattering Hamiltonian is 0. Thus there is no scattering and so no electrical resistance.
This is the true source of superconductivity.

4.6 Summary of Consequences of the Uncertainty In Distance (separation) C In $-\delta z=\delta z\delta z+C$ eq.1

1) C as width of a slit determines uncertainty in photon location and resulting wave particle duality (see above section 4.3.8).

2) C is uncertainty in separation of particles which is large at high temperatures. Note degeneracy repulsion (two spin ½ can't be in a single state) is not necessarily time dependent and is zero only for bosons. Also given the already extremely small Brillioun zone bosonization separation (see equation 4.3 for pairing interaction source) then C is small so not much more is needed for C to drop below ¼ to the r axis for Bosons. Thus time axis $\Delta t=0$ so $\Delta v=a\Delta t=0$. (note relative v is big here. Therefore there is no Δv and so no force (F=ma) associated with the time dependent acceleration 'a' for this Boson flowing through a wire with the stationary atoms in the wire. So there is no electrical resistance to the flow of the Bosons in this circuit and we have therefore derived superconductivity from first principles. But there is a force between electrons in a pairing interaction (that creates the Boson) because v between them is so small. Use pairing interaction force mv^2/r between leptons from sect.4.8: $F_{pair}=A(dv/dt)/v^2$. is large. Recall that a superfluid has no viscosity. But doesn't viscosity constitute a force F as well (F/m=a in dv=adt) and isn't helium 4 already a boson so that when C drops below ¼ then dt drops to zero as well? So superfluidity for helium 4 is also a natural outcome of a small C.

3) C is separation between particle-antiparticle pair (pair creation). For C<1/4 we leave the 135° and 45° diagonals jump to the r axis and simple ds^2 wave equation dependence (Ch1,section 2). Thus we have derived pair creation and annihilation. The dt is zero giving no time dependence thus stable states. On the superconductivity we derived the pairing interaction (eq.4.5.3) and superfluidity (sect.4.6). So for two paired leptons (via the pairing interaction) the Hamiltonian of each one is then a function of both wavefuctions: $\hbar\partial\psi_1\partial/t=u1\psi 1\ v_2\psi_2$ and $\hbar\partial\psi_2/\partial t=u_2\psi_1+v_2\psi_2$ which gives the superconducitivity. See Feynman lectures on superconductivity.

Alternative Method Of Doing QM: Markov Chains (eg.,Implying Path Integral)

4.7 Markov Chain Zitterbewegung For r>Compton Wavelength Is A Blob

Recall that the mainstream says that working in the Schrodinger representation and starting with the average current (from Dirac eq. $(\not{p}-mc)\psi(x)=0$) assumption and so equation 9 gives $J^{(+)}=\int\psi^{(+)t}c\alpha\psi^{(+)}d^3x$. Then using Gordon decomposition of the currents and the Fourier superposition of the $b(p,s)u(p,s)e^{-ipuxu/\hbar}$ solutions (b(p,s) is a normalization constant of $\int\psi^t\psi d^3x$.) to the free particle Dirac equation(9) we get for the observed current (u and v have tildas):

$$J^k=\int d^3p\{\Sigma_{\pm s}[|b(p,s)|^2+|d(p,s)|^2]p^kc^2/E+i\Sigma_{\pm s,\pm s'}b^*(-p,s')d^*(p,s)e^{2ix\theta p\theta/\hbar}u(-p,s')\sigma^{k0}v(p,s)$$
$$i\Sigma_{\pm s,\pm s'}b(p,s')d(p,s)e^{2ix\theta p\theta/\hbar}v(p,s')\sigma^{k0}u(p,s). \quad (4.11.4)$$

(2) E.Schrodinger, Sitzber.Preuss.Akad.Wiss.Physik-Math.,24,418 (1930)

Thus we can either set the positive energy v(p,s) or the negative energy u(p,s) equal to zero and so we no longer have a $e^{2ix\theta p\theta/\hbar}$ zitterbewegung contribution to J_u, the zitterbewegung no longer can be seen. Thus we have derived the mainstream idea that the zitterbewegung does not exist.

But if we continue on with this derivation we can also show that the zitterbewegung does exist if the electron is in a confined space of about a Compton wavelength in width, so that a nearby confining wall exists then.

(3) Bjorken and Drell, *Relativistic Quantum Mechanics*, PP.39, eq.3.32, (1964)

Derivation Of Eq.9 From (uncertainty) Blob (reference 1)

Recall from section 3.4.4 that we can derive the zitterbewegung blob (within the Compton Wavelength) from the equation 9.(see reference 2.) Also recall from section 1 that we postulated a blob that was nonzero, non infinite and with constant standard deviation (i.e., we postulated $\delta\delta 1=0$). But that is the same thing as Schrodinger's zitterbewegung blob mentioned above. So we postulated the electron and derived the electron rotated 2AI (i.e.,eq.9) from that postulate. We therefore have created a mere trivial tautology.

4.13 The Most General Uncertainty C In Eq.1 Contains Markov Chains

This final variation wiggling around inside dr= error region near the Fiegenbaum point also implies a dz that is the sum of the total number of all possible individual dz as in a *Markov chain* (In that regard recall that the Schrodinger equation free particle Green's function propagator mathematically resembles Brownian motion, Bjorken and Drell) where we in general let dt and dr be either positive or negative allowing several δz to even coexist at the same time (as in Everett's theory and all possible paths integration path integral theories below). Recall dt can get both a $\sqrt{(1-v^2/c^2)}$ Lorentz boost (with the nonrelativistic limit being $1-v^2/2c^2+\ldots$) and a $1-r_H/r=\kappa_{oo}$ contraction time dilation effects here. In section 2.2.6 we note that for a flat space Dirac equation Hamiltonian the potentials are infinite implying below an unconstrained Markov chain and so unconstrained phase in the action So $dt\rightarrow dt\sqrt{(1-v^2/c^2)}\sqrt{\kappa_{oo}}$. $r_H=2e^2/(m_ec^2)$. We also note the alternative (doing all the physics at the point ds at 45°) of allowing $C>C_1$ to wiggle around instead between ds limits mentioned above results in a Markov chain. $dZ=\psi\equiv\int dz=\int e^{id\theta}dc=\int e^{idt/so}dc=\int e^{idt/\sqrt{(1-v^2/c^2)}\sqrt{\kappa oo}/so}ds'ds$.. In the nonrelativistic limit this result thereby equals $\int e^k e^{ikdt(v^2-k/r)}= \int e^{i\int k\int(T-V)dt}ds'ds\ldots =\int e^{iS}ds'ds \equiv dz_1+dz_2+.. \equiv\psi_1+\psi_2+$. (4.13.1)many more ψs (note S is the classical action) and so integration over all possible paths ds not only **deriving the Feynman path integral but also Everett's *alternative*** (to Copenhagen) many worlds (i.e., those above many Markov chain $\delta z_i=\psi s$ in $\int dz = \psi s\equiv\psi_1+\psi_2+$.) interpretation of quantum mechanics where the possibility of $-dt$ allows a pileup of δzs at a given time just as in Everett's many worlds hypothesis. But note equation 9 curved space Dirac equation does not require infinite energies and so unconstrained Markov chains making the need for the path integral and Everett's many worlds mute.: We don't need them anymore. Thus we have derived both the Many Worlds (Everett 1957) and Copenhagen interpretations (Just below) of quantum mechanics (why they both work) and also have derived the Feynman path integral.

In regard to the Copenhagen interpretation if we stop our J.S.Bell analysis of the EPR correlations at the quantum mechanical $-\cos\theta$ polarization result we will not get the nonlocality (But if instead we continue on and (ad hoc and wrong) try to incorporate hidden variable theory (eg.,Bohm's) we get the nonlocality, have transitioned to classical physics two different ways. We then have built a straw man for nothing. Just stick with the $h\rightarrow 0$, Poisson bracket way. So just leave hidden variables alone. The Copenhagen interpretation thereby does not contain these EPR problems. And any lingering problems come from that fact that the Schrodinger equation is parabolic and so with these noncausal instantaneous boundary conditions. But the Dirac equation is hyperbolic and so has a retarded causal Green's function. Since the Schrodinger equation is a special nonrelativistic case of the Dirac equation we can then ignore these nonlocality problems all together.

4.14 2D⊕2D

Also with eq.2AI first 2D solution there is no new pde and so no wave function. The other solution to 2AI adds the other 2D (observer) and so we get the eq.9 new pde and thereby its wave function. So we needed the observer to "collapse" the wave function. This is the proof of the core part of the Copenhagen interpretation. Eq.42IA gives the probability density $\delta z^*\delta z$ (another component of the Copenhagen interpretation so we have a complete proof of the Copenhagen interpretation of quantum mechanics here.

4.15 Mixed State 2AI+2AI Implies There Is No Need For A Dirac Sea

The 1928 solution to the Dirac equation has for the positron and electron simultaneous x,y,z coordinates (bottom of p.94 Bjorken and Drell derivation of the free particle propagator) creating the need for the Dirac sea of filled states so the electron will not annihilate immediately with a collocated negative energy positron which is also a solution to the same Dirac equation. Recall $\psi(+)$ and $\psi(-)$ are separate but (Hermitian) orthogonal eigenstates and so $\langle\psi(+)|\psi(-)\rangle=0$ without a perturbation so we can introduce a displacement $\psi(x)\rightarrow\psi(x+\Delta x)$ for just one of these eigenfunctions. But the mixed state positron and electron separated by a substantial distance Δx will not necessarily annihilate. Note in the 2AI (i.e.,$\sqrt{\kappa_{\mu\mu}}\gamma^\mu\partial\psi/\partial x_\mu=(\omega/c)\psi$) equation the electron is at 45° -dr,dt and the positron is at 135° dr',-dt' which means formally they are not in the same location in this formulation of the Dirac equation. In that regard note that $dr/\sqrt{(1-r_H/r)}=dr'$, $r_H=2e'e/m_ec^2=\varepsilon$ so that different e leads in general to different dr' spatial dependence for the $\psi(x)$ in the general representation of the 4X4 Dirac matrices. So in the multiplication of 4 ψs the antiparticle ψ will be given a r_H displacement Δr ($dr\rightarrow dr'$ here) by the$\pm\varepsilon$ term in the associated $\kappa_{\mu\nu}$ So the $\psi(+)$and $\psi(-)$ in the Dirac equation column matrix will have different (x,y,z,t) values for the $\psi(+)$ than for the $\psi(-)$. As an analogy an electron in a given atomic state of a given atom can't decay into a empty state of a completely different atom located somewhere else. Thus perturbation theory (eg.,Fermi's golden rule) cannot lead to the electron spontaneously dropping into a negative energy state since such 2AI states are not collocated for a given solutions to a single Dirac equation (other positrons from *other* Dirac equation solutions can always wonder in from the outside in the usual positron-electron pair annihilation calculation case but that is not the same thing). Thus the Dirac sea does not have to exist to explain why the electron does not decay into negative energy.

4.16 No Need for a Running Coupling Constant

If the Coulomb $V=\alpha/r$ is used for the coupling instead of $\alpha/(k_H-r)$ then we must multiply α in the Coulomb term by a floating constant (K) to make the coulomb V give the correct potential energy. Thus if an isolated electron source is used in Z_{00} we have that $(-K\alpha/r)=\alpha/(k_H-r)$ to define the running coupling constant multiplier "K". The distance k_H corresponds to about $d=10^{-18}m=ke^2/m_\tau c^2$, with an interaction energy of approximately $hc/d=2.48X10^{-8}$joules= 1.55TeV. For 80 GeV, $r\approx20$ ($\approx$1.55Tev/80Gev) times this distance in colliding electron beam experiments, so $(-K\alpha/r)= \alpha/(r_H-r) =\alpha/(r(1/20)-r))= -\alpha/(r(19/20))=(20/19)\alpha/r =1.05\alpha/r$ so K=1.05 which corresponds to a $1/K\alpha\equiv1/\alpha'\approx130$ also found by QED (renormalization group) calculations of (Halzen, Quarks). Therefore we can dispense with the running coupling constants, higher order diagrams, the renormalization group, adding infinities to get finite quantities; all we need is the correct potential incorporating $\sqrt{\kappa_{oo}}$.

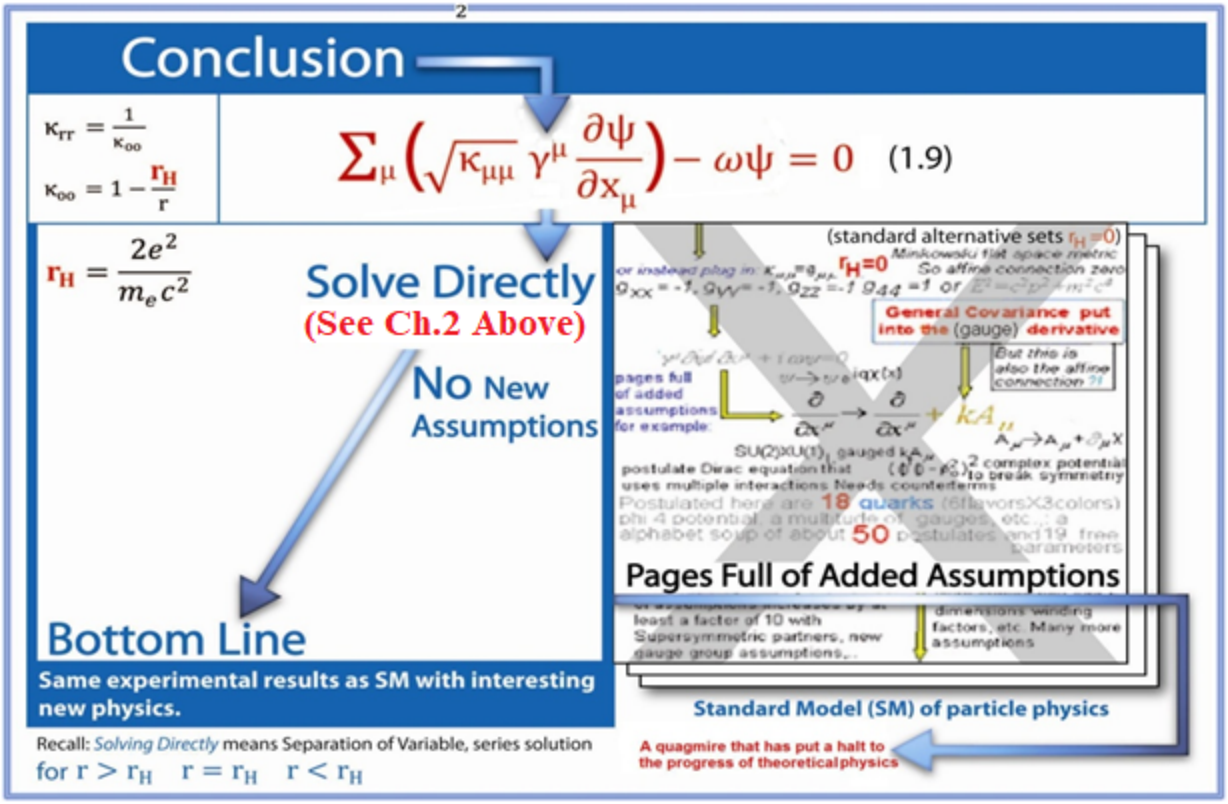
Note that the $\alpha'=\alpha/(1-[\alpha/3\pi(\ln\chi)]$ running coupling constant formula (Faddeev, 1981)] doesn't work near the singularity (i.e., $\chi\approx e^{3\pi/\alpha}$) because the constant is assumed small over all scales (therefore there really *is no formula to compare* $\alpha/(r-r_H)$ to over all scales) but this formula works well near $\alpha\sim1/137.036$ which is where we used it just above.

4.17 Rotated 4AI Implies $\kappa_{00}=1-r_H/r\approx1/\kappa_{rr}$ So No Klein Paradox As Is In The Original 1928 Dirac Equation

Recall that $\kappa rr=1/(1-r_H/r)$ in the new pde eq.2AI. Recall that for the ordinary Dirac equation that the reflection (R_s) and transmission (T_s) coefficients at an abrupt potential rise are: $R_s=((1-\kappa)/1+\kappa))^2$ and $Ts=4\kappa/(1+\kappa)^2$ where $\kappa=p(E+mc^2)/k_2(E+mc^2-V)$ assuming k_2 (ie.,momentum on right side of barrier) momentum is finite.. Note in section1 $dr'^2=\kappa_{rr}dr^2$ and $p_r=mdr/ds$ in the 2AI+2AI mixed state new pde so $p_r=(\sqrt{\kappa_{rr}})p=(1/\sqrt{(1-r_H/r)})p$ and so $p_r\rightarrow\infty$ so $\kappa\rightarrow\infty$ the huge values of the rest of the numerator and denominator cancel out with some left over finite number. Therefore for the actual abrupt potential rise at $r=r_H$ we find that p_r goes to infinity so $R_s=1$ and $T_s=0$.as expected. Thus nothing makes it through the huge barrier at r_H thereby resolving the Klein paradox: there is no paradox anymore with the new pde. No potentials that have infinite slope. Therefore the new pde applies to the region inside the Compton wavelength just as much as anywhere else. *So* if you drop the $\sqrt{\kappa_{rr}}$ in the new pde all kinds of problems occur inside the Compton wavelength such as more particles moving to the right of the barrier than as were coming in from the left, hence the Klein paradox(4).

(4) O.Klein, Z. Physik, 53,157 (1929)

So by adopting the new pde (eq.9) instead of the old 1928 Dirac equation you make the Dirac equation selfconsistent at all scales and so find no more paradoxes.



4.18 Mixed State 2AI+2AI C>1/4 and C<1/4 Implications For Pair Creation And Annihilation

Note that if C<1/4 in equation 1 ($dz=(-B\pm\sqrt{(B^2-4AC)})/2A$, A=1, B=1) the two points are close together and time disappears since dz is then real for the neighborhood of the origin where opposite charges can exist along the 135° line. So we are off the 45° diagonal and therefore the equation 2 extrema does *not* apply. So the eq.2AII fermions disappear and we have only that original second boson derivative $\delta ds^2=0$ circle ($\Box^2 A_\mu=0$, $\Box\bullet A=0$) Maxwell equations. So when two fundamental fermions are too near the origin and so get too close together (ie., dr=dr', dt=dt') you only have a boson and the fermions disappear. So we have explained particle-antiparticle annihilation from first principles. In contrast two fermions of equal charge require energies on the order of 100GeV to get this close together in which case they also generate bosons in the same way and again the fermions do disappear from existence. You then generate the W and the Z bosons (since above sect.4.11 nonweak field $k^\nu k_\nu \kappa_{\mu\mu}$=Proca equation term) .

4.19 Eq.1 δδ1=0=δC=0 Implies Invariance of The Variance

From equation eq.1 C is invariant. We can postulate anything we want. In that regard recall (our postulate of) the concept of 1 can represent anything at all (one rock, one house, etc.,) from appendix A. Algebraically we then write 1 as z=zz with our small real error C (for C<1/4 z is real quadratic formula solution of z=zz+C). z=zzz is more complex, is not the simplest way to write 1 and gives -1 also. Also the concept of error at a minimum requires variance. But for it to be a well defined single variance, as eq.1 δC=0 implies, we also require invariance of the variance so that commoving observers agree on a given value of the variance. Without the invariance even in the proper commoving frame of reference the variance has no set value. So the simplest rigorous definition of error is the "invariance of the variance". So for the greatest generality for real error C then we have by definition the usual real variance $\sigma^2=\Sigma_{i=1}^n(dz_i^2)/n\equiv|dz|^2$ typified by the central limit (theorem) normal curve data. So the invariant (proper) variance is given by $\delta\sigma^2 = \delta(\Sigma_{i=1}^n(dz_i^2)/n) \equiv\delta|dz|^2=0$, i.e., the invariance of the invariance. So we have postulated (in 1+error) the most general error we can by just stating that the variance is also a (proper) invariant as in $\delta\sigma^2=0$. This means we really do have a first principles derivation of theoretical physics.

As a quantum mechanical (QM) analogy to invariant proper time ds in ds^2 $(=dr^2+dt^2)$ the σ can be the √variance in the Schrodinger equation *expanding* minimal uncertainty Gaussian wave packet with $\sigma=\sqrt{(\alpha^2+(\hbar t/2m)^2)}$. Please note the proper time t and its relation to σ for small α. Thus in the case of the minimal uncertainty wavepacket σ really does increase with proper time ds (=t) so we really do have invariance of the variance! Another QM analogy is that $\delta|dz|^2=0$ (eq.4)just says that there is a peak in the central limit theorem normal distribution curve with dz thereby representing the number measurement electrons filling consecutive 1D degenerate states. There are other such QM analogies with $\delta|dz|^2=0$. In any case our error definition is consistent with QM. Also recall that the simplest starting point is a real positive 1 (ie., Relz=1) algebraically defined by z=zz. This is then what we define to be this "real" error. This invariance of the variance is the most general error (there just has to be a peak in P(z) *somewhere*) with the fewest possible artificial constraints on C

making this (z=zz+C→eq.2) a first principles derivation of theoretical physics.

So a realistic error C is a measurement error in addition to being a real number and comes from the most general probability distribution that peaks (possibly even around a systematic error value), such as for a bell shaped curve P(dz) as is implied by the central limit theorem. This systematic error might be due to a slit, as in single slit diffraction for a narrow slit, where the uncertainty-error C is then a measure of the slit width in a diffraction experiment (see section 10C). Note from equation 2 that the ds' uncertainty (call it δ) is along the radius and the ds^2 uncertainty ε is along the circumference. ε,δ (symbols also used in defining the limit in calculus) here then define regions of the 2D plane of nonzero probability (eg.,of our picking the given δ for which $|x-x_o|<\delta$) in our application. So ε more likely is in the variance oval along the circle (for ds^2, other ε s have near zero probability) whereas δ is more likely in the variance oval along the radius for the orthogonal ds' (section 1). Given that the average ds' distance must be to the circle we can only say then that "most probably" $ds^2=ds'^2$. So the peak C can in general be taken to be a real constant error bound given the possibility of these types of systematic error. This is what we mean by realistic error C. Even in the below Mandelbrot set application (and that http simulation in fig 5) we actually only use the real z line results at $-\sqrt{2}$ so the end result C we use is *still* a real number!

C is the most general real error possible which is a necessity here if we are to have a *single* succinct postulate, without qualifiers which would themselves amount to new postulates Also there are other ways of introducing this error C such as $z-C=(z-C_1)(z-C_2)+C_3$ for real Cs. But they *all* lead to a quadratic equation which in general has a complex solution which is the main result coming out of equation 1. The general result is $Az^2+Bz+C=0$ where the A can be canceled out with B then determining the size of the z plane and C being a free floating uncertainty scaled with B allowing us to set B=1. So we can always scale (i.e., rename) the coordinates to some smaller value and not change any physics result. Thus z=zz+C always holds allowing us to maintain consistency with that $z_{N+1}=z_N z_N$ +C (quasi) Markov chain analysis (e.g., fig.5). Also even $z=z_N+C$ (as a substitution into z=zz+C), where N is an arbitrary integer, leads to an equation with a complex plane solution z.

Note for a given fractal manifold Δ^2 (possibly the area of Mandelbrot set), the curvature scalar ($R=2/r_H^2$) metric density $(1/R)/\Delta^2$ =constant. Note by allowing C to be on a Julia set (and not just the one value at ds) we still have those uncorrelated random variances as in the Markov chain application below.

Chapter 5 Second Solution C_M Contribution To $k_{\mu\nu}$ Due To Object B

Note we are within the Compton wavelength of the next higher fractal scale new pde (we are inside of r_H). Also our new pde does not exhibit the Klein paradox within the Compton wavelength (because of the κ_{ij} s) or anywhere else so our new pde is valid there also. Note for $r<r_H$ then $E=\hbar\omega=E=1/\sqrt{\kappa_{oo}}=1/\sqrt{(1-r_H/r)}$ and therefore this square root is imaginary and so $i\omega \rightarrow\omega$ in the Heisenberg equations of motion. Therefore $r=r_o e^{i\omega t}$ becomes instead $r=r_o e^{\omega t}$ (that accelerating cosmological expansion) which is observable zitterbewegung motion since ωt does not cancel out in $\psi^*\psi$ in that case and again we are within the Compton wavelength and so even according to the Bjorken&Drell PP.39 criteria the zitterbewegung therefore exists.

Also note in the above $\kappa_{rr}=1/\kappa_{tt}$ we have derived GR from our theory.

5.1 The $R_{\mu\nu}$ Is Also A Quantum Mechanical Operator.

Recall section 1.5 implies General relativity (recall eq.3.3 and the Schwarzschild metric derivation there). Note also in Ch.10 we defined the quantum mechanical $[A,H]|a,t\rangle=(\partial A/\partial t)|a,t\rangle$ Heisenberg equations of motion in Ch.10 with $|a,t\rangle$ a eq.9 (4AI) eigenstate. Note the commutation relation and so second derivatives (H relativistic eq.9 (4AI) Dirac eq. iteration 2nd derivative) taken twice and subtracted. $(\partial A/\partial t)|a,t\rangle$. For example if 'A' is momentum $p_x= -i\partial/\partial x$. $H= \partial/\partial t$ then [A, so we must use the equations of motion for a curved space. In this ordinary QM case I found for $r<r_H$ that $r=r_o e^{wt'}$ $H]|a,t\rangle=(\partial A/\partial t)|a,t\rangle=(\partial/\partial t)(\partial/\partial x)-(\partial/\partial x)(\partial/\partial t)$=pdot. But $\sqrt{\kappa_{rr}}$ is in the kinetic term in in the new pde with merely perturbative $t'=t\sqrt{\kappa_{oo}}$. But using the C^2 of properties of operator A (C^2 means continuous first and second derivatives and is implied in sect.1.5) in a curved space time we can generalize the Heisenberg equations of motion to curved space *non*perturbatively with: $(A_{i,jk}-A_{i,kj})|a,t\rangle =(R^m_{ijk}A_m)|a,t\rangle$ where R^a_{bcd} is the Riemann Christofell Tensor of the Second Kind and $\kappa_{ab}\rightarrow g_{ab}$. Note all we have done here is to identify A_k as a quantum vector operator here, which it should be. Note again the second derivatives are taken twice and subtracted looking a lot like a generalization of the above Heisenberg equations of motion commutation relations. Note also R^m_{ijk} could even be taken as an eigenvalue of pdot since it is zero when the space is flat, where force is zero. These generalized Heisenberg equations of motion reduce to the above QM form in the limit $\omega\rightarrow 0$, outside the region where angular velocity is very high in the expansion (now it is only one part in 10^5).

5.2 Solution To The Problem Of General Relativity Having 10 Unknowns But 6 Independent Equations

From Chapter 4 this zitterbewegung (de Donder **harmonic** motion (2)) plays a much more important role in general relativity(GR) The reason is that General Relativity has ten equations (e.g., $R_{\mu\nu}=0$) and 10 unknowns $g_{\mu\nu}$. But the Bianchi identities (i.e., $R_{\alpha\beta\mu\nu;\lambda}+R_{\alpha\beta\lambda\mu;\nu}+R_{\alpha\beta\nu\lambda;\mu}=0$) drop the number of independent equations to 6. Therefore the four equations (ie., $(\kappa^{\mu\nu}\sqrt{-\kappa})_{,\mu}=0$) of the (zitterbewegung) harmonic condition fill in the four degrees of freedom needed to make GR 10 equations $R_{\mu\nu}=0$ and 10 unknown $g_{\mu\nu}$. We thereby do not allow the gauge formulations that give us wormholes or other such arbitrary, nonexistent phenomena. In that regard this de Donder **harmonic** gauge (equivalent condition) is what is used to give us the historically successful theoretical predictions of General Relativity such as the apsidal motion of Mercury and light bending angle around the sun seen in solar eclipses. So the harmonic 'gauge' is not an arbitrary choice of "gauge". It is not a gauge at all actually since it is a physically real set of coordinates: the zitterbewegung oscillation harmonic coordinates.

(3) John Stewart (1991), "Advanced General Relativity", Cambridge University Press, ISBN 0-521-44946-4

Fractalness Implications: Effect Of Object B on Object A

6.1 How Many Objects Are There On the M+1th Fractal Scale?

Recall section 4.2 and the 6 cross terms requires yet another electron coming out of eq.2a, then anothera. This procedure carries with it the two neutrinos (so E&M electrons) and more applications of 1b and so it generates a sequence of electrons up until 10^{82}. Thus if we one electron we then must have 10^{82} electrons.

So there could be a second object near to our own object A in this fractal universe. . In fact in our fractal universe there is a 75% probability our object A is one of three objects in a proton. We will call the central eq.2A1 object in this proton object B and the third object, object C.

Note object B is responsible for those ε and $\Delta\varepsilon$ metric quantization states. So where does object B itself come from? Again recall section 3.1 and the origin of the other objects on a given fractal scale. The horizons r_H have the property that the amount of information inside (also the entropy) is equal to the area of the outside. So given $10^{27}\text{m}\approx10^{11}$ LY= r_{Hb} $10^{-15}\text{m}=r_{Hs}$ $A_{Hb}/A_{Hs}=(10^{27})^2/(10^{-15})^2 =10^{54}/10^{-30}=10^{84}$ =number of pieces of information.=number of fractal objects inside r_H. In the context of the 10^{40}X fractal jump result the space time radius is subdivided by10^{40} so alternatively there are $4\pi(10^{40})^2=10^{81}$ pieces of information inside r_H which is the actual first principles method of getting the 10^{82}.given the 10^{40} explicitly comes from that fig.5 Mandelbrot set analysis which comes from our equation 12.Object B is just one of those 10^{82} objects. So in that limit the number of maximum density incompressible r_H radius objects at the r_u surface must be equal to the sphere surface area $4\pi(r_u)^2= 4\pi(2.2813\text{X}10^{40})^2 = 6.54\text{X}10^{81}$ of (fundamental) objects with nonzero rest mass in our universe. Intuitively we are simply saying that the density of all r_H even horizons is the same since we created the larger horizon $4\pi r_H^2$ area by patching together the smaller horizon $4\pi r_H^2$ areas. This result is consistent with (solar mass)X(suns per galaxy)X(number of galaxies)/(proton mass) $=6\text{X}10^{30}\text{X}10^{12}\text{X}100\text{X}10^9/1.67\text{X}10^{-27} = 7.1856\text{X}10^{79}$ objects.

In ħω=E, ω goes down by 10^{40}X in going up to the next fractal scale. So ħ Planck's constant increases by 10^{40}X in going from Nth fractal scale to the N+1th fractal scale. Also the force between the two large universes goes up by 10^{40} but between two electron's goes down by 10^{40}X, gravity.

6.2 $r<r_H$ Observational Evidence For Object B

Recall there are two metrics in section 3.1 and outside Schwarzschild and inside De Sitter. But because of eq.2AI (and so eq.9 modified Dirac equation) we are in a rapidly rotating object, the electron rotating at rate c (in the fractal theory at least. It is the solution to the Dirac equation eq.9). But because of inertial frame dragging in object A observed spin is extremely small except for a small contribution to reducing inertial frame dragging of object B (section 4.1.2). So the geodesics are parallel (flat space holonomy) just like the cylinder. Inertial frame dragging should not destroy the holonomy, just rotate the cylinder but it stays a cylinder. We can realize that for a spherical metric by maintaining the parallel transport which means the expansion is needed to maintain the cylinder. From our perspective we see a sphere with a flat space. Recall the mainstream guy also said this space is in fact that of a 3D cylinder, which it is. This 'seeing ourselves' is also predicted by the mainstream stuff too given the observations of the flat space and the requirement of the cylinder topology. But seeing ourselves is so weird to the mainstream that they have postulated a pretzel space instead at large distances.

So the universe is fractal with the (Dirac spinor) the Kerr metric high angular momentum local cylinder near r_H dominates and creates the flat space time associated with a cylinder so that two parallel lines do remain parallel within the time like interval at least. When we look out at the edge of the universe in some specific direction, beyond that space like interval (that we cannot see beyond) we are very nearly (just over the space- like edge) looking at ourselves as we were over 12by years ago. We are looking back in time at ourselves! (in this fractal model).

The hydra-centaurus supercluster of galaxies is about 150MLY away. We would find it by looking in the opposite direction of the sky from where we see it now, it would be a smudge at submillimeter wave lengths.

So create a map of the giant galaxy clusters within 2By of the Milky Way galaxy and invert each object by 180° to find the map of the oldest redshift galaxy clusters

Given 2D piece of paper, you can connect the ends a few different ways by folding it. Connect one of the dimensions normally and you have a cylinder. Flip one edge over >before connecting and you've made a Mobius strip. Connect two dimensions, the top to the bottom and one side to the other, and you have a torus (aka a donut). In our 3D universe, there are lots of options — 18 known ones, to be precise. Mobius strips, Klein bottles and Hantzsche-Wendt space manifolds are all non-trivial topologies that share something in common: if you travel far enough in one direction, you come back to where you started. Bg gravimagnetic dipole from the new pde provides the spherical torus shape for this.

In this fractal universe we do this. In fact there is only one way to do it: in the r_H cylinder region of the Kerr metric near c rotation rate, so the topology is a given.

6.3 The Distance Of Object B From Object A Determines Particle Mass

Recall section 4.1; 4.1.3 and the derivation of the 10^{81} X electron mass there. That implies that our universe is not the only object on the N+1 fractal scale. Since we are at the Fiegenbaum point the fractalness is exact so that there is a 75% chance our object A is one of three such "electrons" inside a proton. Note in sect.2.1 the equilibrium established after the initial slow expansion so that energy density is uniform so that $k(4/3)\pi r^3$**.** We are located in a huge (rotating) electron Kerr metric object. But if there was no nearby object there would be complete inertial frame dragging. But recalling the large rotating shell approximation of GR (Mach's principle implication) we see that a nearby large object B will reduce the inertial frame dragging and so make the metric a Kerr metric:
Section 3.1 implies a Schwarzschild metric for the outside observer $r>r_H$ for an isolated object (eg., no object B nearby) since that was the assumption made in the derivation. But equation 2A1 (solution to equation 4) leads to equation 9 and the new pde. In that equation the object 2A1 electron has spin S, is rotating and can be seen as such if there is a object B nearby (see below). Thus for no nearby object we have the Schwarzschild metric but in general with a nearby object the internal $r>r_H$ sees a rotational (Kerr) metric (so from section 4.1.2 assumed to be a quantum operator) which is given by:

$$ds^2 = \rho^2\left(\frac{dr^2}{\Delta} + d\theta^2\right) + \left(r^2 + a^2\right)\sin^2\theta d\phi^2 - c^2dt^2 + \frac{2mr}{\rho^2}\left(a\sin^2\theta d\theta - cdt\right)^2,$$

where $\rho^2(r,\theta) \equiv r^2 + a^2\cos^2\theta$; $\quad \Delta(r) \equiv r^2 - 2mr + a^2$, Note the oblation term $a^2\cos^2\theta$.
To find the perturbative contribution of Eq.3.2 in sect.3.1 to the Schwarzschild metric we note that for near zero rotational speed we can take $d\theta/ds=0$, or just $d\theta=0$. Also for $\theta=90°$ then $\cos 90°=0$, $\rho^2 = r^2$. So the above equation becomes

$ds^2= dr^2/(1-2m/r+(a/r)^2)+r^2d\theta^2+(r^2+a^2)\sin^2\theta(vdt/r^2)^2+ 2a\sin^2\theta d\theta cdt+(2m/r-1)dt^2$

$ds^2= dr^2/(1-2m/r+(a/r)^2)+r^2d\theta^2+(r^2+a^2)\sin^2\theta d\phi^2+ 2a\sin^2\theta d\theta cdt+(2m/r-1)dt^2$

$\approx ds^2= dr^2/(1-2m/r+(a/r)^2) +(2m/r-1)dt^2$ (6.1.1)

The $(a/r)^2$ is the energy ε angular momentum term which also turns out to be the muon mass. The fractal ground state $\Delta\varepsilon$ (is part of the background mass) is added to this. That r_H in the old GR metric is $r_H=2GM/c^2$ (the fractal M+1) scale r_H. The Mth scale r_H is that $2e^2/m_ec^2=r_H$ and gives those QED results without the renormalization.

$dr^2/(1-2m/r+(a/r)^2) -c^2dt^2(1-2m/r)$ (6.1.2)

with $(a/r)^2 =\varepsilon$ being the ambient metric of section 6.4. Thus the ambient metric is caused by the reduced inertial dragging associated with a nearby object B. Note in equation 7 we are again subtracting ε but this time possibly in the form of $\zeta dr\equiv(a/r)^2$ where $\zeta\equiv\varepsilon/dr$. This is the mass energy term $\zeta dr=(a/r)^2$ of equation 3.2, sect.1.1.5. The $(a/r)^2$ in eq.6.1.1 is the energy ε angular momentum term (and also $\Delta\varepsilon$), which turns out to be the muon mass..

6.4 This Added $(a/r)^2$ term Is Then The Source Of The Ambient Metric And Mass

Tensor Geometry Consequences of C^2

Recall section 3 implies General relativity (recall eq.3.2and the Schwarzschild metric derivation there). In that regard given a (observable) vector operator A that explicitly operates on the ψ of equation 9) we then construct the Riemann Christofell Tensor of the Second Kind R^a_{bcd} (from section 4.2.1 we can assume it is a quantum operator) from the $\kappa_{ab}\equiv g_{ab}$ using the C^2 of A given by $(A_{i,jk}-A_{i,kj})|a,t\rangle =(R^m_{ijk}A_m)|a,t\rangle$. We can then contract this $R^m_{ijk}A_m|a,t\rangle=$ tensor to get the Ricci tensor R_{ij} (here $R_{ij} \equiv R^m_{ijm}$).

Note here A is the Quantum Operator and the coefficient $R_{\mu\nu}$ is a (geometry) tensor. Define the scalar R = $\kappa^{\mu\nu}R_{\mu\nu}$ We then define conserved quantity $Z_{\mu\nu}$ from

$$R_{\mu\nu}-\tfrac{1}{2}\kappa_{\mu\nu}R\equiv Z_{\mu\nu} \qquad (6.4.3)$$

after substituting in equations 3.2, 4.1 we see for example that $Z_{oo}=4\pi r_H$ (6.4.4) where from equation 4.4.3 we have $r_H=2e^2/m_ec^2$.

In free space we can see from equation 4.2 that: $R_{\mu\nu}A_\nu|a,t\rangle= 0$

From section 1.5 solving the geometry components $R_{22}=0$ and $R_{11}=0$ using 3.2-3.5 for spherical symmetry gives us respectively $1/\kappa_{rr}=1-r_H/r$, and $\kappa_{rr}=1/\kappa_{oo}$ (6.4.5) showing that equation 6.4.2 is equivalent to equations 3.2 and 3.3 if there is no nontrivial background metric contribution (i.e.,ε=0). The $(a/r)^2$ in eq.6.1.1 is the energy ε contribution of the energy angular momentum term, which turns out to be the muon mass in:

$$1/\sqrt{\kappa_{oo}}=(1\pm\varepsilon\pm\Delta\varepsilon/2)\varepsilon/\Delta\varepsilon \qquad (6.4.6)$$

Use metric a ansatz: $ds^2=-e^\lambda(dr)^2-r^2d\theta^2-r^2\sin\theta d\phi^2+e^\mu dt^2$ so that $g_{oo}=e^\mu$, $g_{rr}=e^\lambda$. From equation 4.2 for spherical symmetry in free space

$$R_{11}= \tfrac{1}{2}\mu''- \tfrac{1}{4}\lambda'\mu'+ \tfrac{1}{4}(\mu')^2-\lambda'/r =0 \qquad (6.4.7)$$

$$R_{22}=e^{-\lambda}[1+\tfrac{1}{2} r(\mu'-\lambda')]-1=0 \qquad (6.4.8)$$

$$R_{33}=\sin^2\theta\{e^{-\lambda}[1+\tfrac{1}{2}r(\mu'-\lambda')]-1\}=0 \qquad (6.4.9)$$

$$R_{oo}=e^{\mu-\lambda}[-\tfrac{1}{2}\mu''+\tfrac{1}{4}\lambda'\mu'-\tfrac{1}{4}(\mu')^2- \mu'/r]= 0 \qquad (6.4.10)$$

$$R_{ij}=0 \text{ if } i\neq j$$

(eq. 6.4.7 -6.4.10 from pp.303 Sokolnikof): Equation 6.4.8 is a mere repetition of equation 6.4.7. We thus have only three equations on λ and μ to consider. From equations 6.4.7; 6.4.10 we deduce that

$\lambda'=-\mu'$ so that radial $\lambda=-\mu$+constant $=-\mu+C$ for our nonzero free space metric of section 4.4 normalizing to one real dimension as in the postulate. So $e^{-\mu+C}=e^\lambda$. Note C can be imaginary or real. Then 6.4.8 can be written as:

$$e^{-C}e^\mu (1+r\mu')=1 \qquad (6.4.11)$$

Set $e^\mu=\gamma$. So $e^{-\lambda}=\gamma e^{-C}$ and so integrating this first order equation (equation.4.4.9) we get:

$$\gamma=-2m/r +e^C \equiv e^\mu \text{ and } e^{-\lambda}=(-2m/r +e^C)e^{-C} \qquad (6.4.12)$$

From equation 6.4.3 we can identify radial $e^C\approx1+2\varepsilon$ with also rotational oblateness perturbation $\Delta\varepsilon$ already a component here (section 6.4).

In general write the resulting asymmetry in $1/\kappa_{rr}$ and κ_{oo} by resetting the proper time (squared) clock ds^2 (details in section 6.4.13) by multiplying by the pure radial $e^C\approx1+2\varepsilon$ coefficient allowing here for both (relative) positive and negative ε in the background metric:

$$ds^2=(1\pm\varepsilon)\left[(1\pm\varepsilon+\Delta\varepsilon)dt^2-\frac{1}{(1\pm\varepsilon+\Delta\varepsilon)}dr^2\right] \qquad (6.4.13)$$

Note for the 1+ε choice in equation 4.1.2 we have $g_{oo}=1+2\varepsilon+\Delta\varepsilon$, $g_{22}=1/(1+\Delta\varepsilon)$ (used below in equation 18.3 for real metric coefficient case) or for imaginary C as above

$$g_{oo}= e^{i(2\varepsilon+\Delta\varepsilon)} \qquad (6.4.14)$$

used in 4.4.16 for background metric case. ε=.060406.

Note the $(a/r)^2$ in 6.4.2 is then the $\varepsilon+\Delta\varepsilon$ in the denominator on the right side of eq.6.4.13, the main reason we went to so much trouble to derive 6.4.13. Thus we have shown how a nearby object B creates mass in object A.

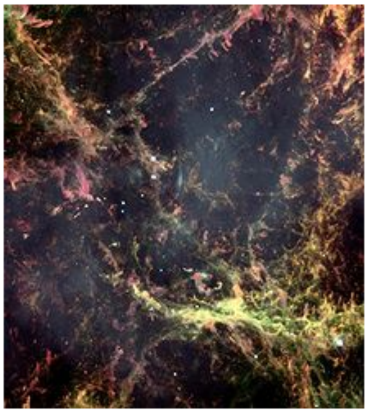
Note(r,t)X(ϕ,θ) is a Cartesian product of two 2D spaces here.

Thus the $(a/r)^2$ term in Eq.6.4.13 thus provides a background metric and this ambient metric then provides the mass of the fundamental leptons. Tauon (1), muon(ε) and electron€. Object B and object A area two body object on the next fractal scale(with $w_B=w_A$ at the r_H boundary due to causality) effect of causing a drop in inertial frame dragging and a increase in the mass of the particles through the mass degeneracy provided by quantum mechanical vibrational τ tauon and rotational ε muon and ground state Δε electron metric quantization eigenstates of object A and B together. In

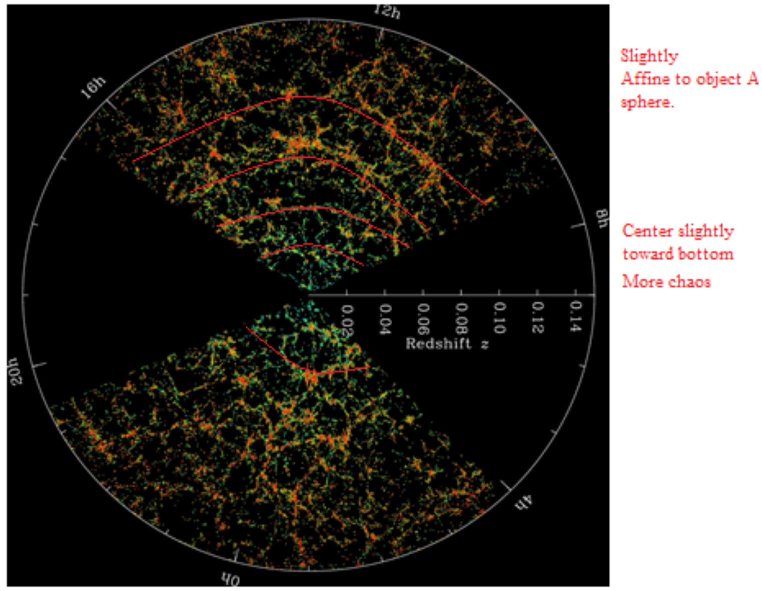
$$\kappa_{00}=1+\varepsilon+\Delta\varepsilon-r_H/r. \quad (6.4.1)$$

6.5 Sum Of All These Effects: Stair Step Metric Expansion

Given the inertial frame dragging reduction effects of nearby object B (sect.6.4.3) the ε (muon) and Δε (electron) have their own zitterbewegung frequencies from the new pde. It is at $r<r_C$ so it exists (sect.4.1). Also from the object A new pde locally $r=r_oe^{kt}$ for expansion. Also the underlying object A space-time is Minkowski, flat space-time as we see in equation 5.1.1 since the time spent in the later parts of the expansion the eq 4 Gauss's law Gaussian Pillbox is nearly empty since most of the material is most of the time next to the horizon r_H So classicaly the interior of r_H has no gravitational force associated with it and thus is a flat Minkowski metric. These two object A criteria are not perturbations (6.11.1). Recall the outside observer sees a zitterbewegung independent of location inside: it all happens at once. So for the $r=r_oe^{kt}$ expansion to work simultaneously with the Minkowski metric it all must happen simultaneously within r_H. The whole thing rises at once from the outside observer's point of view. The two object A and two object B criteria are satisfied everywhere if we have a stair step Minkowski space time, where the space-time is Minkowski at the flat part of the steps with the vertical part being infinitesimal in both time and space. So over the entire interior of object Awe have the step function $g_{oo}=\Sigma_n\sin((2n+1)\omega t)/(2n+1)$ with ω being both separately the ε and Δε omegas giving a square wave which is (locally) flat if the sum is to $n=\infty$. The separate sums also exhibit the required perturbation frequencies ε and Δε. Both ε and Δε are smaller than $1/k=r_c$ so they can be actual oscillations (sect.6.11). So the jumps in the larger ε square wave function $\Sigma_n(\sin((2n+1)\omega t)/(2n+1))$ functions must be to the envelope of the exterior observer $r=r_oe^{kt}$ *non*pertutbative function turning the notional space-time rubber sheet into a stair step function. The whole thing still rises at once. But the ε and Δε object B transmissions are local and so get dispersive frequency cut-offs at galaxy scattering cut-offs at 1/100kLY so have 100kLy wide Gibbs jumps. Thus the space time (and so Gamow factor) briefly jumps up and down every ε (So every 270My, the mass extinctions, the last one being at 248My.) and to a much weaker 1/100 amplitude for Δε every 2.5My. The whole thing rising at once gives rise to some interesting phenomenology. For example a metric quantization event is seen to happen localy at first and then spread out from the observer at speed c. So for example the previous 248My metric jump event can be seen still happening at 248My from us, where in general we then see "rings" of these cyclic events.



Rayleigh Taylor Instability M1

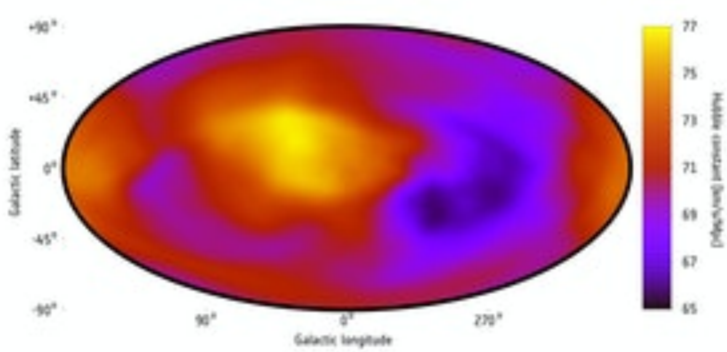


Rayleigh Taylor Instability for universe. Object B zitterbewegung resonances for rotational bands.

270My apart thick radii (red lines) as in this right figure along with remnants of the Rayleigh Taylor instability (4.3.3) of the original big bang**.** Note from rings in image nonrelativistically $\Delta z=.02=x/13.7$, $x\approx 270$My.

The researchers looked at 800 galaxy clusters across the universe, measuring the temperature of each cluster's hot gas. They then compared the data with how bright the clusters appeared in the sky.

If the universe was in fact isotropic, then galaxy clusters of similar temperatures, located at similar distances, would have similar levels of luminosity. But that was not the case.



A map showing the rate of the expansion of the Universe in different directions across the sky.K. Migkas et al. 2020, CC BY-SA 3.0 IGO

In my theory the universe is fractal (note Mandelbrot set discussion below) with 10^40X fractal scale separation. Postulate 1 implies eq.1 and eq.2 and they in turn imply eq.2AI and that Clifford algebra. so they imply leptons, eq.2AI (eq.9) is the electron which has spin so is dipole which also thereby is fractal. So we are inside of the next largest "electron" and it is a dipole, as in that image below. Thus **an interior cosmological dipole is the most blatant manifestation of the fractalness**

From the mainstream:

"The researchers looked at 800 galaxy clusters across the universe, measuring the temperature of each cluster's hot gas. They then compared the data with how bright the clusters appeared in the sky.

If the universe was in fact isotropic, then galaxy clusters of similar temperatures, located at similar distances, would have similar levels of luminosity. But that was not the case. "

Note this dipole has the same orientation as the axis of evil (for the CBR).

6.6 Origin Of Mass

Section 3.3 (object B implications sect.4.1.3; 4.1.4) then give us the origin of the mass of 2AI. For example object B is close to object A (so smaller inertial frame dragging and larger $(a/r)^2$) and larger mass term ξ in 4.1.2 and so in 4.1.3. Also 2AI is off the diagonal so $\xi dr>0$ so $C_M=\xi dr=\varepsilon$ so $\varepsilon/\xi=\lambda$=De Broglie and so $\varepsilon_o/r_H=\Delta\varepsilon$=4AI is larger than if object B was farther away.

In that regard recall that object B is outside the big 10^{11}LY horizon so its state is still oscillatory in the eq.9 Heisenberg QM formulation for p for example $T(t)|p\rangle=|p(t)\rangle$ where $T(t)=e^{iHt/\hbar}$. Recall alternatively inside r_H the $i\rightarrow1$ so the time evolution is purely exponential, hence the $r=r_oe^{kt}$ accelerating universe expansion discovered by Perlmutter et al in 1998. We did a radial coordinate transformation (sect.7.8) to the comoving observer frame and got $\ln(r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-\ln[e^{\mu}-1]]2$ which is locally still $r=r_oe^{kt}$ but jumping by ε and $\Delta\varepsilon$ and entangled state values (sect.4.2.4). The dyadic radial coordinate transformation of $T_{oo}=\varepsilon^2$ dyadic divided by m_e to that local coordinate system comoving with $r=r_oe^{kt}$ gives "constant" gravity G (see Ch.12). So what the N+1th fractal scale observer sees as the electric field the Nth fractal scale observer sees as gravity. The dyadic angular transformation at our present $r=r_H$ gives coefficient $1/(1\pm\varepsilon)^2$ (from 4.7.3). Mass is also time since $2GM/c^2$=invariant in sect.7.4 with G changing with time. So mass is also our clock time.

Section 6.7 N+1 Fractal Scale Object B and C Rotation, Vibrational, Entangled State Transitions For $r<r_H$

In section 7.4 we do the radial coordinate transformation. In this section we do the transformation to the rotating frame allowed by object B. With object B close by there are two quantum states rotation ε and ground chiral state $\Delta\varepsilon$ just as you see in Raman spectra for a diatomic molecule and the entangled states. These are the lepton states 4AI 4AII of section 1). So $\omega_1\rightarrow\omega_2$. and ω_o gets through at the cosmological r_H boundary (i.e., rope not broke). So what was outside (object A cosmological object) as ordinary "diatomic" quantum states (τ vibration $E=\hbar\omega_o(N+1/2)$ and rotation ε $E=\hbar\omega'_o\sqrt{(L(L+1))}$, $\omega_o>>\omega'_o$) is the metric quantization inside and also the entangled states. The single unentangled level metric quantization gets you the particle masses, the entangled states (classical analog: grand canonical ensemble with nonzero chemical potential) are those metric quantization

states (PartIII). Note with metric quantization you can just copy the well known equations associated with the quantum physics of a diatomic molecule to determine what goes on in those metric quantum jumps (the ω_o and H is obviously different from these book values). There is the also the rotational state ε.
From the Kerr metric there is the Δε electron nondiagonal term if object B was not moving. The nearby Fiegenbaum metric point generates spin ½ =s background. But object B also rotates around object A (actually vice versa) so ε (s'=L-s) also exists. Note in Chapter 9 we derived energy eigenvalues for *perturbative* r in r_H+r thereby perturbing the B flux quantization h/2e. The ambient metric is a cosmological global phenomena for the N+1th fractal scale so we use $g_{\mu\nu}$ instead of $\kappa_{\mu\nu}$ and so have r_H/r cosmological contribution in that case. Below fig5 we also noted that $g_{oo}=(dr/dr')^2=(dr/(dr\pm\varepsilon))^2=1/(1\pm\varepsilon)^2\approx(\partial x_o/\partial x'_o)^2$ where g_{oo} component also acts as a dyadic for ds components for the transformation from a nonrotating flat space time. So we can also use a nonperturbative derivation of the P state (solution to the new pde) oblate rotation states in the above section (on object B rotational ε eigenstate implications) to obtain mass eigenvalues since the ε eigenvalue is already known. The new state is then defined by the $\partial x_o/\partial x'_o\equiv\gamma\equiv1/(1+\varepsilon)$ kinematic transformation term in the dyadic 0-0 term whenever κ_{oo} is used implying the r_H. So we have done a rotational coordinate transformation of g_{oo} to the coordinate system commoving with the rotating system (analogous to the radial commoving transformation of sections 7.2, 7.3) and getting a new source ε in g_{ooP}'. Section 7.4).

6.8 3 Metric Quantization Levels From Object B

Recall there are 3 main levels of metric quantization coming out of object B, the Δε,ε,1 levels (i.e., electron, muon, tauon) arising from the QM ground state, rotation and vibration levels of object A with B that get through the r_H boundary and also become GR metrics inside. This means that instead of that single GR single ambient metric rubber sheet there are 3 g_{ij}. So $\omega_1\rightarrow\omega_2$. across the r_H boundary so rotation and oscillation $\hbar\omega$ eigenstates are passed inside as metric quantization provided by object B as $r\rightarrow0$: Metric disturbances cross the metric boundary and curved space unscattered just as light moves through magnetic and electric fields unscattered.
Alternatively, you could also say that object B gives the metric quantized energy levels Δε, ε, τ analogous to carbon monoxide vibrational τ and rotational ε and ground state electron mass Δε energy levels. Also there is that 2D complex plane solution of equation 2a and this plane contains both equation 2AI and 2AII, eg., the electron and the anti neutrino 2AIIB which share the same 4D 6 cross term Clifford algebra eq.4A1 terms. So with these 3 complex planes we have then for the first plane an electron and electron anti neutrino, for the second plane a muon and muon anti neutrino and for the 3rd plane a tauon and tauon anti neutrino. So in the decay channels these fundamental leptons and neutrino are always associated (i.e., associated production). So neutrinos are associated with their respective leptons $(\psi_e+\psi_{e\nu})+(\psi_\varepsilon+\psi_{\varepsilon\nu})+(\psi_\tau+\psi_{1\nu})=\psi$.
Each ω oscillation at the horizon whether it be from oscillatory, rotational, eigenstates brings in an associated ω_τ, ω_μ though the object A horizon r_H as a seperate $g_{\mu\nu}$ implying a separate 2D metric from equation 1 and equation 2 for each $g_{\mu\nu}$. Thus we have three 2D

space-times the neutrino, electron neutrino multiplets.

Casimir Effect

Also for two nearby conducting plates the low energy neutrinos can leave (since their cross–section is so low) but the E&M (E_e standing waves) has to remain with some modes not existing due to not satisfying boundary conditions, because of outside Δε ground state oscillations implying less energy between the plates and so a attractive force between them (We have thereby derived the Casimir effect).

Pure States

$e^{i\Delta\varepsilon} \rightarrow 1/[\sqrt{(1-\Delta\varepsilon-r_H/r)}](1/(1\pm\varepsilon))=(1/\sqrt{\Delta\varepsilon})(1/(1\pm\varepsilon)$ W,Z. ⊥Paschen Back $E=Bu_b(0+0+1+1)$

$e^{i\varepsilon} \rightarrow 1/[\sqrt{(1-\varepsilon-r_H/r)}](1/(1\pm\varepsilon))=(1/\sqrt{\varepsilon})(1/(1\pm\varepsilon)$ $\pi^{\pm}, \pi^{o}$.|| Paschen Back $E=Bu_b(0+0+1+1)$

See section 6.12 and PartIII for **mixed** metric quantization states $e^{i(\varepsilon+\Delta\varepsilon)}$.

Multiple Applications Of The Time Development Operator $U=e^{iHt}$ In $\psi(t) =U[\psi(t_o)]$

6.9 Ultrarelativistic Object B Also Source Of The Mexican Hat Potential

Recall $\psi(t) =U[\psi(t_o)]$ with $U=e^{iHt}$. $t=t_o+dt$.

You substitute in the respective t and H (in the U). $U=U_{KG}+U_B$, where U_{KG}=Klein Gordon 2[nd] derivative component since our ϕ turns out to be a scalar.

So from the fractal theory object B has to be ultrarelativistic (γ =1836) for the positrons to have the mass of the proton. So the time behaves like mc^2 energy: has the same gamma: $t\rightarrow t_o/\sqrt{(1-v^2/c^2)}=KH$ since energy $H=m_oc^2$ has the same γ factor as time does. So in the e^{iHt} of object B the $Ht/\hbar=(H/\sqrt{(1-v^2/c^2)})t_o/Kt_o= KH^2=\phi^2$. Define $\phi=H\sqrt{K}$. Note also ultrarelativistically that p is proportional to energy: for ultrarelativistic motion $E^2=p^2c^2+m_o^2c^4$ with m_o small so E=Kp. Suppressing the inertia component of the κ thus made us add a scalar field ϕ. Thus $\phi'=p(t)=e^{iHt/\hbar}|p_o\rangle=\cos(Ht/\hbar)=\exp(iH^2t_o/Kt_o)=\exp(i\phi^2)=\cos(\phi^2)=\phi'=1-\phi^4/2$. Thus for a Klein Gordon boson we can write the Lagrangian as $L= T-V=(d\phi/dx)(d\phi/dx)-\phi'^2= (d\phi/dx)(d\phi/dx)-\phi'^2= (d\phi/dx)(d\phi/dx)-i(1-\phi^4)'^2$. Thus we define this Klein Gordon scalar field ϕ=4AI by itself from:

$(D_\mu)^t(D_\mu\phi)-\frac{1}{4}\lambda\left(((\phi^t\phi)^2-v^2)\right)^2$ Note in the covariant derivative

$$D_\mu\phi=\left[\vartheta_\mu+igW_\mu t+ig'\frac{1}{2}B_\mu\right]\phi$$

W is from our new pde S matrix. Need the B_μ of the form it has to make the neutrino charge zero. Need to put in a zero charge Z. The B component is generated from the r_H/r and the structure of the B and A=W+B $=A_\mu=cos\theta_W B_\mu+sin\theta_W W_\mu^1$ is needed to both have a zero charge neutrino and nonzero mass electron. So Define

$$A_\mu=cos\theta_W B_\mu+sin\theta_W W_\mu^1$$

$$Z_\mu=-sin\theta_W B_\mu+cos\theta_W W_\mu^1$$

The left handed doublet was given by the fractal theory (eq.1.12)

$$l_e=\begin{pmatrix}v_{EL}\\ e_L\end{pmatrix}$$

W is needed in W +B to bring in the epsilon ambient metric mass.

Need to add the second term to the Dirac equation to give the electron mass.

$$\Lambda L_e=e_R i\gamma^\mu(\partial_\mu-ig'B_\mu)e_R-f_\mu(l_e\phi_e+e_R\phi l_e)$$

Recall section 4.9 ambient metric requires division by $(1+\varepsilon+\Delta\varepsilon+r_H/r)$ to create the nontrivial ambient metric term 1±ε.

6.10 Use $\psi(t) =U[\psi(t_o)]$ with $U=e^{iHt}$. $t=t_o+dt$ To Derive Physics

Recall $\psi(t) = U[\psi(t_o)]$ with $U=e^{iHt}$. $t=t_o+dt$. U is called the time development operator. In the Schrodinger representation. To figure out what the time reperesents we note that $2GM/c^2=r_H$ (as well as the 10^{40}X smaller $r_H=2e^2/m_ec^2$) is invariant from section 1.1; it is the Fiegenbum point. So from sect.7.4 if G is going down in time then M has to go up! Recall $E=1/\sqrt{\kappa_{00}}$ with $\kappa_{00}=1-\varepsilon-\Delta\varepsilon-r_H/r$. Therefore mass M varies with time and so we use M as a measure of time. So in general $\psi(t)=U\psi(t_o)=e^{iHt}\psi(t_o)=\kappa_{00}\psi(t_0) =$

$$e^{i\frac{E_\tau+E_\varepsilon+E_{\Delta\varepsilon}}{\sqrt{2}}t_0}\psi(t_0) \equiv \left(exp\left[\frac{i(\Delta\varepsilon+\varepsilon)}{\sqrt{2}}\frac{1}{(1-\varepsilon)\sqrt{1-\varepsilon+\Delta\varepsilon+\frac{r_H}{r}}}\right]\right)\psi(t_o)\equiv e^{iHt}\psi(t_o)$$

(6.10.1)

6.11 S States Are Point like Particles And P States Are Not Point Like Particles

P States At $r=r_H$

Recall $\Delta\varepsilon$ is ultrarelativistic so integrating the 2AI+2AI+2AI (PartII) Fitzgerald contraction in the 2P state (L=1), $r=r_H$ gives ($\cos\theta\equiv v/c=\beta$)

$$r_H\int\sqrt{(1-\cos^2\theta)}\cos\theta d\theta=r_H\int\sin\theta\cos\theta d\theta=r_H\sin^2\theta/2=r_H/2\equiv r_{HP}$$

so there is contraction by only a factor of 2 from the vantage point of the plane of rotation (From the axial perspective the radius is Fitzgerald contracted to near zero.).
From part II. the ε P state big radius: $r_{HP}\equiv 2ke^2/\text{electron}\approx 2ke^2/m_ec^2 = 2.817F = r_H$

S States at $r=r_H$

A S state $\tau+\mu+e$ doesn't rotate (note P states in contrast are L=1; S states S=0) so there is a simple Fitzgerald contraction across r_H. For $r=r_H$ S state $\kappa_{oo}=1/\kappa_{rr}$ for $\kappa_{00}=1-r_H/r$ in the spherical symmetry of the Schwarzchild metric. This requires new distance and time units be defined using

$$\left(1-\epsilon-\Delta\varepsilon-\frac{r_H}{r}\right)\frac{dt^2}{1-\varepsilon-\Delta\varepsilon}+..\equiv\left(1-\frac{\frac{r_H}{1-\varepsilon-\Delta\varepsilon}}{r}\right)dt'^2+. \quad (6.11.1)$$

This also gives us the magnitude of our Fitzgerald contraction. $\gamma=(4X1836)X$ of τ and μ in $r_L=r_H/(1+\varepsilon")=r_H/(4m_p(1+\varepsilon)c^2)$ Lepton r_L (6.11.2)

Thus the object B, S and P state metric quantization is the source of the tiny S state radius

$$\varepsilon\equiv r_{HS}\equiv 2ke^2/2\text{tauon}\approx 2ke^2/(4m_p(1+\varepsilon)c^2) \quad (6.11.3)$$

This explains why leptons (S states) appear to be point particles and baryons aren't!

So used eq.6.11.1 in the time development operator $\kappa_{00}\psi(t_0)\equiv e^{i\frac{E_\tau+E_\varepsilon+E_{\Delta\varepsilon})t_0}{\sqrt{2}}}\psi(t_0) =$

$$\left(exp\left[\frac{i(\Delta\varepsilon+\varepsilon)}{\sqrt{2}}\frac{1}{(1-\varepsilon)\sqrt{1-\left(\frac{\frac{r_H}{(1-\varepsilon-\Delta\varepsilon)}}{r}\right)}}\right]\right)\psi(t_o)\equiv e^{iHt}\psi(t_o) \quad \text{so}$$

$$E_e=\frac{1+\varepsilon}{\sqrt{1-\frac{r_C}{r}\frac{1}{(1+\varepsilon)}}}-(tauon+muon+e\ masses) \quad (6.11.4)$$

6.12 Calculate S½ State Energy Caused By That New √κoo In Equation 9

Also recall the 2,0,0 state hydrogen eigenfunction $\psi_{2,0,0}=(1/(2a_o))^{3/2}(1-r/(2a_o))e^{-r/2ao}$. Also from eq. 4.4.1: $r_H=2e^2/m_ec^2$. Next find $\psi_{2,0,0}$ eigenfunction average radial center of charge value of:

r=<r>= $\int_0^{\infty} r\psi *_{2,0,0}\psi_{2,0,0} r^2 dr = \frac{4}{(2a_o)^3}\int_0^{\infty} r(1-r/2a_o)e^{-r/2a_o}(1-r/2a_o)e^{-r/2a_o} r^2 dr=$

$$4\frac{(2a_o)^4}{(2a_o)^3}\int_0^{\infty} r^3(1-2r+r^2)e^{-2r}dr = \frac{4(2a_o)^4}{2(2a\ )^3}\int_0^{\infty}\left(\frac{r^3}{8}-2\frac{r^4}{16}+\frac{r^5}{32}\right)e^{-r}dr = \frac{8a_o}{2}\left(\frac{6}{8}-\frac{48}{16}+\frac{120}{32}\right)=$$

$6a_o$ which is not the Bohr theory peak amplitude radius of $4a_o$ (average and peak don't necessarily equal each other and we need average here.). Note $6a_o$ is measured from the Compton wavelength λ_c so r=<r>=$6a_o \rightarrow 6a_o+\lambda_c$. $r_c=2e^2$. Using our sect.4.8 normalization division by 1+ε"=(τ+μ) our $1/\sqrt{\kappa_{oo}}$ Taylor expansion=e contribution (r→∞) is then from 6.11.4 reads for the electron potential energy:

$$E_e = \frac{1+\varepsilon}{\sqrt{\frac{(1+\varepsilon)-\frac{r_C}{r}}{1+\varepsilon}}} = \frac{1+\varepsilon}{\sqrt{1-\frac{r_C}{r}\frac{1}{(1+\varepsilon)}}} = (\tau+\mu+e)+\frac{r_C}{2r(\tau+\mu)}(\tau+\mu+e)-\frac{3}{8}\left(\frac{r_C}{r(\tau+\mu)}\right)^2(\tau+\mu+e)..$$

–(tauon+muon+e masses). Note since we have normalized out the τ+μ in the metric coefficient κ_{oo}. The $S_{1/2}$ state second term= $V=2e^2(\tau+\mu+e)/[(\tau+\mu+e)2r]$=electron potential energy. From eq.4.7.2 the Taylor series new third 3/8 term is=E_e=

$$+\frac{3}{8}\left(\frac{r_C}{r(\tau+\mu)}\right)^2(\tau+\mu+e) =$$

$$\frac{3}{8}\left[\frac{8(8.89X10^9)(1.602X10^{-19})^2}{6(.53X10^{-10}+2.42X10^{-12})(4(1.06)(1.67X10^{-27})(3X10^8)^2}\right]^2(4(1.06)(1.67X10^{-27})(3X10^8)^2 =$$

$= hf = 6.626X10^{-34}27{,}400{,}000$ so that f=27Mhz (6.12.1)

Recall also the 1000Mhz component is due to the electron zitterbewegung cloud itself taking up space which we get by adding the Compton wavelength directly into the Coulomb potential radius at $6a_o$.

Thus we account for the entire Lamb shift without evaluating any higher order diagrams. See Ch.9 for gyromagnetic ratio derivation. So we don't need renormalization anymore. See eq.8.3 for anomalistic gyromagnetic ratio which also comes out of that $\sqrt{\kappa_{oo}}$ in eq.9.

Why Does The Ordinary Dirac Equation ($\kappa_{\mu\nu}$=constant**) Require Infinite Fields?**

Note from section 1.3.2 that equation 9 $\kappa_{\mu\nu}$=possibly nonconstant. So it does not have to be flat space, whereas for the standard Dirac equation $g_{\mu\nu}$=constant in eq. 4.2.1. Also eq.9 has closed form solutions (eg. section 4.9), no infinite fields required as we see in the above eq.6.12.1. So why does the mainstream solution require infinite fields (caused by infinite charges)? To answer that question recall the geodesics $\Gamma^m_{ij}v^iv^j$ give us accelerations, with these v^k s limited to <c. Recall g_{ij} also contains the potentials (of the fields) A_i. We can then take the pathological case of $\int g^{ij} = \int A = \infty$ in the S matrix integral context and $\partial g_{ik}/\partial x^j=\mathbf{0}$ since the mainstream (circa 1928) Dirac equation formalism made the g_{ij} constants in eq.4.2.1. Then $\Gamma^m_{ij} \equiv (g^{km}/2)(\partial g_{ik}/\partial x^j+\partial g_{jk}/\partial x^i-\partial g_{ij}/\partial x^k)$ $=(1/\mathbf{0})(\mathbf{0})$=*un*defined, but *not* zero. Take the $\partial g_{ik}/\partial x^j$ to be mere 0 *limit* values and then $\Gamma^\alpha_{\beta\gamma}$ becomes *finite* then. Furthermore 9.13 (Coulomb potential) would then imply that A_o=1/r (and U(1)) and note the higher orders of the Taylor expansion of the Energy=1/(1-1/r) term (=1-1/r+$(1/r)^2$-$(1/r)^3$...(geometrical series expansion) where we could then represent these n th order $1/r^n$ terms with individual 1/r Coulomb interactions accurate if doing alternatively Feynman vacuum polarization graphs in powers of 1/r). Also we

could subtract off the infinities using counterterms in the standard renormalization procedure. *Thus in the context of the S matrix this flat space-time could ironically give nearly the exact answers if pathologically* ∫A=∞ and so we *have explained why QED renormalization* works! Thus instead of being a nuisance these QED infinities are a necessity if you *mistakenly* choose to set $r_H=0$ (so constant κ_{ij}).
But equation 9 is not in general a flat space time (i.e.,.in general $\kappa_{\mu\nu}\neq$constant) so we do not need these infinities and the renormalization and we still keep the precision predictions of QED, where in going from the N+1th fractal scale to the Nth fractal scale $r_H=2GM/c^2\rightarrow 2e^2/m_ec^2$ See sect.3.9 and Ch.9 where we calculate the Lamb shft and anomalous gyromagnetic ratio in closed form from our eq.9 energy: $E=1/\sqrt{\kappa_{oo}}=1/\sqrt{(1-r_H/r+\Delta\varepsilon)}$ (Ch.3.9) and the square root in the separable eq.9 (Ch.9 and section 4.9 for Lamb shift calculation without renormalization.).

6.13 Again Use Eq.6.3.10 $U=e^{iHt}$**, This Time To Calculate Metric Quantization Mixed States (εΔε cross terms) That Might Not Be Spherically Symetric**

From 1.1.4, 1.1.5 Δε≡4AI is an operator, $\Delta\varepsilon^2$ is not the same operator. Also 1/(1-r) can be expanded only one way as (r<<1) $1/(1-r)= 1+r+r^2+r^3+$..If r was an operator each term in this expansion would itself be a unique operator. We do *not* assume a spherically symmetric 2S state here as in section 6.10 so we do not normalize κ_{oo}: the contributions of object B reduction in inertial frame dragging of object A give this nonspherial metric quantization contribution. Note since Δε and ε are time dependent this is just the new pde time development operator: $U=e^{iHt}$. And Δε and ε are also times. So again equation 6.10.1 is written as $\psi(t)=\kappa_{oo}\psi(t_0)= U\psi(t_0)= (e^{iHt})\psi(t_0)=$

$$\kappa_{00}\psi(t_0) = (exp\left[\frac{i(\Delta\varepsilon+\varepsilon)}{\sqrt{2}}\frac{1}{(1-\varepsilon)\sqrt{1-\varepsilon-\Delta\varepsilon-\frac{r_H}{r}}}\right])\psi(t_o) \quad (6.13.1)$$

The $\exp[i(\Delta\varepsilon+\varepsilon)]/\sqrt{2}]$ term is the new pde zitterbewegung term ($r<r_C$ here).
√2 merely normalizes the two metric quantization states eq.8.2a and 6.4.6:
$\frac{1}{\sqrt{1-\varepsilon-\Delta\epsilon-\frac{r_H}{r}}}$ is the general relativity cosmological energy H component
1/(1-ε) is the object B rotational component from 6.1.1. So our time development operator is relative to the free falling flat background outside of objects A and B. Note since Δε and ε are time dependent (sect.7.4) we can use them as times. This becomes just the new pde $U=e^{iHt}$ zitterbewegung oscillation for $r<r_C$ as expected. Note there is a square that gives cross terms in ε and Δε.

$$\text{realU}=cos\left[\frac{i(\Delta\varepsilon+\varepsilon)}{\sqrt{2}}\frac{1}{(1-\varepsilon)\sqrt{1-\varepsilon-\Delta\varepsilon-\frac{r_H}{r}}}\right]\approx 1-\frac{\left[\frac{i(\Delta\varepsilon+\varepsilon)}{\sqrt{2}}\frac{1}{(1-\varepsilon)\sqrt{1-\varepsilon-\Delta\varepsilon-\frac{r_H}{r}}}\right]^2}{2}+..$$

Do the square and then only use the term that cross multiplies ε and Δε (i.e., 2**εΔε**) so that we can find the cross rerm εΔε contribution to κ_{oo}. Also set $r=r_H$ at the cosmological horizon we are now near after our 370by expansion (So $1-r_H/r=0$.). To include cross term effects we note: $\kappa_{00}=U=1-\frac{\left[\frac{i(\Delta\varepsilon+\varepsilon)}{\sqrt{2}}\frac{1}{(1-\varepsilon)\sqrt{\varepsilon+\Delta\varepsilon}}\right]^2}{2}$ (6.13.2)

This adds a real mixed state term to U and therefore to κ_{oo}. We normalize out the ε and Δε just as we did with the Lamb shift derivation but this time there is no 1 and r_H/r to divide by. The mixed part of the 2^{nd} term times 2εΔε goes as: $[2\varepsilon\Delta\varepsilon/(4(1-2\varepsilon))]/(\varepsilon+\Delta\varepsilon))=$ $(1/(2(1-2\varepsilon))\ ][\Delta\varepsilon/(1+\Delta\varepsilon/\varepsilon))]=1/(2(1-2\varepsilon))]X[\Delta\varepsilon/(1+\Delta\varepsilon/\varepsilon))]$
$=[\Delta\varepsilon+\Delta\varepsilon^2/\varepsilon+\ldots\Delta\varepsilon^{N+1}/\varepsilon^N+.]/(2(1-2\varepsilon))\equiv\Delta\varepsilon'$. (6.13.3)

Compare (Mixed States, εΔε=Ht) **With Our Comoving Flat Background ($|\kappa_{oo}|=1$)**
Note in the flat background limit $U=e^{i(\varepsilon+\Delta\varepsilon)(t_o)}\approx1+(i(\varepsilon+\Delta\varepsilon')+..\ )t_o\approx\kappa_{oo}$. We next find the contribution of this mixed state 6.13.2 relative to the freefall comoving flat background metric (like we did to find $\ln(r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-\ln[e^{\mu}-1]]2$). They should be the same contribution in this freefalling frame of reference as well (for a distant exterior observer to objects B&A but in a comoving frame of reference.) relative to the local flat background. Just as in the Lamb shift case $U\psi(t_o)=\kappa_{00}\psi(t_0)=\psi(t)$.
But in the halo of the galaxy $\kappa_{oo}=g_{oo}$ (6.13.4)
Note 2εΔε is H times t in the exponent so 2εΔε = Ht. So we again plug Δε' (6.1.3.2) into the time development operator directly $U=e^{iHt}$, all by itself, in a flat space-time background. So 6.13.2;6.13.3 real$\kappa_{oo}=g_{oo.}=1-(2GM/c^2)/r$ which gives us only the mixed state contributions relative to a flat background. So that $1-\Delta\varepsilon'^2/2=g_{oo}=1-2GM/(c^2r)$ with $mv^2/r=GMm/r^2$. Thus the first term is $1-\Delta\varepsilon'^2/2=1-2v^2/c^2$ (6.13.5)
So cΔε'/2=v. Δε' is from 6.13.2 and 0.00058=Δε for the electron in which the tauon mass is set to 1, muon mass =.0608. This geometric series 6.13.2 is unique, no other nontrivial such series can be built here. So we can put the operator contributions from 6.13.2 into 6.13.3, one at a time, in place of Δε' in eq.6.13.4, and find get v≈98.6km/sec≈100km/sec in galaxy halos. So v =100+1+.01+..= 100km/sec +1km/sec+10m/sec+..=independent values of metric quantization (6.4.18) since each $\Delta\varepsilon^N/(\varepsilon^{N-1})$ represents a different quantum operator. Recall Δε≡4AI is an operator (Note $\Delta\varepsilon^2$ is not the same operator) so each term in the 1/(1-Δε) expansion is a a unique operator. So term is a different speed v in this unique geometrical series (see Ch.11 for many examples). These $\Delta\varepsilon^N/(\varepsilon^{N-1})$ are mixed (hybrid) quantum states or in the classical limit are: 'grand canonical ensembles' with nonzero chemical potential.
Metric quantization changes with COM energy. So for lower energies you might get 1km/sec quantization jumps. The energy COM density and we start seeing units of 2km/sec, then 4km/sec than a large jump in energy to 100km/sec (eg., at the chromosphere-corona boundary). For the galaxy if the ring is heavier than the hub then the v at ring diameter v difference becomes the new quantized v.

Metric quantization (and C) As A Perturbation Of the Hamiltonian
$H_o\psi=E_n\psi_n$
for normalized ψ_ns. We introduce a strong *local* metric perturbation H'=ΔG due to motion through matter let's say so that:
$H'+H=H_{total}$ where H ≡ΔG is due to the matter and H is the total Hamiltonian due to all the types of neutrino in that H_{M+1} of section 4.6.$H'=C^2$. Because of this metric perturbation
$\psi=\Sigma a_i\psi_{Ii}$=orthonormal eigenfunctions of H_o. $|a_i|^2$ is the probability of being in the neutrino state i. The nonground state a_is would be (near) zero for no perturbations with

the ground state energy a_i (electron neutrino) largest at lowest energy given for ordinary beta decay for example. Thus the passage through matter creates the nonzero higher metric quantization states (i.e., H' can add energy) with:

$a_k=(1/(\hbar i)\int H'_{lk}e^{i\omega lkt}dt$

$\omega_{lk} =(E_k- E_l) /\hbar$

Thus in this way motion through matter perturbs these mixed eigenstates so that one type of neutrino might seemingly change into another (oscillations).

Pure States From 2AI+2AI+2AI Equation 6.13.2 (Also see Part II of This Book)

Instead of the (hybrid) mixed metric quantization state $1/\sqrt{(\Delta\varepsilon+\varepsilon)}$ of sect.6.13 we find the masses of the pure states $1/\sqrt{\Delta\varepsilon}$ and $1/\sqrt{\varepsilon}$ individually in the bound state 4AI+4AI+4AI (or 2AI+2AI) at $r=r_H$ of part II so that $1-r_H/r=0$ in 6.13.2 (r_H =Nth fractal scale, our subatomic scale).

Note these are not the free particle pure states $\Delta\varepsilon$ (electron) and ε (muon) giving also the galactic halo constant stellar velocities.

$e^{i\Delta\varepsilon} \rightarrow 1/[\sqrt{(1-\Delta\varepsilon-r_H/r)}](1/(1\pm\varepsilon))=(1/\sqrt{\Delta\varepsilon})(1/(1\pm\varepsilon)$ =mass of W,Z i.e., ⊥same as Paschen Back: $E_Z=Bu_B(0+1+1+1)$) (fixes the value of the LS coupling coefficient)

$e^{i\varepsilon} \rightarrow 1/[\sqrt{(1-\varepsilon-r_H/r)}](1/(1\pm\varepsilon))=(1/\sqrt{\varepsilon})(1/(1\pm\varepsilon)$= mass of $\pi^{\pm}, \pi^{o}$. || Paschen Back
Fixes the value of the LS coupling coefficient

More Implications of The Two Metrics Of Equation 7 Of Section 1.1.6

6.14 Gaussian Pillbox Approach To General Relativity

The real component of eq. 4 $\delta(\delta z\bullet\delta z)$ is equation 4A $\delta(dr^2+(idt)^2)=\delta[(dr+dt)(dr-dt)=[\delta[(dr+dt)](dr-dt)]+[(dr+dt)[\delta(dr-dt)]=0$ has solutions:

$\delta(dr+dt)$ and $dr+dt=0$, 0, (4AI) $\delta(dr+dt)=0$ and $\delta(dr-dt)=0$ (4AII)

in each of the 4 quadrants. Combining eq.4AI and eq.4AII we have eq.4A Reparameterization Invariant. RI) condition. See section 1.1.6 for discussion.

$dr-\varepsilon/2+dt+\varepsilon/2=dr'+dt'=kds$ which applies for $r>\varepsilon$ since for the transition to $r<\varepsilon\equiv r_H$ ds turns discontinuously into a complex number which also violates $\delta ds=0$ (we noted in section 1 the source of this problem: a √tensor transformation hyperbolic $1\rightarrow i$ discontinuity at $r=r_H$).

Iinvariant ds $=dr-\varepsilon/2+dt+\varepsilon/2 =dr'+dt'$. In my new $\sqrt{k_{ij}}$ the sign changes as you go through rH. Essentially then dr and ep/2 switch places to keep the $dt'=\sqrt{k_{oo}}dt=\sqrt{(1-\varepsilon/r)}dt$ from being imaginary. Note from equation Eq.1.1.6 given the above S^n object for $r<\varepsilon=r''$ then $r''^2-r^2/2+t''^2+r^2/2 = r'^2+t'^2$ and $t''=r''=\varepsilon$, for $r<\varepsilon$. This condition is required because the above S^1 is real for $r<r_H$. ds is always real given its dr+dt definition is always real as noted in eq. 2AI and 2AII above. So combining the inside (de Sitter) $r<\varepsilon$ and outside (Schwarzschild) $r>\varepsilon$ cases makes ds always real in the real dr,dt plane regardless of whether $r<\varepsilon$ or $r>\varepsilon\equiv r_H$ also implying $\delta ds=0$ as required by case A above. This allows two independent Gaussian pillboxes, one inside and one outside r_H.

Also in the case 2 (second point) section we note that this circle contains yet another 2D surface with origin (0, our original 0 has not changed, See appendixA on same reference origin 0) with perhaps a different orientation (angle). See section 1.1.6 Note C_M is along the –dr axis, not dr which is still a +integer along with dt. A large number of such points and associated circles thereby provides the geometric structure of the 4D De Sitter submanifold surface thereby proving that we must live on a 4D submanifold hyperspace in this many point limit. So inside r_H for empty Gaussian Pillbox (since everything is at r_H)

Minkowski $ds^2=-dx_o^2+\Sigma_{i=1}^n dx_i^2$ (6.14.1)

Submanifold is $-x_0^2+\Sigma_{i=1}^n x_i^2=\alpha^2$

In static coordinates r,t : (the new pde harmonic coordinates for $r<r_H$)

$x_o=\sqrt{(\alpha^2-r^2)}\sinh(t/\alpha)$: (6.14.2)

$x_1=\sqrt{(\alpha^2-r^2)}\cosh(t/\alpha)$:

$x_i= rz_i$ $2\le i\le n$ z_i is the standard imbedding n-2 sphere. R^{n-1}

$ds^2=-(1-r^2/\alpha^2)dt^2+(1-r^2/\alpha^2)^{-1}dr^2+ d\Omega^2_{n-2}$

$\alpha\to i\alpha$, $r\to ir$ Outside is the Schwarzschild metric to keep ds real for $r>r_H$ since r_H is fuzzy because of objects B and C.

For torus $(x^2+y^2+z^2+R^2-r^2)^2=4R^2(x^2+y^2)$. R=torus radius from center of torus and r=radius of torus tube.

Let this be a spheroidal torus with inner edge at so r=R. If also $x=r\sin\theta$, $y=r\cos\theta$, $\theta=\omega t$ from the new pde

Define time from 2R=t you get the light cone for $\alpha\to i\alpha$ in equation 6.14.2.

$x^2+y^2+z^2-t^2=0$ of 6.14.1 with also $(x=r\sin\theta, y=r\cos\theta)\to$

$(x=\sqrt{(\alpha^2-r^2)}\sinh(t/\alpha), y=\sqrt{(\alpha^2-r^2)}\cosh(t/\alpha))$, $\alpha\to i\alpha$. So to incorporate the new pde into the Gaussian pillbox inside we end up with a spheroidal torus that has flat space geodesics.

Note on a toroid surface two parallel lines remain parallel if there was no expansion. So you have a flat space which is what is what is observed. The expansion causes them to converge for negative t. Note the lines go around the spheroidal toroid back to where they started, have the effect on matter motion of a gravimagnetic dipole field.

You are looking at yourself in the sky as you if you were a baby (370by ago that is). The sky is a baby picture of YOU!

The problem is that you are redshifted out to z=infinity so all you can see of your immediate vicinity (within 2byly that is) is the nearby galaxy super clusters such as the Shapely concentration and Perseus Pisces with lower red shifts.

So these superclusters should have a corresponding smudge in the CBR in exactly the opposite direction! I checked this out.

Note the sine wave has a period of 10trillion years and we are now at 370billion years, near $\theta=-\pi/2$ in $r=r_o\sin\theta$ where the upswing is occurring and so accelerating expansion is occurring. This is where we start out at in the sect.7.3 derivation. Since the metric is inside $r<r_H$ it is also a source as we see in later section 5.4

Observations Inside Of r_H

The metric quantization pulses ride the metric like sound waves moving in air, including going in straight lines in our toroidal universe. That means that when we look in the direction of object B using nearby metric quantization effects, like galaxies falling into a compression part of the vibration wave, which also organizes galaxy clusters as in the Shapely and Perseus-Pisces concentration, we are looking in straight lines at least for local superclusters (<2BLY) and so are actually looking in the direction of object B. But the CBR E&M radiation that is bent by strong gravity follows that toroidal path and so

you really are looking at the (red shifted) light coming from yourself as you formed 370BY ago in this expanding frame of reference.
So the direction to the nearby galaxy clusters, even out to the Shapely concentration, is metric quantization dependent so we have straight line observation, but the CBR follows the curved space and so the galaxy superclusters we see in a given direction have CBR concentration counterparts in exactly the opposite direction. Note distant galaxy clusters are also not seen along straight lines, but lines on that spherical torus. So you only see hints of the actual directions of object B, of the object A electron dipole, etc. for relatively nearby superclusters.

The spherical torus Bg gravimagnetic dipole shape comes from the rotational motion implied by the new pde (from eq.2AI). Recall the new pde applies to dipole Bg field and spin motion; The electron has spin as you know. The new pde spherical torus is applied on top of a Minkowski space-time inside rH because the Gaussian pillbox does not (usually) contain anything if its radius is smaller than rH. So astronomers really are observing the inside of an electron (i.e.,what comes out of the new pde) in this fractal model!

6.15 Relevance (Of These Two Metrics Of Section 1.1.5) to Shell Model of The Nuclear Force Just Outside r_H

Note my model is a flat de Sitter $\alpha\rightarrow i\alpha$ inside r_H and perturbed Schwarzschild (i.e.,Kerr) just outside, the two metrics of section 3.1 and Part II (on 2AI+2AI+2AI) above. The transition between the two is quite smooth. So at about r_H we have a force that gets stronger as r increases.
But this is what the simple harmonic oscillator does in this region. So my model gives the simple harmonic oscillator (transition to Schwarzschild metric) and the flat part inside that the Shell model people have to arbitrarily have to adhoc put in (they call it the flattening of the bottom of the simple harmonic potential energy). Anyway, the above fractal theory explains all of this.
Also the object B perturbation metric is a perturbative Kerr rotation.

7 Comoving Coordinate System: What We Observe Of The Ambient Metric

7.1 Comoving Coordinate System

Here we multiply eq. 4.6 result $p\psi=-i\partial\psi/\partial x$ by ψ^* and integrate over volume to define the expectation value:

$$\int\psi^* p_x\psi dV\equiv \langle p_x\rangle=\langle p,t|p_x|p,t\rangle \text{ of } p_x. \qquad (7.1.1)$$

In general for any QM operator A we write $\langle A\rangle=\langle a,t|A|a,t\rangle$. Let A be a constant in time (from Merzbacher, pp.597). Taking the time derivative then:

$$i\hbar\frac{d}{dt}<a,t\,|\,A\,|\,a,t>=i\hbar\frac{d}{dt}<\Psi(t),A\Psi(t)>=\left(\Psi(t),Ai\hbar\frac{\partial}{\partial t}\Psi(t)\right)-\left(i\hbar\frac{\partial}{\partial t}\Psi(t),A\Psi(t)\right)$$

$$=\left(\Psi(t),AH\Psi(t)\right)-\left(\Psi(t),HA\Psi(t)\right)=i\hbar\frac{d}{dt}<A>=<AH-HA>\ \equiv[H,A]$$

In the above equation let $A=\alpha$, from equation 9 Dirac equation Hamiltonian H, $[H,\alpha]=i\hbar\, d\alpha/dt$ (Merzbacher, pp.597).

The second and first integral solutions to the Heisenberg equations of motion (i.e., above $[H,\alpha]=i\hbar d\alpha/dt$) is: $r=r(o)+c^2p/H+(\hbar c/2iH)[e^{(i2Ht/\hbar)}-1](\alpha(0)-cp/H)$. (7.1.2)

$$v(t)/c=cp/H+e^{(i2Ht/\hbar)}(\alpha(0)-cp/H)$$

Note there is no Klein paradox at r<Compton wavelength in this theory and also Schrodinger's 1930 paper on the lack of a zitterbewegung does not apply to a region smaller than the Compton wavelength. So the above zitterbewegung analysis does apply in that region. The $\sqrt{\kappa_{oo}}=\sqrt{(1-r_H/r)}$ modifies this a little in that from the source equations for $\kappa_{\mu\nu}$you also need a feed back since the field itself, in the most compact form, also is a eq.4.4.1. G_{oo} energy density (source).

7.2 $r<r_H$ $e^{\omega t}$ -1 Coordinate transformation of $Z_{\mu\nu}$: Gravity Derived

Summary:

Fractal Scale Content Generation From Generalized Heisenberg Equations of Motion

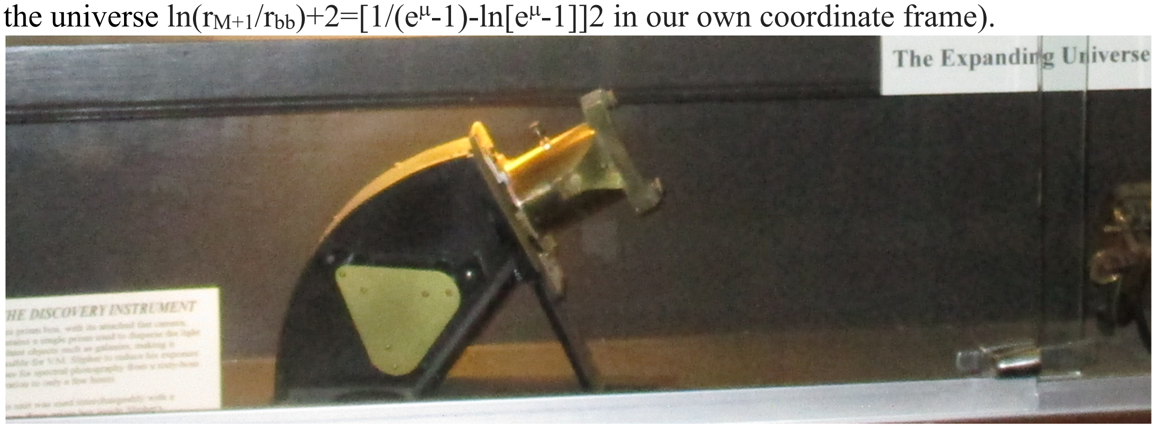
Specifically C in equation 1 applies to "observable" measurement error. But from the two "observable" fractal scales (N,N+1) we can infer the existence of a 3rd next smaller fractal N-1 scale using the generalized Heisenberg equations of motion giving us

$(\partial x_{oN})/\partial x_{oN+1})\ (\partial x_{oN})/\partial x_{oN+1})T_{ooN}-T_{ooN}=T_{ooN-1}$ (7.2.3)

which is equation 7.4.4 below. Thus we can derive the content of the rest of the fractal scales by this process.

7.3 Derivation of The Terms in Equation 7.2.3

For free falling frame no coordinate transformation is needed of source T_{oo}. For non free falling comoving frame with N+1fractal eq.9 motion we do need a coordinate transformation to obtain the perturbation ΔT of T_{oo} caused by this motion (in the new coordinate system we also get 5.1.2: the modified R_{ij}=source describing the evolution of the universe $\ln(r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-\ln[e^{\mu}-1]]2$ in our own coordinate frame).



THE DISCOVERY INSTRUMENT Spectroscope Slit

Slipher's Spectroscope Focal Plane Used To Discover The Expanding Universe.
It is in the rotunda display at Lowell Observatory.

7.4 Dyadic Coordinate Transformation Of T_{ij} In Eq. 7.2.3

The Dirac equation object has a radial center of mass of its zitterbewegung. That radius expands due to the **ambient metric expansion** of the next larger N+1th fractal scale (Discovered by Slipher. See his above instrumentation). We define a Z_{oo} E&M energy-momentum tensor 00 component replacement for the G_{oo} Einstein tensor 00 component. The energy is associated with the Coulomb force here, not the gravitational force. The

dyadic radial coordinate transformation of Z_{ij} associated with the expansion creates a new z_{oo}. Thus transform the dyadic Z_{oo} to the coordinate system commoving with the radial coordinate expansion and get $Z_{oo}\rightarrow Z_{oo}+z_{oo}$ (section 3.1). The new z_{oo} turns out to be the gravitational source with the G in it. The mass is that of the electron so we can then calculate the value of the gravitational constant G. From Ch.1 the object dr as see in the observer primed nonmoving frame is: $dr=\sqrt{\kappa_{rr}}dr'=\sqrt{(1/(1+2\varepsilon))}dr'=dr'/(1+\varepsilon)$.
$1/\sqrt{(1+.06)}=1.0654$. Also using $S_{1/2}$ state of equation 2.6. $\varepsilon=.06006=m_\mu+m_e$
From equation 11.4 and $e^{i\omega t}$ oscillation in equation 11.4. $\omega=2c/\lambda$ so that one half of λ equals the actual Compton wavelength in the exponent of section 4.11. Divide the Compton wavelength $2\pi r_M$ by 2π to get the radius r_M so that $r_M=\lambda_M/(2(2\pi))= h/(2m_ec2\pi)=$ $6.626X10^{-34}/(9.1094X10^{-31}X2.9979X10^8X4\pi)=1.9308X10^{-13}$
From the previous chapter the Heisenberg equations of motion give $e^{i\omega t}$ oscillation (zitterbewegung) both for velocity and position so we use the classical harmonic oscillator probability distribution of radial center of mass of the zitterbewegung cosine oscillation lobe. So the COM (radial) is: $x_{cm}=(\sum xm)/M=$
$=\iiint r^3\cos r\sin\theta d\theta d\phi dr/(\iiint r^2\cos r\sin\theta d\theta d\phi dr)$ =1.036. As a fraction of half a wavelength (so πphase) r_m we have $1.036/\pi=1/3.0334$ (7.4.1)
Take $H_t=13.74X10^9$ years$=1/2.306X10^{-18}$/s. Consistent with the old definition of the 0-0 component of the old gravity energy momentum tensor G_{oo} we define our single $S_{1/2}$ state particle (E&M) energy momentum tensor 0-0 component From eq.3.1 Z_{oo} we have:
$c^2Z_{oo}/8\pi\equiv\varepsilon=0.06$,. $\varepsilon=\frac{1}{2}\sqrt{\alpha}$=square root of charge.
$Z_{oo}/8\pi\equiv e^2/2(1+\varepsilon)m_pc^2=8.9875X10^9(1.6X10^{-19})^2/(2c^2(1+\varepsilon)1.6726X10^{-27})=0.065048/c^2$
Also from equation 9 the ambient metric expansion component Δr is:

eq.1.12 $\Delta r=r_A(e^{\omega t}-1)$. (7.4.2)

To find the physical effects of the equation 11.4 expansion *we must* do a dyadic radial coordinate transformation (equation 7.4.3) on this single charge horizon (given numerical value of the Hubble constant H_t= 13.74 bLY in determining its rate) in eq.4.2. In doing the time derivatives we take the ω as a constant in the linear t limit:

$\frac{\partial x^\alpha}{\partial x'^\mu}\frac{\partial x^\beta}{\partial x^\nu{}'}Z_{\alpha\beta}=Z'_{\mu\nu}$ with in particular $Z_{oo}\rightarrow Z'_{oo}\equiv Z_{oo}+z_{oo}$ (7.4.3)

After doing this Z'_{oo} calculation the resulting (small) z_{oo} is set equal to the Einstein tensor gravity source ansatz $G_{oo}=8\pi Gm_e/c^2$ for this *single* charge source m_e allowing us to solve for the value of the Newtonian gravitational constant G here as well. We have then derived gravity for **all** mass since this single charged m_e electron vacuum source composes all mass on this deepest level as we noted in the section 4.2 discussion of the equivalence principle. Note Lorentz transformation similarities in section 2.3 between $r=r_o+\Delta r$ and $ct=ct_o+c\Delta t$ using $D\sqrt{1-v^2/c^2}\approx D(1-\Delta)$ for v<<c with just a sign difference (in 1-Δ, + for time) between the time interval and displacement D interval transformations. Also the t in equation 10.2 and therefore 12.3 is for a light cone coordinate system (we are traveling near the speed of light relative to t=0 point of origin) so $c^2dt^2=dr^2$ and so equation 11.4 does double duty as a r=ct time x_o' coordinate. Also note we are trying to find G_{oo} (our ansatz) and we have a large Z_{oo}. Also with $Z_{rr}<<Z_{oo}$ we needn't incorporate Z_{rr}. Note from the derivative of $e^{\omega t}-1$ (from equation 11.4) we have slope$=(e^{\omega t}-1)/H_t=\omega e^{\omega t}$. Also from equation 2ABwe have $\delta(r)=\delta(r_o(e^{\omega t}-1))=(1/(e^{\omega t}-$

1))δ(r_o). Plugging values of equation 7.4.1 2 and 7.4.2 and the resulting equation 4.7.1 into equation 7.4.3 we have in $S_{1/2}$ state in equation 4.3:

$$\frac{8\pi e^2}{2(1+\varepsilon)m_p c^2}\delta(r)=Z_{00}=R_{00}-\frac{1}{2}g_{00}R,\ \frac{\partial x^0}{\partial X^\alpha}\frac{\partial x^0}{\partial X^\beta}Z_{\alpha\beta}=Z'_{00}=Z_{00}+z_{00}\approx$$

(7.4.4)

$$\frac{\partial x^0}{\partial\left[x^0-\Delta r\right]}\frac{\partial x^0}{\partial\left[x^0-\Delta r\right]}Z_{00}=\frac{\partial x^0}{\partial\left[x^0-\frac{r_M}{3.03(1+\varepsilon)}[e^{\omega t}-1]\right]}\frac{\partial x^0}{\partial\left[x^0-\frac{r_M}{3.03(1+\varepsilon)}[e^{\omega t}-1]\right]}Z_{00}=Z'_{00}=$$

$$\left[\frac{1}{\left[1-\frac{r_M\omega}{3.03c(1+\varepsilon)}e^{\omega t}\right]}\right]^2\frac{8\pi e^2}{2(1+\varepsilon)m_p c^2}\delta(r)\equiv\left(\frac{8\pi e^2}{2(1+\varepsilon)m_p c^2}\delta(r)+8\pi G\left(\frac{m_e}{c^2}\right)\delta(r)\right)$$

(Recall 3.03 value from eq.7.4.1.) So setting the perturbation z_{oo} element equal to the ansatz and solving for G:

$$2\left(\frac{e^2}{2(1+\varepsilon)m_p}\right)\left(\frac{r_M}{3.03m_e c(1+\varepsilon)}\right)\omega e^{\omega t}=$$

$$\left(2\left(\frac{e^2}{2(1+\varepsilon)m_p}\right)\left(\frac{r_M}{3.03m_e c(1+\varepsilon)}\right)\left([e^{\omega t}-1]/H_t\right)\right)\delta(r)=$$

$$=2\left(\frac{e^2}{2(1+\varepsilon)m_p}\right)\left(\frac{r_M}{cm_e 3.03(1+\varepsilon)}\right)\left([e^{\omega t}-1]\delta(r_o)/\left(\left[e^{\omega t}-1\right]H_t\right)\right)=G\delta(r_0)$$

Make the cancellations and get:

$2(.065048)[(1.9308X10^{-13}/(3X10^8X9.11X10^{-31}X3.0334(1+.0654))]\ (2.306X10^{-18}) =$
$=2(.065048)(2.2X10^8)(2.306X10^{-18}) = 6.674X10^{-11}\ Nm^2/kg^2 \equiv G$ (7.4.5)

from plugging in all the quantities in equation 7.4.5. This new z_{oo} term is the classical $8\pi G\rho/c^2=G_{oo}$ source for the Einstein's equations and we have then **derived gravity** and incidentally also derived the value of the Newtonian gravitational constant since from our postulate the m_e mass (our "single" postulated source) is the *only* contribution to the Z_{oo} term. Note Dirac equation implies +E and -E solutions for –e and +e respectively and so in equation 7.4.5 we have $e^2=ee=q_1Xq_2$ in eq.7.4.5. So when G is put into the Force law Gm_1m_2/r^2 there is an *additional* m_1Xm_2 thus the resultant force is proportional to $Gm_1m_2 =(q_1Xq_2)m_1m_2$ which is always positive since the paired negatives always are positive and so the gravitational force is always attractive.

However just as with the speed of light, we cannot measure a changing G since our clock time changes proportionally due to the changing gravitational field.GM/c^2, if M is the mass of the universe, is always $10^{40}X2e^2/m_ec^2$ so G is invariant.

To summarize we have then just done a coordinate transformation to the moving frame to find the contributing fields associated with the moving frame. Analogously one does a coordinate transformation to the charge comoving frame to show that current carrying wires have a magnetic field, also a 'new' force, around them. Also note that in the second derivative of eq.7.1.2 **$d^2r/dt^2 = r_o\omega^2 e^{\omega t}$= radial acceleration.** Thus in equations 7.1.4 and 7.1.5 (originating in section 2AB) **we have a simple account of the cosmological radial acceleration expansion** (discovered recently) **so we don't need any theoretical constructs such as 'dark energy' to account for it.**

If r_o is the radius of the universe then $r_o\omega^2 e^{\omega t} \approx 10^{-10}m/sec^2 = a_M$ is the acceleration of all objects around us relative to a inertial reference frame and comprises a accelerating frame of reference. If we make it an inertial frame by adding gravitational perturbation we still have this accelerating expansion and so on. Thus in gravitational perturbations $na_M = a$ where n is an integer.

Note below equation 7.4.5 above that $t=13.8X10^9$years and use the standard method to translate this time into a Hubble constant. Thus in the standard method this time translates into light years which are $13.8X10^9/3.26 = 4.264X10^9$ parsecs= $4.264X10^3$ megaparsecs assuming speed c the whole time. So $3X10^5$km/sec/$4.264X10^3$ megaparsecs = 70.3km/sec/megaparsec= Hubble's constant for this theory.

7.5 Metric Quantized Hubble Constant

Metric quantization 4.2.3 means (change in speed)/distance is quantized.. Given 6billion year object B vibrational metric quantization the radius curve

$\ln(r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-\ln[e^{\mu}-1]]2$ is not smooth but comes in jumps.

I looked at the metric quantization for the 2.5My metric quantization jump interval using those 3 Hubble "constants" 67, 70, 73.3 km/sec/megaparsec.

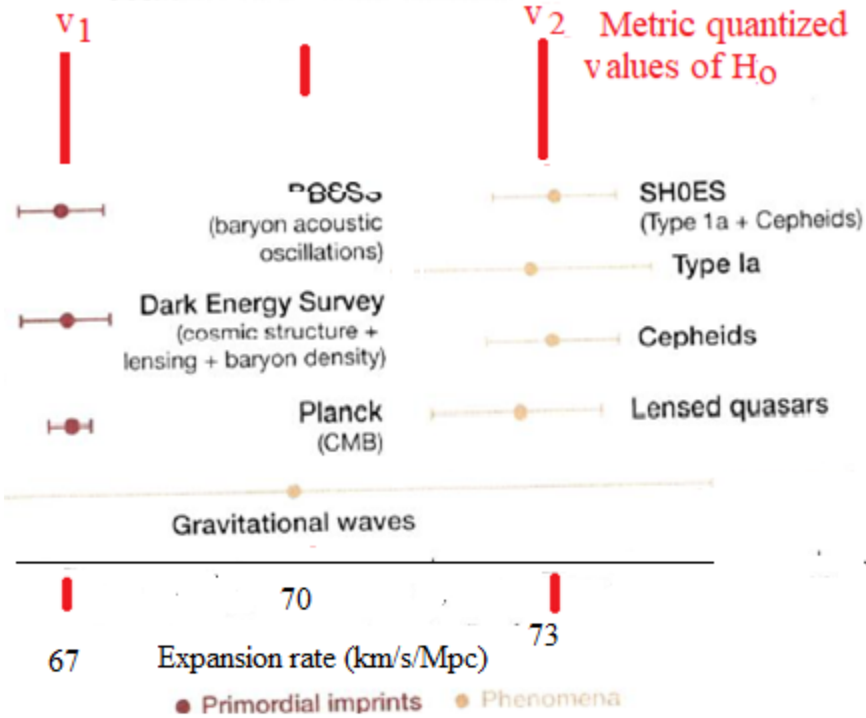
Recall that for megaparsec is 3.26Megalightyear=(2.5/.821)Megalightyear.

But **2.5 million years is the time between one of those metric quantization jumps.**

So instead of the 3 detected Hubble constants 67km/sec/megaparsec and 70km/sec/megaparsec and 73.3km/sec/megaparsec we have 81.6km/sec/2.5megaly, 85.26km/sec/2.5megaly, 89.3km/sec/2.5megaly. the difference between the contemporary one, the last and the two others then is

89.3km/sec/2.5megaly- 85.26km/sec/2.5megaly,=**4km/sec**/2.5megaly
and 89.3km/sec/2.5megaly- 89.3km/sec/2.5megaly=**8km/sec**/2.5megaly.

So the Hubble constant, with refernence to the 2.5my metric quantization jump time, appears quantized in units of **4km/sec**,**8km/sec**, etc. Other larger denominator „averages“



are not accurate. **Hubble Constant Measurements**

7.6 Cosmological Constant In This Formulation

In equation 4.6 r_H/r term is small for $r >> r_H$ (far away from one of these particles) and so is nearly flat space since ε and Δε are small and nearly constant. Thus equation 6.4.5 can be redone in the form of a Robertson Walker homogenous and isotropic space time. Given (from Sean Carroll) the approximation of a (homogenous and isotropic) Robertson Walker form of the metric we find that:

$$\frac{a''}{a} = -\frac{4\pi G}{3}(\rho + 3p) + \frac{\Lambda}{3}$$

Λ=cosmological constant, p=pressure, ρ=density, a =1/(1+z) where z is the red shift and 'a' the scale factor. G the Newtonian gravitational constant and a" the second time derivative here using cdt in the derivative numerator. We take pressure=p=0 since there is no thermodynamic pressure on the matter in this model; the matter is commoving with the expanding inertial frame to get the a" contribution. The usual 10 times one proton per meter cubed density contribution for ρ gives it a contribution to the cosmological constant of $4.7X10^{-36}/s^2$.

Since from equation 7.6.1 $a=a_o(e^{\omega t}-1)$ then $a'' = (\omega^2/c^2)\sinh\omega t = a(\Lambda/3) = (\Lambda/3)\sinh\omega t$ and there results:

$\Lambda = 3(\omega^2/c^2)$

From section 12.1 above then $\omega=1.99X10^{-18}$ with 1 year$=3.15576X10^7$ seconds, also $c=3X10^8$ m/s. So:

$\Lambda = 3(\omega^2/c^2) = 1.32X10^{-52}/m^2$, which is our calculated value of the cosmological constant. Alternatively we could use $1/s^2$ units and so multiply this result by c^2 to obtain:

$1.19X10^{-35}/s^2$. Add to that the above matter (i.e.,ρ) contributions to get $\Lambda=1.658X10^{-35}/s^2$ contribution.

7.7

Note that we have thereby derived the Newtonian gravitational constant G by using a radial coordinate transformation of the $T_{oo}=e^2$ charge density component to the coordinate system commoving with the expansion of the N+1 th fractal scale (cosmological).

Note that our new force we derived was charge and mass independent but the old force was charge dependent. Also note that the new force metric has universal geodesics that even curve space for photons. The old one had a q in the kij (chap.17). If q=0 as with the photon there would be no effect on the trajectory of the photon whereas the same photon moving near a gravitational source would be deflected. Recall again this is all caused by the taking of the derivative in the above coordinate transformation.

So as a result of this coordinate transformation photons are deflected by the N+1 fractal scale metric and area not defelected by the Nth scale metric.

Also the G does not change in the commoving coordinates for the same reason as the speed of light does not change as you enter a black hole, your watch slows down because of GR to compensate.

References

Merzbacher, *Quantum Mechanics,* 2nd Ed, Wiley, pp.597

7.8 Comoving Interior Frame

Recall from solution 2 (section 1.2) that the new pde zitterbewegung $E=1/\sqrt{\kappa_{oo}}$ energy smudged out $r=\langle r_o e^{i\omega t}\rangle$ with $\omega\to i\omega$ inside r_H. so m r=sinhωt. Do a coordinate transformation (Laplace Beltrami) to the coordinate system of the r>rH commoving observer (us) and that equation pops right out.

In the commoving De Sitter metric reference frame inside r_H we are not in free space anymore so the multiple of the Laplacian of the metric tensor in harmonic local coordinates whose components satisfy $R_{ij}=-(1/2)\Delta(g_{ij})$ where Δ is the Laplace-Beltrami second derivative operator is not zero. Geometrically, the Ricci curvature is the mathematical object that controls the growth rate of the volume of metric balls in a manifold Note the second derivative (Laplacian) of sinωt is $-\omega^2\sin\omega t$. Also recall that inside r_H so that $r<r_H$, then sinωt→sinhωt, which is rewritten as sinhμ to match with $R_{22}=e^{-\lambda}[1+½ r(\mu'-\lambda')]$ with μ=λ (spherical symmetry). So the de Sitter metric submanifold is itself the source of this R_{22} which is a nontrivial effect in the very early, extremely high density, universe. (Note that the contemporary G calculation in Ch.12 just uses the de Sitter sinhμ (just as in Ch.12 coordinate transformation because this feedback effect no longer is dominant in this era). So the usual spherically symmetric: $R_{22}=e^{-\lambda}[1+½ r(\mu'-\lambda')]-1=0\to$ de Sitter metric sinhμ, itself is the source, comoving coordinate system→

$R_{22}=e^{-\lambda}[1+½ r(\mu'-\lambda')]-1=\sinh\mu$. (applies only for μ≈1, |sinμ|≈1) (A)

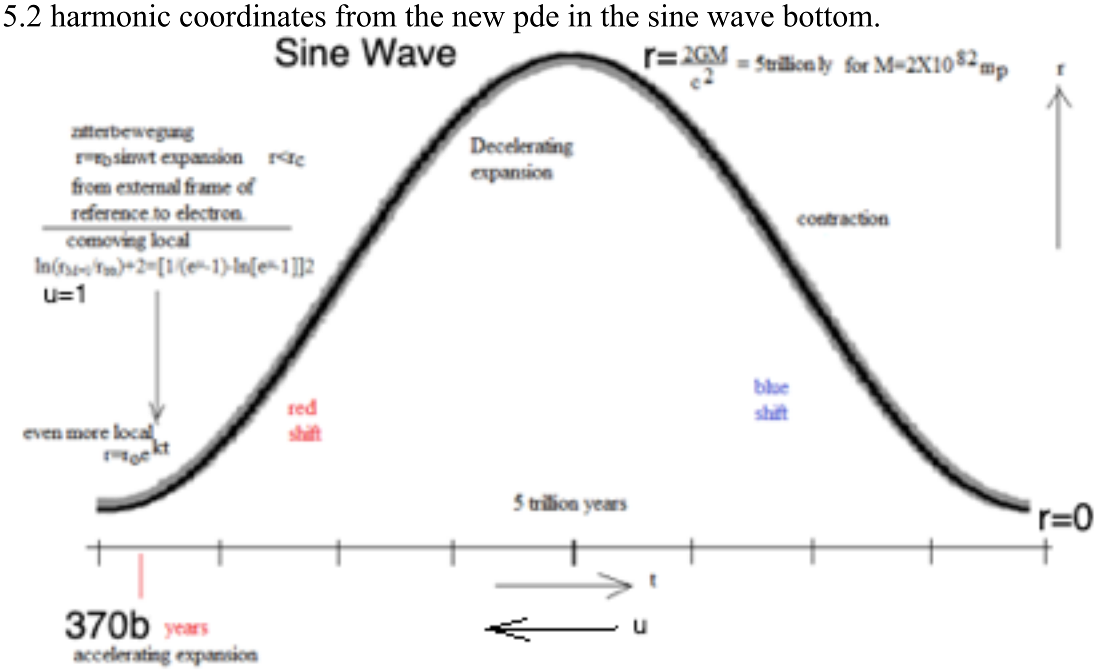
With μ=λ this can be rewritten as: $e^{\mu}d\mu/(1-\cosh\mu)=dr/r$ (B)

The integration is from μ=ε=1 projection at 45° particles at r=smallest (see section 1,C=0) to the present day mass of the muon= .06 (of tauon mass, C>0). Note our postulate of ONE is still needed to calculate the big bang Integrating equation B from $\varepsilon=1$ to the present ε value we then get:

$$\ln(r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-\ln[e^{\mu}-1]]2 \qquad (7.8.1)$$

```
      program FeedBack
      DOUBLE PRECISION e,ex,expp,rM1,rd,rb,rbb,uu,u11,den,eu1,u
      DOUBLE PRECISION NN,enddd,bb,ee,rmorbb,Ne,rr
      INTEGER N,endd
      open(unit=10,file='FeedBack_m',status='unknown')
      !FeedbackEquation
      !e^udu/(1-coshu)=dr/r
      !ln(rM+1/rbb)+2=[1/(e^u-1)-ln[e^u-1]]2
      e=2.718281828
      u11=.06
      endd=100
      enddd=endd*1.0
      uu=.06/enddd
      Ne=1000.0
      Do 1000 N=100,1000
      Ne=Ne-1.0
      rr=n/100.0
      rbb=30.0*(10.0**6)*1600.0
      rbb=1.0
     ! rd=2.65*(10**13)
      u=Ne*uu
      eu1=(e**u)-1.0
      ex=(2.0/eu1)-(2.0*LOG(eu1))-2.0
      expp=(ex)
      rM1=(e**expp)*rbb  !ln logarithm
      rM1=e**ex
      !rMorbb
      !bb=log(ee)
      if (ex.GT.36.0)THEN
      goto 2001
      endif
      write(10,2000) rr,rM1
 1000   CONTINUE
 2000   format(f7.2,1x,1x,1x,f60.6)
 2001   end
```

Sin(1-u)=r gives the same functionality as the above program does for $\mu\approx1$ the $\sin(1-\mu)$ And and the sine: $\sin(1-\mu)\approx\sinh(1-\mu)$. For larger $1-\mu$ we must use $1-\mu\rightarrow i(1-\mu)$ given sect 5.2 harmonic coordinates from the new pde in the sine wave bottom.



Recall object B is close by so we must include the small Kerr metric oblation term $a\cos\theta$=.9602 in $r_{bb}^2 = r^2+a^2\cos^2\theta$ that gives an added $\Delta\varepsilon$ when it is inserted.
So substituting into $\ln (r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-\ln[e^{\mu}-1]]2$ using the r_{bb} value=~30M miles to the present r_{M+1}= 13.7X10^{9}LY value for the case with and without the oblation term gives $\ln(r_{M+1}/r_{bb})$=36.06 and current value ε=.06, and $\Delta\varepsilon$=.00058 from the oblation term. Thus the present day mass of the muon gives us the size of the universe at the time of the big bang, it was not a point! Note that (from appendix A) all the 10^{81} baryons at r_H (~10^{-15}m) separation were packed into this $(4\pi/3)r_{bb}^3$ volume and so not violating baryon number conservation since from this fractal theory these objects originated from a previous collapse. Thus we do not need to be concerned with baryogenesis because the baryons survived the big bang. Equation B implies that the commoving time turns out to be 370by. So the universe is not 13.7by old but 370by. This long of time explains the thermalization of the CBR and the mature looking galaxies and black holes at 13by ago. The contemporaneous tangent line intersection with the r axis for $r=r_oe^{kt}$ gives the 13by. Thus we have derived the values of the free lepton masses in our new pde and have a curved space, non perturbative curved space generalization of the Heisenberg equations of motion.
This would be the Schwarzschild metric (a=0) without object B. Given the incomplete inertial fram dragging angular momentum then provides an oblation term.
Recall that the new pde for $r<r_H$ gives $i\omega\rightarrow\omega$ in its Heisenberg equations of motion.(Ch.10) Thus $r=r_oe^{wt}$ or $\ln(r/r_o)=\omega t=\omega t_o\sqrt{(1+\varepsilon)}$ where the sum of the free lepton masses in the new pde is under the square root sign. Recall this equation gives our expanding universe and the second derivative gives the acceleration in this expansion. Note the (section 1.2.1) 10^{81} particles give above $r=r_H$ if edges touching can be contained in volume of radius 1.746X10^{12} m Also the present radius of the universe is approximately 13.7X10^{9}LY=1.27X10^{27}m. Given the oblation term $a^2\cos^2\theta \equiv\Delta^2$ from the above rotation metric we have then
$\ln(r_{M+1}/\sqrt{(r_M^2+\Delta^2)})=\ln(1.27X10^{27}/1.746X10^{12})$=34.22 if Δ=0. Given the muon mass =.06 ((1/16.8) tauon mass) we find that Δ=1.641X10^{12}m so that
acos(1.64X10^{12}/1.746X10^{12})=20°, our polar angle from the rotation axis.
Recall from the above nonperturbative derivation we got ε=.060 without oblateness and with oblateness r_L get the added rotation contribution $\Delta\varepsilon$=.00058. Note here (i.e.,eq.5.1.2) that there is no big bang from a point. Instead it is from 434million km radius object, so with just enough volume to hold all the baryons (10^{81}each of radius~.434Fermi) and so this type of “big bang” event can be easily computer modeled as a core collapse supernova like rebound (but too hot even for iron production). Note that the mass of the electron is determined by the drop in inertial dragging (giving that oblation term) due to nearby object B. 1, ε, $\Delta\varepsilon/2$ is the ratio of the tauon to muon to electron mass and so our new Dirac pde 9 gives us the three fundamental S state lepton masses with $\Delta\varepsilon$ the single ground state lepton with nonzero rest mass. Note also $\Delta\varepsilon=m_e\propto \hbar$ from eq.9 and $m_e \propto e^2 \propto\alpha h$ since r_H is an integration constant. . The main result though of this chapter is that the *present numerical value of the lepton masses imply this huge fig.2a 10^{40}X scale jump* (from S state classical electron radius=10^{-18}m to the r_{final} cosmological radius) of equation 5.1.2 from the electron equation 9 object to the cosmological scale equation 9 object implied by equation 5.1.2. The rebound time is 350by =very large >>14by solving the

horizon problem since temperatures could (nearly) come to equilibrium during that time (From recent Hubble survey: "The galaxies look remarkably mature, which is not predicted by galaxy formation models to be the case that early on in the history of the universe." “lots of dust already in the early universe”, “CBR is the result of thermodynamic equilibrium” requiring slow expansion then, etc.).

7.9 Summary

In the external reference frame the $\kappa_{oo}=1-r_H/r$ and the equation 9 (4AI) zitterbewegung gives a smudged out blob $r=<r_oe^{ikt}>$ first solution ($r>r_H$, new pde, eq.9, 4AI) and $R_{ij}=0$ from the second solution. But in the commoving frame of reference inside $r<r_H$ in the new pde is not free space anymore and so R_{ij} does not equal 0 anymore and so equals the above De Sitter dual choices sinh or cosh so the second solution requires R_{ij}=sinhu (R_{22} eq.A left side does not match with cosh). A second derivative of sinh is once again a sinh so this is a source in the Laplace-Beltrami second derivative operator-(De Sitter source). This result also comes out of the second solution but for the commoving internal observer frame of reference. Recall that the multiple of the Laplacian of the metric tensor in harmonic local coordinates whose components satisfy $R_{ij}=-(1/2)\Delta(g_{ij})$ where Δ is the Laplace-Beltrami second derivative operator. In that regard geometrically, the Ricci curvature is the mathematical object that controls the growth rate of the volume of metric balls in a manifold.

So R_{ij}=sinhu comes out of the new pde with the second solution! This is equal to $e^{ud}u/(1-\cosh u)=dr/r$ whose solution is $\ln(r_{M+1}/r_{bb})+2=[1/(e^u-1)-\ln[e^u-1]]2$.

This equation and the metric quantization sect. 6.8 stair step give the equation of motion stair v steps of our universe for the inside r_H and so give that quantized Hubble constant.

Note here also the muon (and so the pion) were 100X times heavier at the big bang making the nuclear force equal to the E&M force then.

7.10 Construct The Standard Model Lagrangian

Note we have derived from first principles (i.e.,from postulate 1) the new pde equation for the electron (2AI, eq.9), pde for the neutrino (eq.2AII) Maxwell’s equations for the photon, the Proca equation for the Z and the W (Ch.3) and the found the mass for the Z and the W (4.2.1). We even found the Fermi 4 point from the object C perturbations. The distance to object B determines mass and we found that it is equivalent to a scalar field (Higgs) source of mass in sect.4.1.5. We have no gluons or quarks or color in this model but we can at least derive the phenomenology these concepts predict with our 2AI+2AI+2AI at $r=r_H$ strong force model (ie., 2AI+2AI+2AI $r=r_H$, Ch.9,10)

So from the postulate of 1 we can now construct the standard model Largrangian, or at least predict the associated phenomenology, from all these results for the Nth fractal scale. Here it is:

1

$$-\frac{1}{2}\partial_\nu g^a_\mu \partial_\nu g^a_\mu - g_s f^{abc}\partial_\mu g^a_\nu g^b_\mu g^c_\nu - \frac{1}{4}g_s^2 f^{abc} f^{ade} g^b_\mu g^c_\nu g^d_\mu g^e_\nu +$$
$$\frac{1}{2} i g_s^2 (\bar{q}^\sigma_i \gamma^\mu q^\sigma_j) g^a_\mu + \bar{G}^a \partial^2 G^a + g_s f^{abc} \partial_\mu \bar{G}^a G^b g^c_\mu - \partial_\nu W^+_\mu \partial_\nu W^-_\mu -$$

2

$$M^2 W^+_\mu W^-_\mu - \frac{1}{2}\partial_\nu Z^0_\mu \partial_\nu Z^0_\mu - \frac{1}{2c_w^2} M^2 Z^0_\mu Z^0_\mu - \frac{1}{2}\partial_\mu A_\nu \partial_\mu A_\nu - \frac{1}{2}\partial_\mu H \partial_\mu H -$$
$$\frac{1}{2} m_h^2 H^2 - \partial_\mu \phi^+ \partial_\mu \phi^- - M^2 \phi^+ \phi^- - \frac{1}{2}\partial_\mu \phi^0 \partial_\mu \phi^0 - \frac{1}{2c_w^2} M \phi^0 \phi^0 - \beta_h [\frac{2M^2}{g^2} +$$
$$\frac{2M}{g} H + \frac{1}{2}(H^2 + \phi^0\phi^0 + 2\phi^+\phi^-)] + \frac{2M^4}{g^2}\alpha_h - i g c_w [\partial_\nu Z^0_\mu (W^+_\mu W^-_\nu -$$
$$W^+_\nu W^-_\mu) - Z^0_\nu (W^+_\mu \partial_\nu W^-_\mu - W^-_\mu \partial_\nu W^+_\mu) + Z^0_\mu (W^+_\nu \partial_\nu W^-_\mu -$$
$$W^-_\nu \partial_\nu W^+_\mu)] - i g s_w [\partial_\nu A_\mu (W^+_\mu W^-_\nu - W^+_\nu W^-_\mu) - A_\nu (W^+_\mu \partial_\nu W^-_\mu -$$
$$W^-_\mu \partial_\nu W^+_\mu) + A_\mu (W^+_\nu \partial_\nu W^-_\mu - W^-_\nu \partial_\nu W^+_\mu)] - \frac{1}{2} g^2 W^+_\mu W^-_\mu W^+_\nu W^-_\nu +$$
$$\frac{1}{2} g^2 W^+_\mu W^-_\nu W^+_\mu W^-_\nu + g^2 c_w^2 (Z^0_\mu W^+_\mu Z^0_\nu W^-_\nu - Z^0_\mu Z^0_\mu W^+_\nu W^-_\nu) +$$
$$g^2 s_w^2 (A_\mu W^+_\mu A_\nu W^-_\nu - A_\mu A_\mu W^+_\nu W^-_\nu) + g^2 s_w c_w [A_\mu Z^0_\nu (W^+_\mu W^-_\nu -$$
$$W^+_\nu W^-_\mu) - 2 A_\mu Z^0_\mu W^+_\nu W^-_\nu] - g\alpha [H^3 + H\phi^0\phi^0 + 2H\phi^+\phi^-] -$$
$$\frac{1}{8} g^2 \alpha_h [H^4 + (\phi^0)^4 + 4(\phi^+\phi^-)^2 + 4(\phi^0)^2\phi^+\phi^- + 4H^2\phi^+\phi^- + 2(\phi^0)^2 H^2] -$$
$$g M W^+_\mu W^-_\mu H - \frac{1}{2} g \frac{M}{c_w^2} Z^0_\mu Z^0_\mu H - \frac{1}{2} i g [W^+_\mu (\phi^0 \partial_\mu \phi^- - \phi^- \partial_\mu \phi^0) -$$
$$W^-_\mu (\phi^0 \partial_\mu \phi^+ - \phi^+ \partial_\mu \phi^0)] + \frac{1}{2} g [W^+_\mu (H \partial_\mu \phi^- - \phi^- \partial_\mu H) - W^-_\mu (H \partial_\mu \phi^+ -$$
$$\phi^+ \partial_\mu H)] + \frac{1}{2} g \frac{1}{c_w} (Z^0_\mu (H \partial_\mu \phi^0 - \phi^0 \partial_\mu H) - i g \frac{s_w^2}{c_w} M Z^0_\mu (W^+_\mu \phi^- - W^-_\mu \phi^+) +$$
$$i g s_w M A_\mu (W^+_\mu \phi^- - W^-_\mu \phi^+) - i g \frac{1-2c_w^2}{2c_w} Z^0_\mu (\phi^+ \partial_\mu \phi^- - \phi^- \partial_\mu \phi^+) +$$
$$i g s_w A_\mu (\phi^+ \partial_\mu \phi^- - \phi^- \partial_\mu \phi^+) - \frac{1}{4} g^2 W^+_\mu W^-_\mu [H^2 + (\phi^0)^2 + 2\phi^+\phi^-] -$$
$$\frac{1}{4} g^2 \frac{1}{c_w^2} Z^0_\mu Z^0_\mu [H^2 + (\phi^0)^2 + 2(2s_w^2 - 1)^2 \phi^+\phi^-] - \frac{1}{2} g^2 \frac{s_w^2}{c_w} Z^0_\mu \phi^0 (W^+_\mu \phi^- +$$
$$W^-_\mu \phi^+) - \frac{1}{2} i g^2 \frac{s_w^2}{c_w} Z^0_\mu H (W^+_\mu \phi^- - W^-_\mu \phi^+) + \frac{1}{2} g^2 s_w A_\mu \phi^0 (W^+_\mu \phi^- +$$
$$W^-_\mu \phi^+) + \frac{1}{2} i g^2 s_w A_\mu H (W^+_\mu \phi^- - W^-_\mu \phi^+) - g^2 \frac{s_w}{c_w} (2c_w^2 - 1) Z^0_\mu A_\mu \phi^+ \phi^- -$$
$$g^1 s_w^2 A_\mu A_\mu \phi^+ \phi^- - \bar{e}^\lambda (\gamma\partial + m_e^\lambda) e^\lambda - \bar{\nu}^\lambda \gamma\partial \nu^\lambda - \bar{u}^\lambda_j (\gamma\partial + m_u^\lambda) u^\lambda_j -$$

3

$$\bar{d}^\lambda_j (\gamma\partial + m_d^\lambda) d^\lambda_j + i g s_w A_\mu [-(\bar{e}^\lambda \gamma^\mu e^\lambda) + \frac{2}{3}(\bar{u}^\lambda_j \gamma^\mu u^\lambda_j) - \frac{1}{3}(\bar{d}^\lambda_j \gamma^\mu d^\lambda_j)] +$$
$$\frac{ig}{4c_w} Z^0_\mu [(\bar{\nu}^\lambda \gamma^\mu (1+\gamma^5) \nu^\lambda) + (\bar{e}^\lambda \gamma^\mu (4s_w^2 - 1 - \gamma^5) e^\lambda) + (\bar{u}^\lambda_j \gamma^\mu (\frac{4}{3}s_w^2 -$$
$$1 - \gamma^5) u^\lambda_j) + (\bar{d}^\lambda_j \gamma^\mu (1 - \frac{8}{3}s_w^2 - \gamma^5) d^\lambda_j)] + \frac{ig}{2\sqrt{2}} W^+_\mu [(\bar{\nu}^\lambda \gamma^\mu (1+\gamma^5) e^\lambda) +$$
$$(\bar{u}^\lambda_j \gamma^\mu (1+\gamma^5) C_{\lambda\kappa} d^\kappa_j)] + \frac{ig}{2\sqrt{2}} W^-_\mu [(\bar{e}^\lambda \gamma^\mu (1+\gamma^5) \nu^\lambda) + (\bar{d}^\kappa_j C^\dagger_{\lambda\kappa} \gamma^\mu (1 +$$
$$\gamma^5) u^\lambda_j)] + \frac{ig}{2\sqrt{2}} \frac{m_e^\lambda}{M} [-\phi^+ (\bar{\nu}^\lambda (1-\gamma^5) e^\lambda) + \phi^- (\bar{e}^\lambda (1+\gamma^5) \nu^\lambda)] -$$

4

$$\frac{g}{2} \frac{m_e^\lambda}{M} [H (\bar{e}^\lambda e^\lambda) + i\phi^0 (\bar{e}^\lambda \gamma^5 e^\lambda)] + \frac{ig}{2M\sqrt{2}} \phi^+ [-m_d^\kappa (\bar{u}^\lambda_j C_{\lambda\kappa} (1-\gamma^5) d^\kappa_j) +$$
$$m_u^\lambda (\bar{u}^\lambda_j C_{\lambda\kappa} (1+\gamma^5) d^\kappa_j] + \frac{ig}{2M\sqrt{2}} \phi^- [m_d^\lambda (\bar{d}^\lambda_j C^\dagger_{\lambda\kappa} (1+\gamma^5) u^\kappa_j) - m_u^\kappa (\bar{d}^\lambda_j C^\dagger_{\lambda\kappa} (1 -$$
$$\gamma^5) u^\kappa_j] - \frac{g}{2} \frac{m_u^\lambda}{M} H (\bar{u}^\lambda_j u^\lambda_j) - \frac{g}{2} \frac{m_d^\lambda}{M} H (\bar{d}^\lambda_j d^\lambda_j) + \frac{ig}{2} \frac{m_u^\lambda}{M} \phi^0 (\bar{u}^\lambda_j \gamma^5 u^\lambda_j) -$$
$$\frac{ig}{2} \frac{m_d^\lambda}{M} \phi^0 (\bar{d}^\lambda_j \gamma^5 d^\lambda_j) + \bar{X}^+ (\partial^2 - M^2) X^+ + \bar{X}^- (\partial^2 - M^2) X^- + \bar{X}^0 (\partial^2 -$$

5

$$\frac{M^2}{c_w^2}) X^0 + \bar{Y} \partial^2 Y + i g c_w W^+_\mu (\partial_\mu \bar{X}^0 X^- - \partial_\mu \bar{X}^+ X^0) + i g s_w W^+_\mu (\partial_\mu \bar{Y} X^- -$$
$$\partial_\mu \bar{X}^+ Y) + i g c_w W^-_\mu (\partial_\mu \bar{X}^- X^0 - \partial_\mu \bar{X}^0 X^+) + i g s_w W^-_\mu (\partial_\mu \bar{X}^- Y -$$
$$\partial_\mu \bar{Y} X^+) + i g c_w Z^0_\mu (\partial_\mu \bar{X}^+ X^+ - \partial_\mu \bar{X}^- X^-) + i g s_w A_\mu (\partial_\mu \bar{X}^+ X^+ -$$
$$\partial_\mu \bar{X}^- X^-) - \frac{1}{2} g M [\bar{X}^+ X^+ H + \bar{X}^- X^- H + \frac{1}{c_w^2} \bar{X}^0 X^0 H] +$$
$$\frac{1-2c_w^2}{2c_w} i g M [\bar{X}^+ X^0 \phi^+ - \bar{X}^- X^0 \phi^-] + \frac{1}{2c_w} i g M [\bar{X}^0 X^- \phi^+ - \bar{X}^0 X^+ \phi^-] +$$
$$i g M s_w [\bar{X}^0 X^- \phi^+ - \bar{X}^0 X^+ \phi^-] + \frac{1}{2} i g M [\bar{X}^+ X^+ \phi^0 - \bar{X}^- X^- \phi^0]$$

Fig. 10

The next fractal scale N+1 coming out of our eq.1 gives the cosmology and GR gravity, which is not included in the standard model. In fact the whole model repeats on the N+1 fractal scale. Object B provides ambient metric quantization states that have been observed implying new physics. So there is the promise of breakthrough physics from our new (postulate 1) model.

7.11 Summary

This is a first principles derivation of mathematics and theoretical physics. “Astronomers are observing from the inside of what particle physicists are studying from the outside, ONE object, the new pde (2AI) electron”. Recall the electron was the only object in the first quadrant (so positive integer), every other object is an excited state, caused by increasing noise C. So we started with postulate of 1 and ended with ONE after all this derivation (solving two equations for two unknowns) derivation, we derived ONE thing, which must be the same thing! So we really did just "postulate ONE" and nothing else, as we claimed at the beginning. That makes this theory remarkably comprehensive (all of theoretical physics and rel# math) and the origin of this theory remarkably simple: “one”. So we have only ONE simple postulate here.

7.12 The Above Mainstream Model (fig.10) Has Many Free Parameters, This Fractal Model has None

For example the Mandelbrot set $\{C_M\}=r_H$ in $dr-C_M$ so we can always set $C_M=2ke^2/m_ec^2$. $c^2m_edr=c^2m_eC_M=2ke^2$ to define our length units. In section 1.2.7 we show that with a *single* m_e (nonzero proper mass) we can start with arbitrary ke^2/r energy units and have no free parameters among these values. Note this 2A1 electron has the only nonzero proper mass m_e (i.e.,so only C_M) in free space making it the only fractal solution. In the time domain the h in $E=h(1/t)$ just defines energy units (equation 4.6) in terms of event time intervals t. The gyromagnetic ratio of m_e is derived from the rotated 4AI, eq.9 new pde. The muon mass comes from the distance to object B (Ch.5). The proton mass comes from the flux quantization h/2e (Sect.8.1). The other highest energy boson masses come from the Paschen Back effect given this proton mass (Ch.8). The strength of the strong force arrises from the ultrarelativistic field line compression in the 2AI+2AI+2AI model

(Ch.8). The mass energies and quantum numbers of the many particles below about 1.5GeV come out of the Frobenius solution (Ch.9) which is merely a solution to eq.9 (i.e., 2AI). Recall the CP violation is due to the fractalness (selfsimilarity with a spinning electron): we are inside a rotating object Kerr metric implying a cross term $d\phi dt$ in it. So you can derive the CP violation magnitude that they use in the CKM matrix. Multiply through the Fermi interaction integral (from the Standard model output and this output from the theory) and integrate to get the Cabibbo angle eq.10.8.7). The pairing interaction force of superconductivity is even derived by substituting the $\kappa_{\mu\mu}$ in the geodesic equations (sect.4.5). You can derive the neutrino masses for a nonhomogenous non isotropic space time (Ch.3). We derived the exact value of the pion mass (Ch.9).
Note since quarks don't exist in this model (they are merely those $2P_{3/2}$ trifolium lobes at $r=r_H$) those 6 quark mass free parameters vanish. The Mandelbrot set 10^{40}X scale change automatically sets the universe size and the gravitational constant size (sect.7.4) in comparison to classical electron mass and E&M force strength respectively.

If you do a tally **that free parameter list has just shrunk from ~30 down to 0**: so they are all derivable parameters, not free.. In contrast setting these parameters as free parameters is really postulating them because the parameter values are postulated. The equations they are used in constitute many more postulates (fig.10), so the number of potulates you get doing it that way goes out the roof, 100 or so?
But you have to ask yourself: where did all these assumptions come from? You actually do not understand the fundamental physics at all if you require a lot of postulates, free parameters, etc., you are merely curve fitting. In contrast here we have only one simple postulate and get the whole shebang out all at once: that being the standard model particles and cosmology and gravity. We finally 'understand' in the deepest sense of that word!
Note this model (Ch.1) also has none of the mainstream paradoxes either (Klein paradox, Dirac sea, 10^{96}grams/cm^3 vacuum, infinite mass and charge,.. in Ch.4) and not a single gauge but it still keeps the QED precission (eg., see Lamb shft calculation in 6.12).

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[i] Weinberg, Steve, *General Relativity and Cosmology*, P.257