

## This theory is 0

**Introduction** All QM physicists know about *real* eigenvalue (Dirac eq), observables. All mathematicians know that the limit of a Cauchy sequence of rational numbers is a Cauchy *real* number. So all we did here is show we postulated *real*#0 by using it to derive a rational Cauchy sequence with limit 0. We did this because that same postulate (of *real*#0) math *also* implies *the* real eigenvalues we get from a generally covariant generalization of the Dirac equation that does not require gauges (Newpde), clearly an advance over previous physics pdes. To show this

**Define0:** with numbers  $1 \equiv 1+0$  and definition of list  $0 \equiv 0X0$ ,  $1 \equiv 1X1$  as symbol  $z = zz$  (algebraic definition of 0). Also

**Postulate *real* number 0 if  $z'=0$  and  $z'=1$  plugged into  $z' = z'z' + C$  (eq.1) results in some  $C=0$  constant (ie  $\delta C=0$ ).**

There is of course the obvious  $C=0$  solution but including  $\delta C=0$  in those above *plugins* adds other Cs. So:

**Plug  $z'=0$  into eq.1** get 2D **Mandelbrot** set

So  $z_0=0$  into eq1 iteration (plug left side into right side repeatedly)  $z_{N+1} = z_N z_N + C$ , (generates the larger numbers  $z_{N+1}$  so more *symbol* algebra so calculus definitions) requires we reject the Cs for which  $\delta C = \delta(z_{N+1} - z_N z_N) = \delta(\infty - \infty) \neq 0$ . The Cs that are left over define the **Mandelbrot set** with new eq1  $z$  so  $\delta z \leq C_M = 10^{40N} 1.4$ ..fractal scaleN jumps

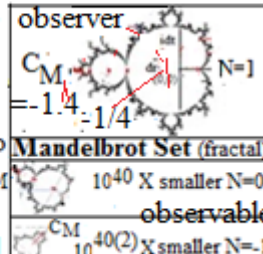
**Plug  $z'=1$  into eq.1** get 2D **Dirac** equation (new 2 degrees of freedom from  $\delta z$ )

So  $z=1+\delta z$  into eq.1 is  $\delta z + \delta z \delta z = C$ . So  $\delta z = (-1 \pm \sqrt{1 + 4C})/2 \equiv dr + idt$  So bounded complex (Mandelbrot) set  $\delta C=0$  extreme  $-1/4 > C \geq -1.4$ ..= $C_M$  in fig1. For  $N=1$  (big C observer) then  $\delta z \approx C$  so  $\delta C = \delta \delta z \approx 0$  and so  $\delta C = \delta(\delta z + \delta z \delta z) = \delta \delta z + 2\delta \delta z \delta z \approx \delta(\delta z \delta z) = \delta((dr + idt)^2) = \delta[(dr^2 - dt^2) + i(dr dt + dt dr)] = 0 = \text{Minkowski metric} + \text{Clifford algebra} \equiv \text{Dirac eq.}$  Also  $\delta C=0$  extremum  $-1/4$  Mandelbrot set iteration becomes the rational Cauchy sequence  $-1/4, -3/16, -55/256, \dots, 0$ , implying **0** is *real*

4D **Mandelbrot** and **Dirac** relation rewritten with  $N=0$  observability (eq.11) and 3D orthogonalization is QM

**Newpde**  $\equiv \gamma^\mu (\sqrt{\kappa_{\mu\mu}}) \partial \psi / \partial x_\mu = (\omega/c) \psi$  for  $e, \nu$ ,  $\kappa_{00} = e^{i(2\Delta\epsilon/(1-2\epsilon))} - r_H/r$ ,  $\kappa_{rr} = 1/(1 + (2\Delta\epsilon/(1+\epsilon)) - r_H/r)$ ,  $r_H = C_M/\xi = e^2 X 10^{40N}/m$  ( $N = ., -1, 0, 1, .$ ),  $\Delta\epsilon = 0$  for neutrino  $\nu$  and  $N=-1$

See davidmaker.com for backups

<b>Spherical Harmonic Solutions to Newpde: <math>2P_{3/2}, 1S_{1/2}, 2S_{1/2}</math> at <math>r=r_H</math> Stable <math>2P_{3/2}</math> at <math>r=r_H</math></b>	
<p><math>N=0</math> at <math>r=r_H</math> <math>2P_{3/2}</math> <math>3e</math> baryons (QCD not required) Hund's rule <math>1S_{1/2}, 2S_{1/2}</math> leptons (Koide)</p> <p>4 SM Bosons from 4 axis extreme rotations of <math>e, \nu</math></p> <p><math>N=-1</math> (i.e., <math>e^2 X 10^{-40} \equiv C_M^2</math>). <math>\kappa_{\mu\nu}</math> is then by inspection the Schwarzschild metric <math>g_{\mu\nu}</math> (For <math>N=-1, \Delta\epsilon \ll 1</math>). So we just derived General Relativity (GR) and the gravity constant G from Quantum Mechanics (QM) in one line.</p> <p><math>N=1</math> Newpde zitterwegung expansion stage is the cosmological expansion.</p> <p><math>N=1</math> Zitterbewegung harmonic coordinates and Minkowski metric submanifold (after long time expansion) gets the DeSitter ambient metric we observe.</p> <p><math>N=0</math> The third order Taylor expansion (terms) in <math>\sqrt{\kappa_{\mu\nu}}</math> gives the anomalous gyromagnetic ratio and Lamb shift <i>without</i> the renormalization and infinities.</p> <p>So <math>\kappa_{\mu\nu}</math> provides the general covariance of the Newpde.</p> <p>So we got all of physics here by <i>mere inspection</i> of this Newpde with no gauges!</p>	 <p>observer</p> <p><math>N=1</math></p> <p><math>C_M</math></p> <p><math>-1.4</math></p> <p><math>-1/4</math></p> <p><b>Mandelbrot Set (fractal)</b></p> <p><math>C_M</math> <math>10^{40}</math> X smaller <math>N=0</math></p> <p><b>observable</b></p> <p><math>C_M</math> <math>10^{40(2)}</math> X smaller <math>N=-1</math></p> <p>fig1</p>

•**Conclusion:** So by merely (**plugging 0,1 into eq.1**) **postulating 0**, out pops the whole universe, BOOM! easily the most important discovery ever made or that will ever be made again. We finally figured it out.

Note a theory with many assumptions is *not* fundamental: so where did those many assumptions come from? Also a first principles theory with the correct ultimate Occam's razor assumption(0), as here, will *not* hit a brick wall, thus the sky is the limit for breakthrough physics innovation coming out of such a theory.

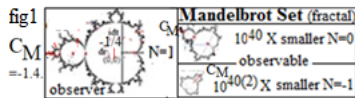
## This theory is 0

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Some C=0 constant (ie  $\delta C=0$ )

There is of course the obvious C=0 solution but including  $\delta C=0$  adds other Cs: Note the *plugins*

**Plug  $z'=0$  into eq.1** get 2D **Mandelbrot** set

So  $z_0=0$  into eq1 iteration (plug left side into right side repeatedly)  $z_{N+1}=z_N z_N + C$ ,  
 (generates the larger numbers  $z_{N+1}$  so more *symbol algebra* so calculus definitions) requires  
 we reject the Cs for which  $\delta C = \delta(z_{N+1} - z_N z_N) = \delta(\infty - \infty) \neq 0$ . The Cs that are left over define  
 the **Mandelbrot set** with new eq1  $z$  so  $\delta z \leq C_M = 10^{40N} 1.4..$  fractal scale N jumps.



<http://www.youtube.com/watch?v=0jGaio87u3A>

**Plug  $z'=1$  into eq.1** get 2D **Dirac** equation (new 2 degrees of freedom from  $\delta z$ )

So  $z=1+\delta z$  into eq.1 is  $\delta z + \delta z \delta z = C$ . So  $\delta z = (-1 \pm \sqrt{1 + 4C})/2 \equiv dr + idt$  So bounded complex (Mandelbrot)  
 set  $\delta C=0$  extreme  $-1/4 > C \geq -1.4.. = C_M$  in fig1. For N=1 (big C observer) then  $\delta z \approx C$  so  $\delta C =$   
 $\delta \delta z \approx 0$  and so  $\delta C = \delta(\delta z + \delta z \delta z) = \delta \delta z (1 + 2\delta z) \approx \delta(\delta z \delta z) = \delta((dr + idt)^2) = \delta[(dr^2 - dt^2) + i(dr dt + dt dr)]$   
 $= 0 =$  **Minkowski metric + Clifford algebra  $\equiv$  Dirac eq..** Also  $\delta C=0$  extremum  $-1/4$  Mandelbrot  
 set iteration becomes the rational Cauchy sequence  $-1/4, -3/16, -55/256, \dots, 0$ , implying **0** is *real*

4D **Mandelbrot** and **Dirac** relation rewritten with N=0 observability (eq.11) and 3D orthogonalization is QM  
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 $r_H = C_M/\xi = e^2 X 10^{40N}/m$  (N=., -1, 0, 1..),  $\Delta\epsilon = 0$  for neutrino  $\nu$  and N=-1

### **Spherical Harmonic solutions to Newpde: $2P_{3/2}$ , $1S_{1/2}$ , $2S_{1/2}$ at $r=r_H$ . stable state $2P_{3/2}$**

N=0 at  $r=r_H$ ,  **$2P_{3/2}$  3e baryons** (QCD not required) Hund's rule  $1S_{1/2} \mu$ ;  $2S_{1/2} \tau$ ; **leptons** (Koide)  
 4 SM Bosons from 4 axis extreme rotations of  $e, \nu$

N=-1 (i.e.,  $e^2 X 10^{-40} \equiv G m_e^2$ ).  $\kappa_{ij}$  is then by inspection the Schwarzschild metric  $g_{ij}$ . (For N=-1,  
 $\Delta\epsilon \ll 1$ ). So we just derived General Relativity (GR) and the gravity constant G from Quantum  
 Mechanics (QM) in one line.

N=1 Newpde zitterbewegung expansion stage explains the cosmological expansion.

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N=0 The third order Taylor expansion (terms) in  $\sqrt{\kappa_{ij}}$  gives the anomalous gyromagnetic ratio  
 and Lamb shift without the renormalization and infinities.

So  $\kappa_{ij}$  provides the general covariance of the Newpde.

So we got all of physics here by mere inspection of the Newpde with no gauges!

So get rel# math and physics, *everything*, no more, no less.

•**Conclusion:** So by merely (plugging 0,1 into eq.1) **postulating 0**, out pops the whole universe,  
 BOOM! easily the most important discovery ever made or that will ever be made again.

We finally figured it out.

PS. Note how smoothly and simply those 2 plugins (ie postulate 0) get the Mandelbrot set and  
 Dirac eq *and* real# math. and how easily they then both yield the Newpde and so the universe.  
 So we indeed have *merely* postulated 0.

**Introduction:** All QM physicists know about *real* eigenvalue (Dirac eq), observables. All mathematicians know that the limit of a Cauchy sequence of rational numbers is a Cauchy *real* number. So all we did here is show we postulated *real* by using it to derive a rational Cauchy sequence with limit 0. We did this because that same postulate (of *real*) math *also* implies the real eigenvalues we get from a generally covariant generalization of the Dirac equation that does not require gauges(Newpde), clearly an advance over previous such physics pdes. **0** is the simplest idea imaginable so ‘the’ ultimate Occam’s razor assumption implying we finally figured it out. To show this we:

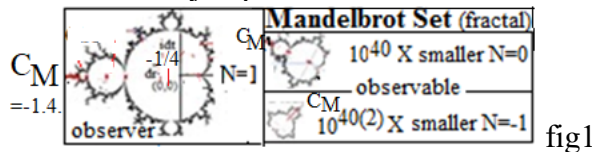
1) **Define 0:** with numbers  $1 \equiv 1+0$  and definition of list  $0 \equiv 0X0$ ,  $1 \equiv 1X1$  as symbol  $z = zz$  (algebraic definition of 0). Also

2) **Postulate real number 0** if  $z' = 0$  and  $z' = 1$  plugged into  $z' = z'z' + C$  (eq.1) results in some  $C = 0$  constant (ie  $\delta C = 0$ ).

There is of course the obvious  $C = 0$  solution but including  $\delta C = 0$  adds other Cs:

• **Plug in  $z = 0 = z_0 = z'$  in eq.1.** Note the equality sign in eq.1 demands we substitute  $z'$  on left (eq.1) into right  $z'z'$  repeatedly and get iteration  $z_{N+1} = z_N z_N + C$ . (Generates the larger numbers  $z_{N+1}$  including Cauchy sequence limits so more *symbol* algebra so calculus definitions). So postulate 0 also *generates* the big number algebra and calculus (given this Cauchy sequence completeness) we can now use.

For example we can now define constant C with that  $\delta C = 0$ . When applied on iteration  $z_{N+1} = z_N z_N + C$ ,  $z_0 = 0$  it also requires we reject the Cs for which  $\delta C = \delta(z_{N+1} - z_N z_N) = \delta(\infty - \infty) \neq 0$ . The Cs that are left over define the fractal **Mandelbrot set** (6) with new eq.1  $z$  so  $\delta z \leq C_M = 10^{40N} 1.4..$  fractal scale N jumps and so  $z = 1 + \delta z$  must be substituted into eq.1 to get  $\delta z + \delta z \delta z = C$  (3)



Defining the ‘observers’ (required by eq.11, so circle) scale as fractal scale N then  $M < N$  (implied by eq.3) is the ‘observables’ scale M. For example we can define the fig.1 ‘observer’ fractal scales as  $N=1$  implying  $|\delta z| \gg 1$  since C is then huge in comparison to the  $M=0$  scale..

**Plug  $z' = 1$  into eq.1** get 2D **Dirac** equation (new 2 degrees of freedom from  $\delta z$ )

So  $z = 1 + \delta z$  into eq.1 is  $\delta z + \delta z \delta z = C$ . So  $\delta z = (-1 \pm \sqrt{1 + 4C}) / 2 \equiv dr + idt$  So bounded complex (Mandelbrot) set  $\delta C = 0$  extreme  $-1/4 > C \geq -1.4.. = C_M$  in fig.1. For  $N=1$  (big C observer) then  $\delta z \approx C$  so  $\delta C = \delta \delta z \approx 0$  and so  $\delta C = \delta(\delta z + \delta z \delta z) = \delta \delta z (1) + 2 \delta \delta z \delta z \approx \delta(\delta z \delta z) = \delta((dr + idt)^2) = \delta[(dr^2 - dt^2) + i(dr dt + dt dr)] = 0 = \text{Minkowski metric} + \text{Clifford algebra} \equiv \text{Dirac eq.}$  Also  $\delta C = 0$  extremum  $-1/4$  Mandelbrot set iteration becomes the rational Cauchy sequence  $-1/4, -3/16, -55/256, \dots, 0$ , implying **0** is *real* QED Note the  $<$  in eq.4 implies the actual real number is the  $N=0$  limit  $C \approx \delta z = dr$  is not at exactly 0 so also giving us the real number line.

Factor **real** eq.5  $\delta(dr^2 - dt^2) = \delta[(dr + dt)(dr - dt)] = 0 = [\delta(dr + dt)](dr - dt) + (dr + dt)[\delta(dr - dt)] = 0$  (6) so  $-dr + dt = ds, -dr - dt = ds \equiv ds_1 (\rightarrow \pm e)$  Squaring & eq.5 gives circle in  $e, v$  (dr, dt) 2<sup>nd</sup>, 3<sup>rd</sup> quadrants (7) &  $dr + dt = ds, dr - dt = ds, dr + dt = 0$ , light cone ( $\rightarrow v, \bar{v}$ ) in **same** (dr, dt) plane 1<sup>st</sup>, 4<sup>th</sup> quadrants (8) &  $dr + dt = 0, dr - dt = 0$  so  $dr = dt = 0$  defines vacuum (while eq.4 derives space-time) (9)

Those quadrants give *positive* scalar  $dr dt$  in eq.7 (if *not* vacuum) since also, given the Mandelbrot set  $C_M$ , (Here at  $-1.4.. \in C_M$ )  $C_M$  iteration definition, implies  $z \neq \infty$ . This then implies the eq.5 *non* infinite extremum for **imaginary**  $\equiv dr dt + dt dr = 0 \equiv \gamma^i dr^j dt + \gamma^j dt^i dr = (\gamma^i \gamma^j + \gamma^j \gamma^i) dr dt$  so

$(\gamma^i\gamma^j+\gamma^j\gamma^i)=0, i\neq j$  (from **real** eq5  $\gamma^i\gamma^i=1$ ) (7a) Thus from eqs5,7a:  $ds^2=dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$  Note how eq5 Dirac eq. and  $C_M$  Mandelbrot set just fall (pop) out of eq.1, amazing!

We square eqs.7 or 8 or 9  $ds_1^2=(dr+dt)(dr+dt)=(-dr-dt)(-dr-dt)=[dr^2+dt^2]+(drdt+dt dr)\equiv ds^2+ds_3=\mathbf{Circle}+\text{invariant}$ .  $\mathbf{Circle}\equiv\delta z=dse^{i\theta}=dse^{i(\Delta\theta+\theta_0)}=dse^{i((\cos\theta dr+\sin\theta dt)/(ds)+\theta_0)}$ ,  $\theta_0=45^\circ$  min of  $\delta ds^2=0$  given eq.7 constraint for  $N=0$   $\delta z'$  perturbation of eq5 flat space implying a further  $\delta C=0$   $(\partial C/\partial r)_t dr+i(\partial C/\partial t)_r dt=0$  where  $dt\approx 0$  and  $45^\circ$  allowed (so where also  $dr\approx 0$  on  $1/4R$  circle) is the Feigenbaum and zoom point. We define  $k\equiv dr/ds$ ,  $\omega\equiv dt/ds$ ,  $\sin\theta\equiv r$ ,  $\cos\theta\equiv t$ .  $dse^{i45^\circ}\equiv ds'$ . Take ordinary derivative  $dr$  (since flat space) of 'Circle'.

$$\frac{\partial(dse^{i(\frac{rdr+tdt}{ds})})}{\partial r} = i\frac{dr}{ds}\delta z \text{ so } \frac{\partial(dse^{i(rk+wt)})}{\partial r} = ik\delta z, k\delta z = -i\frac{\partial\delta z}{\partial r} \quad (11)$$

Recall from above that we proved that  $dr$  is a real number. So  $k=dr/ds$  is an operator with *real* eigenvalues (So  $k$  is an observable). Also  $k=2\pi/\lambda$  (eg., in  $\delta z=\cos kr$ ) thereby deriving the DeBroglie wavelength  $\lambda$ . Note the derivation of eq11 from that circle. Also eq.11 with integration by parts implies  $\langle p_r \rangle^* = \int (p_r \psi)^* \psi d\tau = \int \psi^* p_r \psi d\tau = \langle p_r \rangle$  and  $\int \psi_a p \psi_b d\tau = \langle a|p|b \rangle$  in Dirac notation. Therefore  $p_r = \hbar k$  is Hermitian given  $dr$  is real.

**Our postulate 0 implies  $z=zz+C\approx z=zz+0$**  (if  $z=1,0$  plugged into eq1) **so a small C**  
But for  $N=0$  observable eq.3  $\delta z+\delta z\delta z=C$  reads  $C\approx\delta z$ . So that postulated small  $C\approx 0$  implies an eq.5 (Minkowski metric) Lorentz contraction (9)  $1/\gamma$  boosted frame of reference **small**

$$C\approx\delta z/\gamma=C_M/\xi=\delta z' \quad (12)$$

So take variation

$$\delta C = \delta C_M = (\delta\xi)\delta z + \xi\delta\delta z = 0 \quad (13)$$

**Given  $z=1+\delta z$  for our above  $z\approx 1$**  (in our postulate plugin)

$\delta z$  in  $\delta\xi\delta z$  is small (eg., in free space  $\delta\delta z\approx 0$  and appendix A:  $2S_{1/2}, \tau, ; 1S_{1/2}, \mu$ ) so in eq.13  $\delta\xi$  and  $\xi$  can be large (**unstable large mass**  $\xi=\tau+\mu$ ) So.  $\delta z' \approx C = C_M/\xi = C_M/(\tau+\mu)$  (14)

**Given  $z=1+\delta z$  for our above  $z\approx 0$**

Given  $|\delta z|$  in  $\delta\xi\delta z$  is large ( $\delta z=-1$  eg., for  $2P_{3/2}$  at  $r=r_H$ ) so  $\delta\xi$  and  $\xi$  can be small (**stable small mass: electron**  $\xi_0=m_e$  ground state  $\delta z$  so  $\delta z' \approx C = C_M/\xi_0 = C_M/m_e$  (15)

for internal  $r\approx r_H$  comoving  $2P_{3/2}$  at  $r=r_H$  ultrarelativistic observer. For external observer then  $2m_e \rightarrow \xi = m_p$  so  $C$  is still small.

$C_M = e^2 10^{40N}$  fractal for  $N=0$  defines charge  $e$ .  $\xi$  defines mass.

**$\delta z'$  perturbs eq.7  $\delta z$**  In complex plane  $\delta z'+\delta z=(dx_1+idx_2)+(dx_3+idx_4)\equiv dr+idt$

For the  $N=1$  huge observer  $\delta z \gg \delta z\delta z$  from eq.3. Thus the required  $N=-1, N=0$  tiny observable ( $C_M/\xi=\delta z' \ll \delta z$ ) is a perturbation of the eq.7  $\delta z \approx dr \approx dt$  at  $45^\circ$   $(dr-\delta z')+(dt+\delta z')\equiv dr'+dt'=ds$  (16)

But for the high energy big  $\delta\delta z$  (see eq.22 and extreme "axis" perturbations)  $\delta z$  is small. So finding big  $\delta\delta z$  'observables' requires we artificially stay on the circle (appendix C) implying this additional  $\delta z'$  eq7 perturbation.

Define  $\kappa_r \equiv (dr/dr')^2 = (dr/(dr-\delta z'))^2 = 1/(1-r_H/r)^2 = A_1/(1-r_H/r) + A_2/(1-r_H/r)^2$  (RN)

The partial fractions  $A_I$  can be split off from RN and so  $\kappa_r \approx 1/[1-r_H/r]$ . (17)

$$\text{in } ds^2 = \kappa_r dr'^2 + \kappa_{oo} dt'^2 \quad (18)$$

From eq.7a  $dr'dt' = \sqrt{\kappa_r} dr' \sqrt{\kappa_{oo}} dt' = dr dt$  so

$$\kappa_r = 1/\kappa_{oo} \quad (19)$$

This 4D **Mandelbrot** and **Dirac** relation rewritten with ( $N=0$ ) observability (eq.11) and 3D orthogonalization is QM

• **Both  $z=0, z=1$**  rewritten (in eq1. Use 3D orthogonality to get (2D+2Dcurved space)). Thus  $\delta z'+\delta z=(dx_1+idx_2)+(dx_3+idx_4)\equiv dr+idt$  given  $dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$  if  $dr^2\equiv dx^2+dy^2+dz^2$  (3D

orthogonality) so that  $\gamma^r dr = \gamma^x dx + \gamma^y dy + \gamma^z dz$ ,  $\gamma^i \gamma^j + \gamma^j \gamma^i = 0$ ,  $i \neq j$ ,  $(\gamma^i)^2 = 1$ . From eq.14  
 $(\gamma^x \sqrt{\kappa_{xx}} dx + \gamma^y \sqrt{\kappa_{yy}} dy + \gamma^z \sqrt{\kappa_{zz}} dz + \gamma^t \sqrt{\kappa_{tt}} dt)^2 = \kappa_{xx} dx^2 + \kappa_{yy} dy^2 + \kappa_{zz} dz^2 - \kappa_{tt} dt^2 = ds^2$ . Multiply both sides  
 by  $\hbar^2/ds^2$  and  $\delta z^2 = \psi^2$  (since extremum  $C=-2$  is harmonic) use eq.11 inside brackets ( ) get 4D QM  
**Newpde**  $= \gamma^\mu (\sqrt{\kappa_{\mu\mu}}) \partial \psi / \partial x_\mu = (\omega/c) \psi$  for  $e, \nu$ ,  $\kappa_{00} = e^{i(2\Delta\epsilon/(1-2\epsilon))} \cdot r_H/r$ ,  $\kappa_{rr} = 1/(1+2\Delta\epsilon \cdot r_H/r)$ ,  
 $r_H = C_M/\xi = e^2 X 10^{40N}/m$  ( $N = -1, 0, 1, \dots$ ),  $\Delta\epsilon = 0$  for neutrino  $\nu$  and  $N = -1$ .

**Postulate(0) → Newpde**

## Objects A,B,C constitute $10^{40}$ X bigger proton, 2 positrons & electron $2P_{3/2}$ at $r=r_H$

### Appendix A object A Newpde Separation of Variables (12) gives Half Integer Spherical Harmonics Schrodinger equation limit for bound state $2P_{3/2}$ at $r=r_H$ implying also $2S_{1/2}, 1S_{1/2}$

The only nonzero proper mass particle solution to the Newpde is the electron  $m_e$  ground state.  
 The only multiparticle stable state is the  $2P_{3/2}$  at  $r=r_H$  **3e** state.

**Stability**(bound state) of  $2P_{3/2}$  at  $r=r_H$

At  $r=r_H$ . we have *stability* ( $dt'^2 = \kappa_{00} dt^2 = (1-r_H/r) dt^2 = 0$ ) since the  $dt'$  clocks stop at  $r=r_H$ . After a possible positron (central) electron annihilation that 2  $\gamma$  ray scattering off the 3<sup>rd</sup> mass (in  $2P_{3/2}$ ) the diagonal metric (eq.17) time reversal invariance is a reverse of the  $\gamma$  ray pair annihilation with the subsequent  $e^\pm$  pair creation inside the  $r_H$  volume given  $\sigma = \pi r_H^2 \approx (1/20)$  barn making it merely a virtual creation-annihilation event. So our  $2P_{3/2}$  composite 3e (proton  $= P = D/2$ ) at  $r=r_H$  is the *only* stable multi e composite. Also see Part II davidmaker.com.

For  $2P_{3/2}$  ground state  $3m_e$  representation the interior curved space ultrarelativistic nature of  $2P_{3/2}$  at  $r=r_H$  allows for *only* a 2 positron  $2m_e$  and one central electron bound state allowing for a reduced mass representation of the 2 positron bound state.  $D/2 = m_p$  with very high  $\gamma$  ( $=917$ ) due to B flux (BA) quantization  $= \hbar h/2e$ . Given this net singlet scalar D wavefunction motion we can then use the Schrodinger equation to derive the nonrelativistic properties such as rest mass.

### Schrodinger equation $SP^2$ limit for 3e composite stable state

Here the Schrodinger equation is the nonrelativistic limit of the Newpde (modified Dirac) equation for COM motion *so that we can identify rest mass values* with it. For the pure Schrodinger equation (eg., No Pauli or Ising term) the two body spins must cancel ( $D=2m_p$ ), so just as with the atomic physics Hund rule, this combined energy must contain both the higher principle quantum number  $N=2$   $2P_{3/2}$  (at  $r=r_H$  for 3e) and the same principle quantum number  $N=2$   $2S_{1/2}$   $\tau$  with the same energy plus the next lower principle quantum number  $N=1$  lower energy  $\mu$  for  $1S_{1/2}$ . Note D is two body ( $\tau + \mu$ ) so also with reduced mass  $D=2m_p$  consistent with the above two body two positrons moving around a central electron reduced mass system. Note associated reduced mass system two body hybrid orbital  $SP^2 = D = \tau + \mu = 2P_{3/2} + \mu = 2m_p$ . so write

$$H\psi = -\frac{\hbar^2}{2m} \frac{\partial^2}{\partial r^2} \psi, P\psi = -\frac{\hbar^2}{2P} \frac{\partial^2}{\partial r^2} \psi = -\frac{\hbar^2}{D} \frac{\partial^2}{\partial r^2} \psi. \text{ So } \delta\delta z = -i\delta_i \delta z \text{ is then energy } X \delta z \quad (22)$$

Thus eq.11  $\hbar(dr/ds)\psi = -i\hbar d\psi/dr$  with  $\hbar$  canceling out from the Newpde  $dr' = dr \sqrt{\kappa_{rr}}$  thereby putting all the canceled out spin effects in a scalar black box allowing us to use the ordinary

scalar eigenfunction Schrodinger equation. So:  $k\psi = -\frac{1}{2m} \frac{\partial^2}{\partial r^2} \psi$  so that:

$$\left(\frac{D}{2}\right)\psi = \left(\frac{\gamma^r}{1} \sqrt{\frac{\kappa_{rr}}{2D/2}} \frac{dr}{ds}\right)^2 \psi, D = m_\tau + m_\mu + m_e = 2m_p, m_p = (1777 + 105.6)/2 = 941.3 \text{ MeV} \quad (23)$$

so minus the above 2 excess  $2S_{1/2}$ , and 2 excess  $1S_{1/2}$  and the 1 Lepton ground state electrons (so -  $5m_e$ ) leaving these 3 leptons) = **938.7 MeV proton** for curved space  $2P_{3/2}$  at  $r=r_H$  s. See partII B flux  $BA = mh/2e$  quantization implications.

### Comparison with QCD

The electron (solution to that new pde) spends 1/3 of its time in each  $2P_{3/2}$  (at  $r=r_H$ )trifolium lobe, *explaining the lobe multiples of 1/3e fractional charge* (So these ‘lobes’ can be named ‘quarks’ or George if you want). The lobes are locked into the center of mass, can’t leave, *giving asymptotic freedom* (otherwise yet another ad hoc postulate of qcd). As derived in PartII the two positrons must be ultrarelativistic (due to interior B flux quantization, so  $\gamma=917$ : sect.7.5,  $3e = (\gamma m_e + \gamma m_e) = m_p$ ) at  $r=r_H$  so the field line separation is narrowed into plates at the central electron explaining the strong force (otherwise postulated by qcd). Also there are 6  $2P$  states *explaining the 6 quark flavors*. P wave scattering *gives the jets*. Thus we derived all the properties of quarks from the Newpde  $2P_{3/2}$  state at  $r=r_H$ . So protons are just 2 Newpde positrons and electron in  $2P_{3/2}$  at  $r=r_H$  states. Quarks don’t exist..

### Part II Implications

The resulting 2 positron reduced mass charge motion gives B field Paschen Back ortho-para states each of which requires a Frobenius series solution giving each of the 6  $2P$  states (called u,s,d,c,b,t) particle multiplets (see part II). The exterior to  $r_H$  zero point energy  $\pi^\pm J=0$  motion suppresses the exterior B through the Meisner effect but adds its own small mass contribution in the gyromagnetic ratio term (eqs. 8.4, 9.22). See partII for details.

### $1S_{1/2}$ $2S_{1/2}$ at $r \leq r_H$ Hund rule States

Recall from just above:

$$(\gamma^x \sqrt{\kappa_{xx}} dx + \gamma^y \sqrt{\kappa_{yy}} dy + \gamma^z \sqrt{\kappa_{zz}} dz + \gamma^t \sqrt{\kappa_{tt}} dt)^2 = \kappa_{xx} dx^2 + \kappa_{yy} dy^2 + \kappa_{zz} dz^2 - \kappa_{tt} dt^2 = ds^2. \quad (21)$$

These same  $3e$  away from  $r=r_H$ , free space.

### Schrodinger equation for Newpde for these $1S_{1/2}$ $\mu$ , $2S_{1/2}$ $\tau$ , at $r \leq r_H$ States

1) Recall associated 2 body *energy eigenvalues of Newpde Schrodinger equation* hydrogen atom  $r > r_H$  Rydberg formula

$$E = R_b / N^2 \quad N = \text{principle quantum number}$$

2) The resulting  $2S_{1/2}$ ,  $1S_{1/2}$ , *G energy eigenvalues of the Newpde Schrodinger eq.* at  $r=r_H$  is given

$$\text{by the Koide formula: } \frac{m_\tau + m_\mu}{(\sqrt{m_\tau} + \sqrt{m_\mu})^2} = \frac{2}{3} \quad . \quad .$$

### Nonrelativistic reduced COM $r=r_H$ observer model for $2P=D$ , Free particle $2S_{1/2} + 1S_{1/2}$

Note also  $\tau + \mu$  must each be excited states of  $3e$  (+e,+e,-e). So left side  $D(3\psi)$  for  $3e$  in  $2P_{3/2}$ . 2positrons orbiting an electron. On the right side for this  $SP^2$  hybrid state  $2S_{1/2} + 1S_{1/2} = D$  with 2 operators themselves operating on each  $4\psi$ :  $SP^2$ ,  $SP^2$ ,  $SP^2$ ,  $2P$  given the same principle quantum number  $N=2$  for  $2P_{3/2}$  and  $2S_{1/2}$ :  $2S_{1/2} + 1S_{1/2}$ : for free particles at  $r=r_H$ . The  $2P$  and  $2S$  principle quantum numbers are the same so the energy eigenvalues are the same at the same  $r=r_H$ .  $(2P_{3/2})\psi_1 = (SP^2)\psi_2$  with different eigenfunctions  $\psi_1, \psi_2$ . To create the Schrodinger equation these two eigenfunctions  $\psi_1, \psi_2$  must be the same. How do we make them the same?

To get both sides to constitute a Schrodinger equation and so have the same eigenfunction  $\psi$  on both sides, we have to *normalize them* to the number of  $\psi$ s there are to be able use one  $\psi$  on both sides. The two  $2P_{3/2}$  reduced mass objects have  $2X$ three electrons  $\psi$  and has the *same principle quantum number*  $N=2$  as the the right side  $SP^2$  hybrid orbital with  $(SP^2, SP^2, SP^2, P)$ , *four* electrons  $\psi$ . So to be able to use the electron eigenfunction  $\psi$  on both sides to create a Schrodinger equation we use the  $6\psi, 4\psi$  *normalization* given by: (principle quantum number same for both sides)

**N=2 energy eigenvalue ( $2P_{3/2}$  state,  $r=r_H$ ) for reduced mass  $6\psi$  is equal to N=2 energy eigenvalue( $SP^2$  state,  $r=r_H$ ) for  $4\psi$**

bound ( $r=r_H$ ) Stable  $2P_{3/2} = 2S_{1/2} + 1S_{1/2}$  they add for free space at  $r=r_H$

$$\left(\frac{D}{2}\right)\psi' = \left(\sqrt{\frac{1}{2D/2}} \frac{dr}{ds}\right)^2 \psi, \text{ reduced mass } D \text{ so Schrodinger equation is scalar singlet } \psi$$

with the four  $SP^2$  electron orbitals given by:

$$SP^2 = \phi_0 = \frac{1}{\sqrt{3}}s - \frac{1}{\sqrt{6}}p_x + \frac{1}{\sqrt{2}}p_y$$

$$SP^2 = \phi_1 = \frac{1}{\sqrt{3}}s - \frac{1}{\sqrt{6}}p_x - \frac{1}{\sqrt{2}}p_y$$

$$SP^2 = \phi_2 = \frac{1}{\sqrt{3}}s + \frac{2}{\sqrt{6}}p_x$$

$$P = \phi_3 = p_z.$$

Principle quantum number =same principle quantum number

Energy eigenvalue for  $6\psi$   $2P_{3/2}$  left side same as  $4\psi$   $SP^2$  on right side

two  $2$ positrons orbiting  $1$  electron = $SP^2$   $SP^2$   $SP^2$   $SP^2$   $P$  on right side

(reduced mass operator) $6X$ eigenfunction=( $2S$ principle quantum operator) $4X$ eigenfunction = $SP^2$

$$(D/2)6\psi = \frac{(m_\tau + m_\mu)}{2} (2X3)\psi = \left(\sqrt{\frac{1}{2D_\tau/2}} \frac{dr}{ds} + \sqrt{\frac{1}{2D_\mu/2}} \frac{dr}{ds}\right)^2 4\psi \quad \text{Schrodinger equation}$$

**Replace black box mass D with its interior ultrarelativistic values**

But from eq.21 (and note  $\tau, \mu, e$  are Dirac equation-Newpde particles with 3 ground state electrons each) for  $\tau$  and  $\mu$ ) we can define the black box eq.21 mass relativistic part: so B10 impies that  $\sqrt{\kappa_{rr}} = m$  nonrelativistically

$\gamma^r \sqrt{\kappa_{rr}} dr \equiv dr'$ . Use  $\gamma^r \gamma^r = 1$

$$(D/2)3X6 = \frac{(m_\tau + m_\mu)}{2} 6\psi = \left(\frac{\gamma^r}{1} \sqrt{\frac{\kappa_{rr\tau}}{(2D_\tau/2)}} \frac{dr}{ds} + \frac{\gamma^r}{1} \sqrt{\frac{\kappa_{rr\mu}}{(2D_\mu/2)}} \frac{dr}{ds}\right)^2 4\psi$$

Scalar D operating on the S state eigenfunction for  $SP^2$  equals S state operators operating on  $4\psi$

Note we have a total of 7 electron ground state masses here, 3 each for the tauon and muon

allowing for the free particle representation. Given the black box interior positron

ultrarelativistic,  $\kappa_{rr} = m^2$  (B10) for 0 relative speed COM motion at  $r=r_H$ . Recall also for equation

7 electron diagonal  $ds = \sqrt{2}dr$  and free space given the addition inside of the brackets:

$$3(m_\tau + m_\mu) = 4 \left( \frac{\gamma^r}{1} \sqrt{\frac{\kappa_{rr\tau}}{m_\tau}} \frac{dr}{\sqrt{2}dr} + \frac{\gamma^r}{1} \sqrt{\frac{\kappa_{rr\mu}}{m_\mu}} \frac{dr}{\sqrt{2}dr} \right)^2$$

so  $(\gamma^r)^2 = 1$  that (again B10 implies  $\sqrt{\kappa_{rr}} = D$  nonrelativistically):

$$3(m_\tau + m_\mu) = 2(\sqrt{m_\tau} + \sqrt{m_\mu})^2 \quad \text{so}$$

$$\frac{Nmm_\tau + Nmm_\mu}{(\sqrt{mNm_\tau} + \sqrt{Nmm_\mu})^2} = \frac{2}{3} \quad (N \text{ is integer multiples of } 2S_{1/2} \ 1S_{1/2} \ . \ m \text{ is derived in PartII.}) \quad (24)$$

Koide

Ratios of the real valued masses that solve Koide are  $m_\tau/m_\mu = 1/.05946 = 1777\text{Mev}/105.6\text{Mev}$  (A1) good to at least 4 significant figures. A triple header with **all free space lepton masses**  $1S_{1/2} \ 2S_{1/2}$  at  $r \leq r_H$  and also the curved space proton as two positron mass  $= (m_\tau + m_\mu)/2 = \text{Proton} = D/2$ : the real eigenvalues. So the m is found in partII. N is integer multiples of  $2S_{1/2} \ 1S_{1/2}$

### $\delta C = 0$ 2 observable extremum (ie $C_M$ and $-1/4$ )

Upper real C extremum with finite imaginary idt is again  $\delta C = 0$  extremum  $C = -1/4$ . But that extremum does not support the  $dr = dt \ 45^\circ$  of eq.7-9 and so eq.11 and observables. (But it does support showing the  $dr$  axis is real). But the lower limit is  $-1.40115$ ..for observables (see zoom). Fiegenbaum pt. is one of those  $1/4 \times$  circles (fig1), so each circle allowing a  $45^\circ \ dr = dt$ . In that regard recall zoom <http://www.youtube.com/watch?v=0jGaio87u3A> which explores the Mandelbrot set interior near the Fiegenbaum point. Since this much smaller object is exactly selfsimilar to the first at this point inside the Lemniscate we can reset the zoom start at such extremum  $S_N C_M = 10^{40N} C_M$  in  $D_3$ . eq.20 In any case the splits are in 3 directions from the orbs. There appear to be about 2.5 splits going by each second (given my PC baud rate) and the next Mandelbrot set comes up in about 62 seconds. So  $3^{2.7 \times 62} = 10^N$  so  $172 \log 3 = N = 82$ . 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  $C_M / \xi \equiv r_H$  in electron (eq.10 above). So for each larger electron there are  **$10^{82}$  constituent electrons.**

### Leap Frog Observers

Recall from the Newpde that for one  $N = -1$  scale source  $e^2 10^{-40} \equiv Gm_e^2$  for each given  $m_e$ , electron, the  $N = 0$  fractal object for the  $N = 1$  scale observer. These  $N = 0$  charges  $\pm e$  cancel out but the  $N = -1 \ Gm_e^2$  obviously does not cancel (given the squared  $m_e$ ), there are  $10^{82}$  of these positive valued objects as we said. So for  $N = -1 \ (\Sigma Gm_e^2) = (\Sigma \text{over } N = -1 \ \text{tiny masses in the cosmos} = 10^{82} e^2 10^{-40}) = e^2 10^{40}$  at  $N = 1$  thereby surprisingly making the  $N = 1$  scale composed of these  $N = -1$  contributions.

Let the observer move out through the next larger horizon and repeat this process: there the sum over all  $N = 0$  don't cancel but the  $N = 1$  do cancel in this new  $10^{82}$  sum over all  $N = 0$ . This effect (eg.  $\Sigma_{10^{82}}(N = -1) \rightarrow N = 1$ ) leapfrogs through all the other fractal scales as well (eg.  $\Sigma_{10^{82}}(N = 0) \rightarrow N = 2$ ).

So for example  $N = 1$ , because of the sum over  $10^{82}$  is actually a ambient  $N = -1$  gravity in  $g_{00} = 1 - 2G\Sigma m_e / (c^2 r)$  but quantized in galaxy halos because of summed  $N = -1$  in  $1 - 2G\Sigma m_e / c^2 r = g_{00} = \text{Newpde asymptotic } N = 0 \ \kappa_{00}$  in the halos at least for circular motion (ie.  $mv^2/r = GMm/r^2$ ) creating a quantized metric. This "leap frog-composition" property makes it so that the observer is observing the next smaller fractal scale  $N = -1$  'observables' by simultaneously observing  $N = 1$  even though it is a larger fractal scale than  $N < 1$  allowing us to be 'observers' of the cosmos ( $N = 1$ ) as well.

### Scale Jump

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 with the C noising giving us our fractal universe.

### C Is Also Noise

Recall again we got from eq.3  $\delta z + \delta z \delta z = C$  with quadratic equation result:



$\delta z = \frac{-1 \pm \sqrt{1-4C}}{2}$ . is real for noise  $C < 1/4$  creating our noise on the  $N=0$  th fractal scale. So  $1/4 = (3/2)kT/(m_p c^2)$ . So T is 20MK. So here we have *derived the average temperature of the universe* (stellar average). That  $z'=1+\delta z$  substitution also introduces Lorentz transformation rotational and translation noise that does not effect the number of splits, analogous to how a homeomorphism does not change the number of holes (which is a Topological invariant). So the excess C noise (due to that small C' boost) causes the Feigenbaum point neighborhood internal structure to become randomized (as our boost scene is then) but the number of electrons ( $10^{82}$ ) remains invariant. See appendix D mixed state case2 for further organizational effects.

#### FractalDimension

$N=r^D$ . So the **fractal dimension** =  $D = \log N / \log r = \log(\text{splits}) / \log(\#r_H \text{ in scale jump})$   
 $= \log 10^{80} / \log 10^{40} = \log(10^{40})^2 / \log(10^{40}) = 2$ . (See appendix E for Hausdorf dimension & measure) which is the same as the 2D of eq.4 and the Mandelbrot set. The next smaller (subatomic) fractal scale  $r_1=r_H=2e^2/m_e c^2$ ,  $N=0$ th,  $r_2=r_H=2GM/c^2$  is defined as the  $N=1$  th where  $M=10^{82}m_e$  with  $r_2=10^{40}r_1$  So the Feigenbaum pt. gave us a lot of physics:

eg. **#of electrons in the universe, the universe size, temp.** With  $10^{82}$  electrons between any two fractal scales we are also *certainly allowed objects B&C* in the Newpde  $2P_{2/3}$  state at  $r=r_H$ .

#### Intuitive Notion (of postulate 0 $\Leftrightarrow$ Newpde+Copenhagen stuff)

The Mandelbrot set introduces that  $r_H = C_M / \xi_1$  horizon in  $\kappa_{oo} = 1 - r_H / r$  in the Newpde, where  $C_M$  is fractal by  $10^{40} X$  scale change (fig.2). So we have found ([davidmaker.com](http://davidmaker.com)) that: Given that fractal selfsimilarity astronomers are observing from the inside of what particle physicists are studying from the outside, that **ONE New pde e** electron  $r_H$ , **one** thing (fig.1). *Everything* we observe big (cosmological) and small (subatomic) is then that (*New pde*)  $r_H$ , even baryons are composite **3e**. So we understand, *everything*. This is the only Occam's razor first principles theory.

**Summary:** So instead of doing the usual powers of 10 simulation we do a single power of  $10^{40}$  simulation and we are immediately back to where we started!

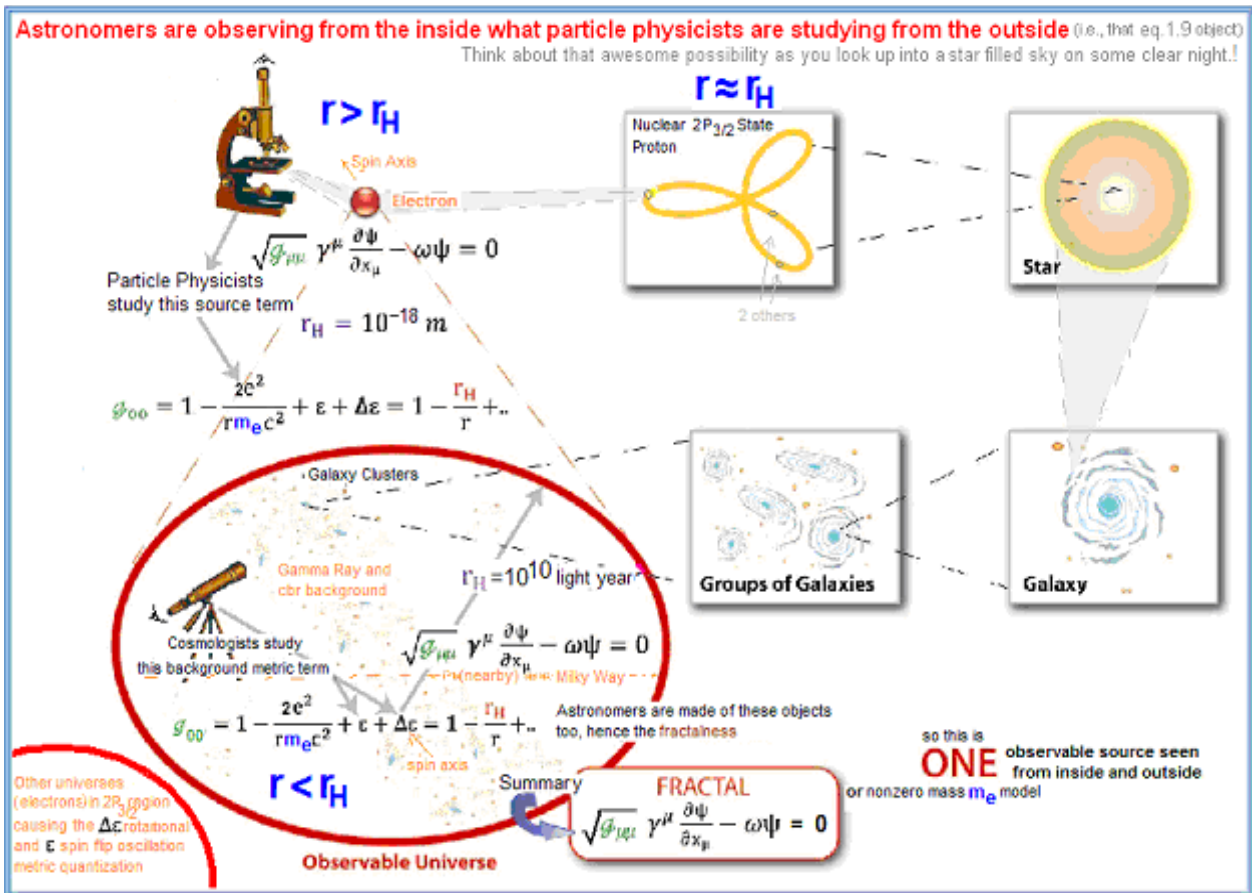


fig2.

(↑lowest left corner) Object C  $g_{00}=\kappa_{00}$  caused caused metric quantization jumps: Reyleigh Taylor->galaxy->globular->protostar nebula,etc. X100 scale change metric quantization jumps (PartIII)

## This theory is 0

**Define0:** numbers  $1=1+0$  in  $0=0X0$ ,  $1=1X1$  as symbol  $z=zz$  (algebraic definition of 0). Also

**Postulate real number 0 if  $z'=0$  and  $z'=1$  plugged into  $z'=z'z'+C$  (eq.1) results in some  $C=0$  constant (ie  $\delta C=0$ ).**

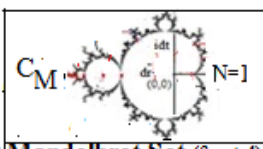
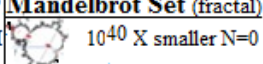
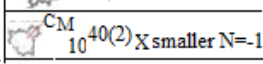
.so

**Plug  $z'=0$  into eq.1** get 2D **Mandelbrot** set iteration and **rel0** (with  $10^{40N}$  fractal scaling,  $N$ =integer)

**Plug  $z'=1$  into eq.1** get 2D **Dirac** equation (Pluggin gives Minkowski metric and Clifford algebra so Dirac eq.)

## Mandelbrot and Dirac

( $\delta z$  observability(eq.11)) as 3D orthogonalization is QM  
 Newpde  $\equiv \gamma^\mu (\sqrt{\kappa_{\mu\mu}}) \partial \psi / \partial x_\mu = (\omega/c) \psi$  for  $e, \nu$ ,  $\kappa_{00} = e^{i(2\Delta\epsilon/(1-2\epsilon))} - r_H/r$ ,  $\kappa_{rr} = 1/(1+2\Delta\epsilon - r_H/r)$ ,  
 $r_H = C_M / \xi = e^2 \times 10^{40N} / m$  ( $N = -1, 0, 1, \dots$ )  $\Delta\epsilon = 0$  for neutrino  $\nu$  and  $N = -1$

<b>Spherical Harmonic Solutions to Newpde: <math>2P_{3/2}, 1S_{1/2}, 2S_{1/2}</math> at <math>r=r_H</math> Stable <math>2P_{3/2}</math> at <math>r=r_H</math></b>	
$N=0$ at $r=r_H$ $2P_{3/2}$ $3e$ baryons (QCD not required) Hund's rule $1S_{1/2}, 2S_{1/2}$ leptons (Koidé)	
4 SM Bosons from 4 axis extreme rotations of $e, \nu$ .	
$N=-1$ (i.e., $e^2 \times 10^{-40} \equiv Gm_e^2$ ). $\kappa_j$ is then by inspection the Schwarzschild metric $g_{\mu\nu}$ (For $N=-1, \Delta z \ll 1$ ). So we just derived General Relativity (GR) and the gravity constant $G$ from Quantum Mechanics (QM) in one line.	
$N=1$ Newpde zitterwegung expansion stage is the cosmological expansion.	
$N=1$ Zitterbewegung harmonic coordinates and Minkowski metric submanifold (after long time expansion) gets the DeSitter ambient metric we observe.	
$N=0$ The third order Taylor expansion (terms) in $\sqrt{\kappa_j}$ gives the anomalous gyromagnetic ratio and Lamb shift <i>without</i> the renormalization and infinities.	
So $\kappa_{\mu\nu}$ provides the general covariance of the Newpde.	
So we got all of physics here by <i>mere inspection</i> of this Newpde with no gauges!	
	
	
	

• **Conclusion:** So by merely (plugging 0,1 into eq.1) **postulating 0**, out pops the whole universe, BOOM! easily the most important discovery ever made or that will ever be made again. We finally figured it out.

## References

- (6) Penrose in a utube video implied that the Mandelbrot set might contain physics. Here we merely showed how to find it. For example the (fractal Mandelbulb neighborhood area  $|drdt| > 0$  of the) Feigenbaum point is a subset (containing that  $10^{40}$  X selfsimilar scale jump: Fig1)
- (7) Cantor: Ueber die Ausdehnung eines Satzes aus der Theorie der trigonometrischen Reihen, "Ueber eine elementare Frage der Mannigfaltigkeitslehre" Jahresbericht der Deutschen Mathematiker-Vereinigung." Cantor proved the real# were dense with a binary # (1,0) argument (Our  $z=zz$  solutions also implying 11c and appendix F). Thus we capture all the core real# properties with postulate0
- (8) Tensor Analysis, Sokolnikoff, John Wiley
- (9) The Principle of Relativity, A Einstein, Dover
- (10) Quantum Mechanics, Merzbacher, John Wiley
- (11) lemniscate circle sequence (Wolfram, Weisstein, Eric)
- (12) Quantum Mechanics, Merzbacher 2<sup>nd</sup> edition pp.605-607
- (13) <http://www.youtube.com/watch?v=0jGaio87u3A>

## Fractal Scales N in eq.20 Newpde

$N=1$  observer (eq.17,18,19 gives our Newpde metric  $\kappa_{\mu\nu}$  at  $r < r_H, r > r_H$ )

Found General Relativity (GR) GR from eq.17- eq.19 so Schwarzschild metric and so can do a dyadic coordinate transformation on it to get the Kerr metric and all these free space metrics to get all the solutions to  $R_{ij}=0$ . so generate the Ricci tensor.

$N=-1$ ,  $e^2 10^{40(-1)} = e^2 / 10^{40} = Gm_e^2$ , solve for  $G$ , get GR. So we can now write the Ricci tensor  $R_{\mu\nu}$  (and fractally self similar perturbation Kerr metric since frame dragging decreased by external object B, sect.B2). Also for fractal scale  $N=0$ ,  $r_H = 2e^2 / m_e c^2$ , and for  $N=-1$   $r'_H = 2Gm_e / c^2 = 10^{-40} r_H$ .

**D=5 if using  $N=-1$ , and  $N=0, N=1$  contributions in same  $R_{ij}=0$**

Note the  $N=-1$  (GR) is yet another  $\delta z$  perturbation of  $N=0$   $\delta z'$  perturbation of  $N=1$  observer thereby adding, if these scales share the same time coordinate, at least 1 independent parameter tiny (wrapped up) dimension added to our  $\delta z + (dx_1 + idx_2) + (dx_3 + idx_4)$  (4+1) *explaining why Kaluza Klein 5D  $R_{ij}=0$  works so well*: GR is really 5D if  $N=0$  E&M included with  $N=-1$ .

## Object A Fractal mass and N=1 (is) cosmology

From Newpde (eg., eq.1.13 Bjorken and Drell special case)  $i\hbar \frac{\partial \psi}{\partial t} = \frac{\hbar c}{i} \left( \alpha_1 \frac{\partial \psi}{\partial x^1} + \alpha_2 \frac{\partial \psi}{\partial x^2} + \alpha_3 \frac{\partial \psi}{\partial x^3} \right) + \beta m c^2 \psi = H\psi$ . For electron at rest:  $i\hbar \frac{\partial \psi}{\partial t} = \beta m c^2 \psi$  so:  $\delta z = \psi_r = w^r(0) e^{-i\varepsilon_r \frac{m c^2}{\hbar} t}$  ( $\varepsilon_r=+1, r=1,2; \varepsilon_r=-1, r=3,4$ ): This implies an oscillation frequency of  $\omega = m c^2 / \hbar$ . which is fractal here ( $\omega = \omega_0 10^{-40N}$ ). So the eq.16 the 45° line has this  $\omega$  oscillation as a (that eq.7-9  $\delta z$  variation) rotation at radius ds. On our own fractal cosmological scale N=1 we are in the expansion stage of one such oscillation. Thus the fractalness of the Newpde explains cosmology. The next higher cosmological scale is independent (but still connected by relativistic superposition of speeds implying a inverse separation of variables result:  $i\hbar \frac{\partial \psi}{\partial t} = \beta \sum_N (10^{-40N} (\omega t)_{\varepsilon+\Delta\varepsilon}) \psi = \beta \sum_N (10^{-40N} m_{\varepsilon+\Delta\varepsilon} c^2 / \hbar) \psi$ ). For time spans smaller than the expansion time of the universe we can set  $m_\tau = 1$  and  $e^{i\tau} = 1$ . So from Kiode at this time (relative to the tauon) the muon  $= \varepsilon = .05946$ , electron  $\Delta\varepsilon = .0005899/2 = .0002826$  is invariant (A1)

Given this  $\omega$ ,  $\alpha$ ,  $\tau$ ,  $\varepsilon$ ,  $\Delta\varepsilon$  are getting larger with time (See Mercuron equation) B3a. Set average  $e^{(-\varepsilon+\Delta\varepsilon)^2} = \delta |e^{i\tau}|$  Newpde zitterbewegung oscillation but  $\tau$  constant (fig6), doesn't jump by a integer number in observable jumps in cosmological time. We then allow  $1, \varepsilon, \Delta\varepsilon$  to be  $n_1, n_2 \varepsilon, n_3 \Delta\varepsilon$  where these  $n_i$  are integer values whose jumps in  $n$  are observable in  $e^{i(\varepsilon+\Delta\varepsilon)}$  in ( $\sqrt{\kappa_r} = e^{i(\varepsilon+\Delta\varepsilon)}$ )  $dr'^2 = \kappa_r dr^2 = e^C \kappa_{00} dr^2 = e^{i(-\varepsilon+\Delta\varepsilon)^2} \kappa_{00} dr^2$  (A2)

But seen from inside at N=1  $E = 1/\sqrt{\kappa_{00}} = 1/\sqrt{(1-r_H/r)}$  (B20) then  $r < r_H$  & E becomes imaginary in  $e^{iE t/\hbar} = \delta z = \sqrt{\kappa_{00}} dt = e^{-i\varepsilon_r \frac{m c^2}{\hbar} t} dt \rightarrow e^{(-n_2 \varepsilon + \Delta\varepsilon n_3) dt}$  (A2)

The negative sign from equation B2a below. The reduced mass ground state rotater ( $\Delta\varepsilon$ ) for  $\varepsilon$  for this  $\kappa_{00}$  part of derivation). This  $n_2=1, n_3=1$  then  $e^{i2\Delta\varepsilon/(1-2\varepsilon)} = \kappa_{00}$  asymptotic value must be equal to  $g_{00}$  in galaxy halos in the plane of the galaxy (sect.11.4). Ricci tensor is given by oscillating source.

### 'Observer' scale N > M 'observables' scale.

Recall from sect.1 if our scale  $N > M$  for some object then N is the observer scale and M is the 'observable' scale. Note the scale difference can be very small. Since we are all electrons that means a slightly smaller scale electron is the observable. But this seems to eliminate astronomy as observation of 'observables' since those objects exist at a *larger* scale  $N=1$ . But not to the  $N=2$  scale (the 'gid' scale as I call it) since to him( $N=2$ ) the  $N=1$  astronomy scale is an 'observable' scale since  $N=2 > N=1$ .

### A2 Two perturbations of the N=1 scale as seen by N=2

We also have two perturbations of the N=1 scale here. The first perturbation is due to the Dirac equation object A zitterbewegung harmonic oscillation (which equivalently could be the source or the manifold). Recall in that regard Weinberg (eg., eq 10.1.9 "Gravitation & Cosmology") calls it a "harmonic coordinate system" (here as eq.1.13 Bjorken and Drell) thereby also providing our manifold in that 2<sup>nd</sup> case. The second much smaller perturbation is due to the drop in inertial frame dragging due to nearby object B. (So 3 objects in this  $N=1$   $2P_{3/2} 3e$  cosmological proton A,B,C.). Appendix C derives the effects of object C.

### Ricci tensor source term for interior to object A

In that regard the Ricci tensor  $= R_{ij} = -(1/2)\Delta(g_{ij})$  (where  $\Delta$  is the Laplace-Beltrami second derivative operator) is not zero and the right side is the metric source. Recall limit  $R_{ij}$  as  $r \rightarrow 0$  is the source, where alternatively gravity creates gravity feedback loop in the Einstein equations

which becomes the modulation of the DeSitter ball implied by the zitterbewegung oscillation of object A. Geometrically, the Ricci curvature is the mathematical object that controls the (comoving *observer*) *growth rate of the volume* of metric balls in a manifold in this case given by the New pde source zitterbewegung. Thus the above Laplace Beltrami source eq. A2  $-\sin\omega t \equiv -\sin\mu \approx -\sin\varepsilon$  here comes out of the Newpde zitterbewegung A2.

**N=2 ‘observer’ sees what we see if  $i \rightarrow 1$  in  $\sin\mu \rightarrow \sinh\mu$  in  $R_{22} = -\sinh\mu$ :** which makes our N=1 ‘observables’.

But  $R_{22} = e^{-\lambda} [1 + \frac{1}{2} r(\mu' - \nu')] - 1$  with  $\mu = \nu$  (spherical symmetry) and  $\mu' = -\nu'$ . So as  $r \rightarrow 0$ ,  $\text{Im}R_{22} = \text{Im}(e^\mu - 1) = \mu + \dots = \sin\mu = \mu + \dots$  for outside  $r_H$  imaginary  $\mu$  for small  $r$  (at the source) so zitterbewegung  $\sin\mu$  becomes a gravitational source (alternatively gravity itself can create gravity in a feedback mechanism). The N=2 observer then multiplies by  $i$  in  $R_{22}$ ,  $-i\sin\mu$  and  $\mu$  to get  $R_{22} = -\sinh\mu$  (A2A)

to see what the N=2 observer sees that we see inside  $r_H$  so:

$R_{22} = e^{-\nu} [1 + \frac{1}{2} r(\mu' - \nu')] - 1 = -\sinh\nu = -(e^\nu - e^{-\nu})/2$ ,  $\nu' = -\mu'$  so  $(e^\mu - 1) = -\sinh\mu$  for positive  $\mu$  in  $\sinh\mu$  then the  $\mu = \varepsilon$  in the  $e^\mu$  on the left is negative (A2B).

Object B mostly contributes to  $\mu'$  in  $-r\mu\omega$ , with object C providing a tiny perturbation of  $\mu'$ , implying there is no such positive  $\sinh\mu$  constraint for object C. Thus the object C *perturbation*  $\mu_c$  in  $e^{\mu_c}$  coefficient can be positive or negative

$e^{-\mu} [-r(\mu')] = -\sinh\mu - e^{-\mu} + 1 = -(e^{-\mu} + e^\mu)/2 - e^{-\mu} + 1 = -(e^{-\mu} + e^\mu)/2 + 1 = -\cosh\mu + 1$ . So given  $\nu' = -\mu'$

$e^{-\nu} [-r(\mu')] = 1 - \cosh\mu$ . Thus

$e^{-\mu} r(d\mu/dr) = 1 - \cosh\mu$

This can be rewritten as:

$$e^\mu d\mu / (1 - \cosh\mu) = dr/r$$

We set the phase  $\mu$  so that when  $t=0$  then  $r=0$  so use  $r = \sin\omega t$  in eq. A1. Given the fractal universe a temporarily comoving proper frame at minimum radius lowest  $\gamma$  must imply a  $\mu$  Mandelbulb chord  $45^\circ$  intersection that implies minimally the Newpde ground state (Which can't go away analogously as for a hydrogen atom orbital electron.)  $\Delta\varepsilon$  electron for comoving outside observer where then at time=0, in B1, B2  $\tau - \varepsilon \approx \omega t = \Delta\varepsilon \approx 1 - 1 = 0$  so that  $\omega t = \Delta\varepsilon$  when  $\sin\omega t \approx 0$ . So the integration of B3 is from  $\xi_1 = \mu = \varepsilon = 1$  to the present day mass of the  $\mu = m_{\text{muon}} = .05946$  (X tauon mass) giving us:

$$\ln(r_{M+1}/r_{bb}) + 2 = [1/(e^\mu - 1) - \ln[e^\mu - 1]]/2 \quad (\text{A3C})$$

implying  $g_r = \varepsilon/2m\varepsilon(1 + m\varepsilon)$  gyromagnetic ratio ( $\mu = m$ ) is changing with time as was discovered recently at Fermi lab 2023 (Ch.7) with CERN 1974 gr muon data for comparison.

## A2 Writing The feedback mechanism two different ways

### Introduction to $\Delta\varepsilon$ contribution to what N=2 sees

We have two perturbations, one due to the zitterbewegung and a smaller one due to the drop in inertial frame dragging due to nearby object B.

So inside object A we can include the zitterbewegung oscillation  $\delta Z = \sqrt{\kappa_{00}} dt = e^{-i\varepsilon r \frac{mc^2}{\hbar} t} dt \rightarrow e^{(-\varepsilon + \Delta\varepsilon)^2 dt}$  in the source as  $-\sinh\mu = R_{22}$

Alternatively zitterbewegung oscillation  $\delta Z = \sqrt{\kappa_{00}} dt = e^{-i\varepsilon r \frac{mc^2}{\hbar} t} dt \rightarrow e^{(-\varepsilon + \Delta\varepsilon)^2 dt}$ , with  $r \rightarrow \infty$ ,  $g_{\alpha\alpha} \rightarrow \text{constant} \neq 1$ , can be the manifold itself, so relative to this manifold the motion is flat space so sourceless. Thereby we set  $R_{22} = -\sinh\mu = 0$  with  $R_{\alpha\alpha} = 0$ .

So these 2 perturbations then give the N=1 contribution to what N=2 sees.

## N=2 sees local interior contribution of object A

### Object B N=1 ambient metric C=constant (nonrotating)

From eqs 17-19 but with ambient metric ansatz:  $ds^2 = -e^\lambda (dr)^2 - r^2 d\theta^2 - r^2 \sin^2 \theta d\phi^2 + e^\mu dt^2$  (A3)

so that  $g_{\theta\theta} = e^\mu$ ,  $g_{rr} = e^\lambda$ . From eq.  $R_{ij} = 0$  for spherical symmetry in free space and  $N=0$

$$R_{11} = \frac{1}{2}\mu'' - \frac{1}{4}\lambda' \mu' + \frac{1}{4}(\mu')^2 - \lambda'/r = 0 \quad (\text{A4})$$

$$R_{22} = e^{-\lambda} [1 + \frac{1}{2} r(\mu' - \lambda')] - 1 = 0 \quad (\text{A5})$$

$$R_{33} = \sin^2 \theta \{ e^{-\lambda} [1 + \frac{1}{2} r(\mu' - \lambda')] - 1 \} = 0 \quad (\text{A6})$$

$$R_{00} = e^{\mu-\lambda} [-\frac{1}{2}\mu'' + \frac{1}{4}\lambda' \mu' - \frac{1}{4}(\mu')^2 - \mu'/r] = 0 \quad (\text{A7})$$

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

(eq. A4-A7 from pp.303 Sokolnikof(8)): Equation A4 is a mere repetition of equation A6. We thus have only three equations on  $\lambda$  and  $\mu$  to consider. From equations A4, A7 we deduce that  $\lambda' = -\mu'$  so that radial  $\lambda = -\mu + \text{constant} = -\mu + C$  where  $C$  represents a possible  $\sim$ constant ambient metric contribution which (allowing us to set  $\sinh \mu = 0$ ) could be imaginary in the case of the slowly oscillating ambient metric of nearby object B from B2. So  $e^{-\mu+C} = e^\lambda$ . Then A3-A7 can be written as:

$$e^{-C} e^\mu (1 + r\mu') = 1. \quad (\text{A9})$$

Set  $e^\mu = \gamma$ . So  $e^{-\lambda} = \gamma e^{-C}$   $\varepsilon$  and  $\Delta\varepsilon$  are time dependent. So integrating this first order equation

(equation A9) we get:  $\gamma = -2m/r + e^C \equiv e^\mu = g_{00}$  and  $e^{-\lambda} = (-2m/r + e^C) e^{-C} = 1/g_{rr}$

or  $e^{-\lambda} = 1/\kappa_{rr} = 1/(1-2m'/r)$ ,  $2m/r + e^C = \kappa_{00}$ . With (reduced mass ground state rotator ( $\Delta\varepsilon$ ) for charged if  $-\varepsilon$ )  $dr$  zitterbewegung from B1  $\kappa_{rr} dr^2 = e^C \kappa_{00} dr'^2 = e^{i(-\varepsilon + \Delta\varepsilon)^2} \kappa_{00} dr'^2$  from A2. We found

$$\kappa_{00} = e^C - 2m/r = e^{i(-\varepsilon + \Delta\varepsilon)^2} - 2m/r \quad (\text{A10})$$

$\Delta\varepsilon$  here is reduced ground state mass  $\Delta\varepsilon$  as in Schrodinger eq  $E = \Delta\varepsilon = 1/\sqrt{\kappa_{00}}$ . (A10a)

does not add anything to  $r_H/r$  in  $\kappa_{rr}$  since  $e^C$  is not added to  $r_H/r$  there.

## Appendix B Object B

Add **Perturbative Kerr rotation (a/r)<sup>2</sup>** to  $r_H/r$  in  $\kappa_{rr}$  Here nothing gets added to  $r_H/r$  in

$\kappa_{00}$

Our new pde has spin  $S=1/2$  and so the self similar ambient metric on the  $N=0$  th fractal scale is the Kerr metric which contains those ambient metric **perturbation rotations** ( $d\theta dt$  T violation so (given CPT) then **CP violation**) due to object B caused drop in inertial frame dragging in object A

$$ds^2 = \rho^2 \left( \frac{dr^2}{\Delta} + d\theta^2 \right) + (r^2 + a^2) \sin^2 \theta d\phi^2 - c^2 dt^2 + \frac{2mr}{\rho^2} (a \sin^2 \theta d\theta - c dt)^2, \quad (\text{B1})$$

where  $\rho^2(r, \theta) \equiv r^2 + a^2 \cos^2 \theta$ ;  $\Delta(r) \equiv r^2 - 2mr + a^2$ , In our 2D  $d\phi=0$ ,  $d\theta=0$  Define:

$$\left( \frac{r^2 + a^2 \cos^2 \theta}{r^2 - 2mr + a^2} \right) dr^2 + \left( 1 - \frac{2m}{r^2 + a^2 \cos^2 \theta} \right) dt^2 \quad \theta \neq 0$$

$\rho^2(r, \theta) \equiv r^2 + a^2 \cos^2 \theta$ ;  $\Delta(r) \equiv r^2 - 2mr + a^2$ ,  $r^{\wedge 2} \equiv r^2 + a^2 \cos^2 \theta$ ,  $r'^2 \equiv r^2 + a^2$ . Inside  $r_H$   $a \ll r$ ,  $r \gg 2m$

$$\left( \frac{(r')^2}{(r')^2 - 2mr} \right) dr^2 + \left( 1 - \frac{2mr}{(r')^2} \right) dt^2 + \dots = \left( \frac{1}{(r')^2} \frac{2mr}{(r')^2} \right) dr^2 + \left( 1 - \frac{2mr}{(r')^2} \right) dt^2.$$

The  $(r'/r)^2$  term is  $\frac{(r')^2}{(r')^2} = \frac{r^2 + a^2}{r^2 + a^2 \cos^2 \theta} = \frac{1 + \frac{a^2}{r^2}}{1 + \frac{a^2}{r^2} \cos^2 \theta} \approx 1/g_{rr} (\approx g_{00})$

$$= \left(1 + \frac{a^2}{r^2}\right) \left(1 - \frac{a^2}{r^2} \cos^2 \theta\right) + \dots = 1 - \frac{a^4}{r^4} \cos^2 \theta - \frac{a^2}{r^2} \cos^2 \theta + \frac{a^2}{r^2} + \dots = 1 + \frac{a^2}{r^2} (1 - \cos^2 \theta) + \dots = 1 + \frac{a^2}{r^2} \sin^2 \theta + \dots \equiv 1 + \left(\frac{a}{r}\right)^2 u^2 = \left(\text{from fig. 6 mass} = \frac{C_M}{\delta z \delta z}\right) = 1 + 2(\varepsilon + \Delta\varepsilon) + \dots \quad (\text{B2})$$

since  $\varepsilon + \Delta\varepsilon$  are time dependent, and add  $2m/r$  to this  $1 + \varepsilon + \Delta\varepsilon$  at the end.  $\Delta\varepsilon$  is *total* (Mandlebulb) mass as in  $C_M/(\delta z \delta z) = (a/r)^2$  in fig6 contributing to inertial frame dragging drop

We can normalize out  $1 + \varepsilon$  over a region we know it is (at least approximately) a constant. That in turn makes the metric coefficients at  $r \gg 0$  flat which is what they should be. In contrast rotation adds to  $\kappa_{rr}$  (B2) and only oblates  $2m/r$  in  $\kappa_{\theta\theta}$ .

**Summary:** Our Newpde metric including the effect of object B (with  $\tau + \mu = 2m_p = \xi_{1.}$ ) is for the  $\tau + \mu + e$  Kiode

$$\tau + \mu \text{ in free space } r_H = e^2 10^{40(0)} / 2m_p c^2, \kappa_{00} = e^{i(2\Delta\varepsilon/(1-2\varepsilon))} r_H / r, \kappa_{rr} = 1 + 2\Delta\varepsilon / (1 + \varepsilon) r_H / r \text{ Leptons} \quad (\text{B3})$$

$$\tau + \mu \text{ on } 2P_{3/2} \text{ sphere at } r_H = r, r_H = e^2 10^{40(0)} / 2m_e c^2, \text{comoving with } \gamma = m_p / m_e. \text{ Baryons, part2} \quad (\text{B4})$$

Imaginary  $i\Delta\varepsilon$  in this cosmological background metric  $\kappa_{00} = e^{i\Delta\varepsilon}$  B13 makes no contribution to the Lamb shift but is the core of partIII cosmological application  $g_{\theta\theta} = \kappa_{\theta\theta}$  of eq B13 of this paper.

## B1 N=0 eq.B3 Application example: anomalous gyromagnetic ratio Separation Of Variables On New Pde.

After separation of variables the “r” component of Newpde can be written as:

$$\left[ \left( \frac{dt}{ds} \sqrt{\kappa_{00}} m_p \right) + m_p \right] F - \hbar c \left( \sqrt{\kappa_{rr}} \frac{d}{dr} + \frac{j+3/2}{r} \right) f = 0 \quad (\text{B5})$$

$$\left[ \left( \frac{dt}{ds} \sqrt{\kappa_{00}} m_p \right) - m_p \right] f + \hbar c \left( \sqrt{\kappa_{rr}} \frac{d}{dr} - \frac{j-1/2}{r} \right) F = 0. \quad (\text{B6})$$

Using the above Dirac equation component we find the anomalous gyromagnetic ratio  $\Delta g_y$  for the spin polarized  $F=0$  case. Recall the usual calculation of rate of the change of spin  $S$  gives  $dS/dt \propto m \propto g_y J$  from the Heisenberg equations of motion. We note that  $1/\sqrt{\kappa_{rr}}$  rescales  $dr$  in  $\left( \sqrt{\kappa_{rr}} \frac{d}{dr} + \frac{j+3/2}{r} \right) f$  in equation B5 with  $\kappa_{rr}$  from B3. Thus to have the same rescaling of  $r$  in the second term we must multiply the second term denominator (i.e.,  $r$ ) and numerator (i.e.,  $J+3/2$ ) each by  $1/\sqrt{\kappa_{rr}}$  and set the numerator ansatz equal to  $(j+3/2)/\sqrt{\kappa_{rr}} \equiv 3/2 + J(g_y)$ , where  $g_y$  is now the gyromagnetic ratio. This makes our equation B5, B6 compatible with the standard Dirac equation allowing us to substitute the  $g_y$  into the Heisenberg equations of motion for spin  $S$ :  $dS/dt \propto m \propto g_y J$  to find the correction to  $dS/dt$ . Thus again:

$$\begin{aligned} [1/\sqrt{\kappa_{rr}}] (3/2 + J) &= 3/2 + J g_y, \text{ Therefore for } J = 1/2 \text{ we have:} \\ [1/\sqrt{\kappa_{rr}}] (3/2 + 1/2) &= 3/2 + 1/2 g_y = 3/2 + 1/2 (1 + \Delta g_y) \end{aligned} \quad (\text{B7})$$

Then we solve for  $\Delta g_y$  and substitute it into the above  $dS/dt$  equation.

Thus solve eq. B7 with Eq.A1 values in  $\sqrt{\kappa_{rr}} = 1/\sqrt{(1+2\Delta\varepsilon/(1+\varepsilon))} = 1/\sqrt{(1+2\Delta\varepsilon/(1+0))} = 1/\sqrt{(1+2 \times 0.0002826/1)}$ . Thus from equation B1:

$[1/\sqrt{(1+2 \times 0.0002826)}] (3/2 + 1/2) = 3/2 + 1/2 (1 + \Delta g_y)$ . Solving for  $\Delta g_y$  gives anomalous **gyromagnetic ratio correction of the electron**  $\Delta g_y = .00116$ .

If we set  $\varepsilon \neq 0$  (so  $\Delta\varepsilon/(1+\varepsilon)$ ) instead of  $\Delta\varepsilon$ ) in the same  $\kappa_{\theta\theta}$  in Newpde we get the anomalous **gyromagnetic ratio correction of the muon** in the same way.

**Composite 3e: Meisner effect For B just outside  $r_H$ . (where the zero point energy particle eq. 9.22 is  $.08 = \pi^\pm$ ) See A4**

Composite 3e CASE 1: Plus +r<sub>H</sub>, therefore is the proton + charge component. Eq.A4:  $1/\kappa_{rr} = 1+r_H/r_H + \varepsilon'' = 2 + \varepsilon''$ .  $\varepsilon'' = .08$  (eq.9.22). Thus from eq.B17  $\sqrt{2 + \varepsilon''}(1.5+.5)=1.5+.5(\text{gy})$ ,  $\text{gy}=2.8$

### The gyromagnetic ratio of the proton

Composite 3e CASE 2: negative r<sub>H</sub>, thus charge cancels, zero charge:

$$1/\kappa_{rr} = 1-r_H/r_H + \varepsilon'' = \varepsilon'' \quad \text{Therefore from equation B7 and case 1 eq.A3 } 1/\kappa_{rr} = 1-r_H/r_H + \varepsilon''$$

$$\sqrt{\varepsilon''} (1.5+.5)=1.5+.5(\text{gy}), \text{gy}=-1.9.$$

the **gyromagnetic ratio of the neutron** with the other charged and those ortho neutral hyperon magnetic moments scaled using their masses by these values respectively.

### A4 eq.B3 $\kappa_{00}$ application example: Lamb shift

After separation of variables the “r” component of Newpde can be written as

$$\left[ \left( \frac{dt}{ds} \sqrt{\kappa_{00}} m_p \right) + m_p \right] F - \hbar c \left( \sqrt{\kappa_{rr}} \frac{d}{dr} + \frac{j+3/2}{r} \right) f = 0 \quad \text{B8}$$

$$\left[ \left( \frac{dt}{ds} \sqrt{\kappa_{00}} m_p \right) - m_p \right] f + \hbar c \left( \sqrt{\kappa_{rr}} \frac{d}{dr} - \frac{j-1/2}{r} \right) F = 0. \quad \text{B9}$$

Comparing the flat space-time Dirac equation to the left side terms of equations B8 and B9:

$$(dt/ds)\sqrt{\kappa_{00}}=(1/\kappa_{00})\sqrt{\kappa_{00}}=(1/\sqrt{\kappa_{00}})=\text{Energy}=E \quad \text{B10}$$

We have normalized out the  $e^c$  in equation B10 to get the pure measured  $r_H/r$  coupling relative to a laboratory flat background given thereby in that case by  $\kappa_{00}$  under the square root in equation B10.

Note for electron motion around hydrogen proton  $mv^2/r=ke^2/r^2$  so  $KE=1/2mv^2=(1/2)ke^2/r=PE$  potential energy in  $PE+KE=E$ . So for the electron (but not the tauon or muon that are not in this orbit)  $PE_e=1/2e^2/r$ . Write the hydrogen energy and pull out the electron contribution B10a. So in eq.B2 and B8  $r_H=(1+1+.5)e^2/(m_\tau+m_\mu+m_e)/2=2.5e^2/(2m_p c^2)$ . B11

#### Variation $\delta(\psi^*\psi)=0$ At $r=n^2 a_0$

Next note for the variation in  $\psi^*\psi$  is equal to zero at maximum  $\psi^*\psi$  probability density where for the hydrogen atom is at  $r=n^2 a_0=4a_0$  for  $n=2$  and the  $\psi_{2,0,0}$  eigenfunction. Also recall eqA4 eq.11a  $\xi_1=m_L c^2=(m_\tau+m_\mu+m_e)c^2=2m_p c^2$  normalizes  $1/2ke^2$  (Thus divide  $\tau+\mu$  by 2 and then multiply the whole line by 2 to normalize the  $m_e/2$ .result.  $\varepsilon=0$  since no muon  $\varepsilon$  here.): Recall in eq.11a  $\xi_0$  has to be pulled in a Taylor expansion as an operator since it a separate observable. So substituting eqs.B1 for  $\kappa_{00}$ , values in eq.B10:

$$E_e = \frac{(tauon+muon)\left(\frac{1}{2}\right)}{\sqrt{1-\frac{r_H}{r}}} - (tauon + muon + PE_\tau + PE_\mu - m_e c^2) \frac{1}{2} =$$

$$2(m_\tau c^2 + m_\mu c^2) \frac{1}{2} + 2 \frac{m_e c^2}{2} + 2 \frac{2.5e^2}{2r(m_L c^2)} m_L c^2 - 2 \frac{2e^2}{2r(m_L c^2)} m_L c^2 - 2 \frac{3}{8} \left( \frac{2.5e^2}{r m_L c^2} \right)^2 m_L c^2$$

$$- 2(m_\tau c^2 + m_\mu c^2) \frac{1}{2}$$

$$= \frac{2m_e c^2}{2} + 2 \frac{e^2}{4r} - 2 \frac{3}{8} \left( \frac{2.5}{r m_L c^2} \right)^2 m_L c^2 = m_e c^2 + \frac{e^2}{2r} - 2 \frac{3}{8} \left( \frac{2.5e^2}{r m_L c^2} \right)^2 m_L c^2$$

So:  $\Delta E_e = 2 \frac{3}{8} \left( \frac{2.5}{r m_L c^2} \right)^2 m_L c^2 =$  (Third order  $\sqrt{\kappa_{\mu\mu}}$  Taylor expansion term)=

$$\Delta E = 2 \frac{3}{8} \left[ \frac{2.5(8.89 \times 10^9)(1.602 \times 10^{-19})^2}{(4(.53 \times 10^{-10}))^2((1.67 \times 10^{-27})(3 \times 10^8))^2} \right]^2 (2(1.67 \times 10^{-27})(3 \times 10^8))^2$$

= $hf=6.626 \times 10^{-34} \times 27,360,000$  so that  $f=27\text{MHz}$  Lamb shift.

The other 1050Mhz comes from the zitterbewegung cloud.



Note: Need infinities if **flat space Dirac 1928 equation**. For flat space  $\partial g_{ik}/\partial x^j = 0$  as a limit. Then must take field  $g^{km} = 1/0 = \infty$  to get finite Christoffel symbol  $\Gamma^m_{ij} \equiv (g^{km}/2)(\partial g_{ik}/\partial x^j + \partial g_{jk}/\partial x^i - \partial g_{ij}/\partial x^k) = (1/0)(0) = \text{undefined}$  but still implying *nonzero* acceleration on the left side of the

geodesic equation:  $\frac{d^2 x^\mu}{ds^2} = -\Gamma^\mu_{\nu\lambda} \frac{dx^\nu}{ds} \frac{dx^\lambda}{ds}$  So we need infinite fields for flat space. Thus QED

requires (many such) infinities. But we have in general curved space  $g_{ij} = \kappa_{ij}$  in the New pde so do not require that anything be infinite and yet we still obtain for the third order Taylor expansion term of  $\sqrt{\kappa_{\mu\nu}}$  the Lamb shift and anomalous gyromagnetic ratio correction (see above sections B3, B4).

So renormalization is a perturbative way (given it's flat space Dirac equation and minimal interaction gauge origins) of calculating these (above) same, *NON* perturbative results, it's a perturbative GR theory. But renormalization gives lots of wrong answers too, eg.,  $10^{96}$  grams/cm<sup>3</sup> vacuum density for starters. (So we drop it here since we don't need it any longer for the high precision QED results.) In contrast note near the end of reference 5 our  $G_{00} = 0$  for a 2D MS. Thus a vacuum really is a vacuum. Also that large  $\xi_1 = \tau(1 + \epsilon')$  in  $r_H$  in eq. B13, 11a is the reason leptons appear point particles (in contrast to the small  $\xi_0$  in the composite 3e baryons).

## B5 eq. B3 $\kappa_{00}$ application example: metric quantization from asymptotic

### $\kappa_{00} = g_{00}$

Given the subatomic fractal scale is dominated by quantum mechanics phenomena in a fractal universe the next higher  $N=1$  fractal scale should bring the QM back: In galaxy halos the Scharzchild metric  $g_{00}$  should equal the background  $N=0$  fractal scale metric  $\kappa_{00}$  at large enough distances. So that  $10^{82} \Sigma \kappa_{00(N=-1)} \equiv g_{00} = \kappa_{00(N=0)}$  (eq. 4.13) with resulting Metric Quantization  $N=1$  result  $g_{00} = \kappa_{00}$  in galaxy halos (eg., replacing need for dark matter) and making  $N=1$  observable since it is made of  $N=-1$  which is observable. Note we have yet to use the  $e^{i(2\Delta\epsilon/(1-2\epsilon))}$  in  $\kappa_{00} = e^{i(2\Delta\epsilon/(1-2\epsilon))} \cdot r_H/r$  of equation B13.  $mv^2/r = GMm/r^2$  is always true (eg., globulars orbiting out of plane) but so is  $g_{00} = \kappa_{00}$  *in the plane* of a flattened galaxy (rotating central black hole planar effect part III). That  $g_{00} = \kappa_{00}$  in the *halo of the Milky Way galaxy* is the fundamental equation of metric quantization. So again  $mv^2/r = GMm/r^2$  so  $GM/r = v^2$  COM in the galaxy halo (circular orbits) ( $1/(1-2\epsilon)$  term from  $\kappa_{00}$  in B13) so

**Pure state  $\Delta\epsilon$**  ( $\epsilon$  excited  $1S_{1/2}$  state of ground state  $\Delta\epsilon$ , so not same state as  $\Delta\epsilon$ )

$\text{Re} \kappa_{00} = \cos \mu$  from B13  $\kappa_{00}$

$$\text{Case 1 } 1 - 2GM/(c^2 r) = 1 - 2(v/c)^2 = 1 - (2\Delta\epsilon/(1-2\epsilon))^2/2 \quad (\text{B12})$$

So  $1 - 2(v/c)^2 = 1 - (2\Delta\epsilon/(1-2\epsilon))^2/2$  so  $=(2\Delta\epsilon/(1-2\epsilon))c/2 = 2 \times 0.0002826 / (1 - (0.05946)^2) (3 \times 10^8) / 2 = 98 \text{ km/sec} \approx 100 \text{ km/sec}$  (Mixed  $\Delta\epsilon, \epsilon$ , states classically here are grand canonical ensembles with nonzero chemical potential.). For ringed (not hub) galaxies the radial value becomes  $100/2 = 50 \text{ km/sec}$ .

Also  $v = (2\Delta\epsilon/(1-2\epsilon))c/2$  so  $v/c = \text{constant}$ .

**Mixed state  $\epsilon\Delta\epsilon$**  (Again  $GM/r = v^2$  so  $2GM/(c^2 r) = 2(v/c)^2$ .)

$$\text{Case 2 } g_{00} = 1 - 2GM/(c^2 r) = \text{Re} \kappa_{00} = \cos[2\Delta\epsilon + \epsilon] = 1 - [\Delta\epsilon + \epsilon]^2/2 = 1 - [(2\Delta\epsilon + \epsilon)^2 / (\Delta\epsilon + \epsilon)^2] / 2 = 1 - [(2\Delta\epsilon^2 + \epsilon^2 + 2\epsilon\Delta\epsilon) / (2\Delta\epsilon + \epsilon)^2]$$

The  $2\Delta\epsilon^2$  is just the above first case (Case 1) so just take the mixed state cross term  $[\epsilon 2\Delta\epsilon/(\epsilon+2\Delta\epsilon)] = c[2\Delta\epsilon/(1+\Delta\epsilon/\epsilon)]/2 = c[2\Delta\epsilon + \Delta\epsilon^2/\epsilon + \dots 2\Delta\epsilon^{N+1}/\epsilon^{N+1}]/2 = \Sigma v_N$ . Note each term in this expansion is itself a (mixed state) operator. So there can't be a single  $v$  in the large gradient 2<sup>nd</sup> case so in the equation just above we can take  $v_N = [2\Delta\epsilon^{N+1}/(2\epsilon^N)]c$ . (B13)

From eq. B23 for example  $v = m100^N \text{km/sec}$ .  $m=2, N=1$  here (Local arm). In part III we list hundreds of examples of B13: (sun, 1,2km/sec, galaxy halos  $m100 \text{km/sec}$ ). The linear mixed state subdivision by this ubiquitous  $\sim 100$  scale change factor in  $r_{bb}$  (due to above object B zitterbewegung spherical Bessel function resonance boundary conditions resulting in nodes) created the voids. Same process for  $N-1$  (so 100X smaller) antinodes get galaxies, 100X smaller: globular clusters, 100X smaller solar systems, etc., So these smaller objects were also created by mixed state metric quantization (eq. B13) resonance oscillation inside initial radius  $r_{bb}$ . We include the effects of that object B drop in inertial frame dragging on the inertial term  $m$  in the Gamow factor and so lower  $Z$  nuclear synthesis at earlier epochs ( $t > 18 \text{by}$ ) BCE. (see part III)

### Appendix C Object C with spinor ansatz for eq.12 (gives ordinary field theory SM)

For the  $N=1$  huge observer  $\delta z \gg \delta z \delta z$  from eq.3. Thus the required  $N=-1, N=0$  tiny observable ( $\delta z' \ll \delta z$ ) is a perturbation of the eq.7  $\delta z \approx dr \approx dt$  at  $45^\circ$   $(dr - \delta z') + (dt + \delta z') \equiv dr' + dt' = ds$  (16)

But for the high energy big  $\delta \delta z$  (extreme "axis" perturbations)  $\delta z$  is small. So finding big  $\delta \delta z$  'observables' requires we artificially stay on the circle (appendix C) implying this additional  $\delta z'$  eq.7 perturbation. These large rotations can then be done as spinor rotations  $\rightarrow$  Pauli matrices  $\rightarrow$  isomorphic to quaternions

So we finally include the orthogonal axis' to orthogonal axis extreme  $ds$  rotations in eq. 16. So on the circle. Recall from sect.1 eq.3 that  $\delta C = \delta(\delta z + \delta z \delta z) = \delta \delta z(1) + \delta \delta z(\delta z) + (\delta z)\delta \delta z = \delta C = 0$  so  $C$  is split between  $\delta \delta z$  noise and  $\delta z \delta z$  and classical  $ds^2$  proper time. Note for  $N=1$   $|\delta z| \gg 1$  and  $C_M \gg 1$ . So eq.5 holds then. But for high energies (like those provided by an accelerator) as  $\gamma$  is boosted observer  $\delta z/\gamma$ ,  $C/\gamma$  gets smaller than the huge  $N=1$  scale (so higher energy, smaller wavelength beam probes)  $\delta \delta z(1)/ds$  noise angle gets relatively larger (relative to  $\delta(\delta z \delta z)/ds$ , sect.1) until finally the next smaller (and next smaller one after that at  $N=-1$ ) is the  $N=0$  fractal scale becomes relatively large.

Large rotation angle  $\delta \delta z/ds$  can then be those large axis'  $ds$  extreme  $\pm 45^\circ$  min  $ds$  and so two possible  $45^\circ$  rotations so through a total of two quadrants for  $\pm \delta z'$  in eq.16. (a single  $\delta z$  just gives  $e, \nu$  back) One such rotation around a axis (SM) and the other around a diagonal (SC).

**These rotations are**

**I  $\rightarrow$  II, II  $\rightarrow$  III, III  $\rightarrow$  IV, IV  $\rightarrow$  I required extremum to eq.16 extremum rotations in eq.7-9 plane Give SM Bosons at high interaction COM energies (where  $\delta \delta z$  gets big).  $N=0$**

Note in fig.3  $dr, dt$  is also a rotation. and so has an eq.11 rotation operator observable  $\theta$ . Thus from equation 11 for  $(\theta)$  angle rotations  $\theta \delta z \equiv (dr/ds)\delta z = -i\partial(\delta z)/\partial r$  for the first  $45^\circ$  rotation. So we got through one Newpde derivative for each  $45^\circ$  rotation. For the next  $45^\circ$  rotation in fig.4 it is then a second derivative  $\theta \theta \delta z' = e^{i0p} e^{i0'} \delta z = e^{i(0p+0')} \delta z = (dr/ds)((dr/ds)dr') = -i\partial(-i\partial(dr'))/\partial r \partial r = -\partial^2(dr')/\partial r^2$  large angle rotation in figure 3. In contrast for  $z=1$ ,  $\delta z'$  small so  $45^\circ-45^\circ$  small angle rotation in figure 3 (so then  $N=-1$ ). Do the same with the time  $t$  and get for  $z=0$  rotation of  $45^\circ+45^\circ$  (fig.4) then  $\theta \theta \delta z' = (d^2/dr^2)z' + (d^2/dt^2)\delta z'$  (C1)

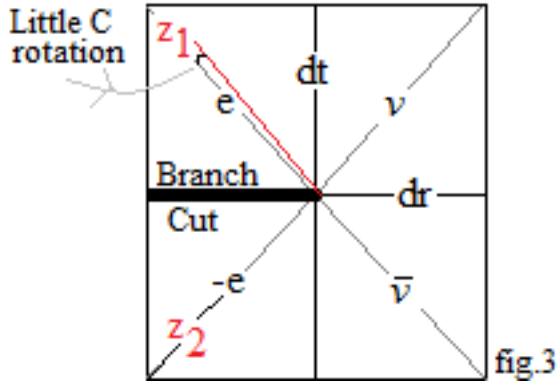


fig.3. for  $45^\circ-45^\circ$  So two body (e,v) singlet  $\Delta S = \frac{1}{2} - \frac{1}{2} = 0$  component so pairing interaction (sect.4.5). Also ortho  $\Delta S = \frac{1}{2} + \frac{1}{2} = 1$  making 2 body (at  $r=r_H$ )  $S=1$  Bosons and so a field theory. Note we also get these Laplacians characteristic of the Boson field equations by those  $45^\circ+45^\circ$  rotations so eq.16 implies Bosons accompany our leptons (given the  $\delta z'$ ), **so these leptons exhibit "force"**.

**Newpde  $r=r_H, z=0, 45^\circ+45^\circ$  rotation of composites e,v implied by Equation 12**

So  $z=0$  allows a large C z rotation application from the 4 different axis' max extremum (of eq.16) branch cuts gives the 4 results: Z,+,-W, photon bosons of the Standard Model. So we have derived the Standard Model of particle physics in this very elegant way (from the four axis'). You are physically at  $r=r_H$  if you rotate through the electron quadrants (I, IV).of eq.7-9. So we have large  $C_M$  dichotomic  $90^\circ$  rotation to the next Reimann surface of eq.12, eq.A1  $(dr^2+dt^2)z''$  from some initial extremum angle(s)  $\theta$ . Eq.16 solutions imply complex 2D plane Stern Gerlach dichotomic rotations using eq.A1 thereby using Pauli matrices  $\sigma_i$  algebra, which maps one-to-one to the quaternion algebra. Using eq.12 we start at some initial angle  $\theta$  and rotate by  $90^\circ$  the noise rotations are:  $C=\delta z'' = [e_L, v_L]^T \equiv \delta z'(\uparrow) + \delta z'(\downarrow) \equiv \psi(\uparrow) + \psi(\downarrow)$  has a eq.12 infinitesimal unitary generator  $\delta z'' \equiv U = 1 - (i/2)\epsilon n \cdot \sigma$ ,  $n = \theta/\epsilon$  in  $ds^2 = U^\dagger U$ . But in the limit  $n \rightarrow \infty$  we find, using elementary calculus, the result  $\exp(-(i/2)\theta \cdot \sigma) = \delta z''$ . We can use any axis as a branch cut since all 4 are eq.20 large extremum so for the 2<sup>nd</sup> rotation we move the branch cut  $90^\circ$  and measure the angle off the next diagonal since Pauli matrix dichotomic rotations are actually axis rotations, leaving our e and v directions the same. In any case  $(dr+dt)z''$  in eq.16 can then be replaced by eq.A1  $(dr^2+dt^2+..) \delta z'' = (dr^2+dt^2+..) e^{\text{quaternion A}}$  Bosons because of eq.C1.

C2 Then use eq. 12 and quaternions to rotate  $\delta z''$  since the quaternion formulation is isomorphic to the Pauli matrices.  $dr' = \delta z_r = \kappa_r dr$  for **Quaternion A**  $\kappa_{ii} = e^{iA_i}$ .

**Possibly large  $\delta \delta z$  in eq.3  $\delta(\delta z + \delta z \delta z) = 0$  so large rotations in eq12** i.e., high energy, tiny  $\sqrt{\kappa_{00}}$  since  $\tau$  normalized to 1 allows formalism for object C

**C1** for the eq.12: large  $\theta = 45^\circ + 45^\circ$  rotation (for  $N=0$  so large  $\delta z' = \theta r_H$ ). Instead of the equation 13,15 formulation of  $\kappa_{ij}$  for small  $\delta z'$  ( $z=1$ ) and large  $\theta = 45^\circ + 45^\circ$  we use  $A_r$  in dr direction with  $dr^2 = dx^2 + dy^2 + dz^2$ . So we can again use 2D  $(dr, dt)$   $E = 1/\sqrt{\kappa_{00}} = 1/\sqrt{e^{iA_i}} = e^{-iA/2}$ . The 1 is mass energy and the first real component after that in the Taylor expansion is field energy  $A^2$ . For 2 particles together the other particle  $\epsilon$  negative means  $r_H$  is also negative. Since it is  $e_1 * e_2 = r_H$ . So  $1/\kappa_r = 1 + (-\epsilon + r_H/r)$  is  $\pm$  and  $1 - (-\epsilon + r_H/r)$  0 charge. (C0)

For baryons with a 3 particle  $r_H/r$  may change sign without third particle  $\epsilon$  changing sign so that at  $r=r_H$ . Can normalize out the background  $\epsilon$  in the denominator of  $E = (\tau + \epsilon) / \sqrt{(1 + \epsilon + \Delta \epsilon - r_H/r)}$  for

Can normalize out the background  $\varepsilon$  in the denominator of  $E=(\tau+\varepsilon)/\sqrt{(1+\varepsilon+\Delta\varepsilon-r_H/r)}$  for small conserved (constant) energies  $1/\sqrt{(1+\varepsilon)}$  and (so  $E=(1/\sqrt{(1+x)})=1-x/2+$ ) large  $r$  (so large  $\lambda$  so not on  $r_H$ ) implies the normalization is:

$E=(\varepsilon+\tau)/\sqrt{((1-\varepsilon/2-\varepsilon/2)/(1\pm\varepsilon/2))}$ ,  $J=0$  para  $e, \nu$  eq.9.23  $\pi^\pm, \pi^0$ . For large  $1/\sqrt{\Delta\varepsilon}$  energies given small  $r=r_H$ , Here  $1+\varepsilon$  is locally constant so can be normalized out as in

$$E=(\varepsilon+\tau)/\sqrt{(1-(\Delta\varepsilon/(1\pm\varepsilon))-r_H/r)}, \text{ for charged if } -, \text{ ortho } e, \nu J=1, W^\pm, Z_0 \quad (11d)$$

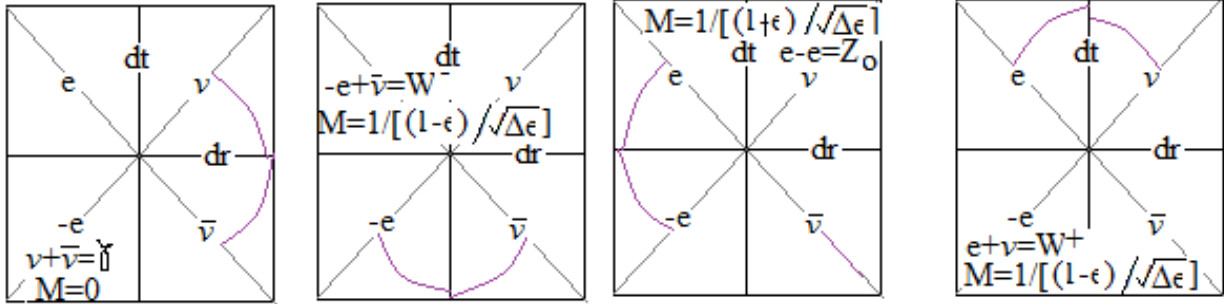


fig4

Fig.4 applies to eq.9  $45^\circ+45^\circ=90^\circ$  case: **Bosons**.

C2 These quadrants were defined in eq.7-9 and used in eq.12. The Appendix C4 derivation applies to the far right side figure. Recall from eq.16  $z=0$  result  $C_M=45^\circ+45^\circ=90^\circ$ , gets Bosons.  $45^\circ-45^\circ=$  leptons. The  $\nu$  in quadrants II(eq.5) and III (eq.9).  $e$  in quadrants I (eq.7) and IV (eq.7). Locally normalize out  $1+\varepsilon$  (appendix D). For the **composite**  $e, \nu$  on those required large  $z=0$  eq.9 rotations for  $C \rightarrow 0$ , and for stability  $r=r_H$  (eg., for  $2P_{1/2}$ ,  $I \rightarrow II$ ,  $III \rightarrow IV$ ,  $IV \rightarrow I$ ) unless  $r_H=0$  ( $II \rightarrow III$ )

Example:

**C4 Quadrants IV  $\rightarrow$  I rotation** eq.C2  $(dr^2+dt^2+..)e^{\text{quaternion } A}$  =rotated through  $C_M$  in eq.16.

example  $C_M$  in eq.C1 is a  $90^\circ$  CCW rotation from  $45^\circ$  through  $\nu$  and anti  $\nu$

$A$  is the 4 potential. From eq.17 we find after taking logs of both sides that  $A_0=1/A_r$  (A2)

Pretending we have a only two  $i, j$  quaternions but still use the quaternion rules we first do the  $r$  derivative: From eq. C1  $dr^2\delta z = (\partial^2/\partial r^2)(\exp(iA_r+jA_0)) = (\partial/\partial r)[(i\partial A_r/\partial r + \partial A_0/\partial r)(\exp(iA_r+jA_0))] = \partial/\partial r[(\partial/\partial r)iA_r + (\partial/\partial r)jA_0](\exp(iA_r+jA_0)) + [i\partial A_r/\partial r + j\partial A_0/\partial r]\partial/\partial r(\exp(iA_r+jA_0)) + (i\partial^2 A_r/\partial r^2 + j\partial^2 A_0/\partial r^2)(\exp(iA_r+jA_0)) + [i\partial A_r/\partial r + j\partial A_0/\partial r][i\partial A_r/\partial r + j\partial/\partial r(A_0)] \exp(iA_r+jA_0)$  (A3)

Then do the time derivative second derivative  $\partial^2/\partial t^2(\exp(iA_r+jA_0)) = (\partial/\partial t)[(i\partial A_r/\partial t + \partial A_0/\partial t)$

$$(\exp(iA_r+jA_0))] = \partial/\partial t[(\partial/\partial t)iA_r + (\partial/\partial t)jA_0](\exp(iA_r+jA_0)) + [i\partial A_r/\partial t + j\partial A_0/\partial t]\partial/\partial t(\exp(iA_r+jA_0)) + (i\partial^2 A_r/\partial t^2 + j\partial^2 A_0/\partial t^2)(\exp(iA_r+jA_0)) + [i\partial A_r/\partial t + j\partial A_0/\partial t][i\partial A_r/\partial t + j\partial/\partial t(A_0)] \exp(iA_r+jA_0) \quad (C4)$$

Adding eq. C2 to eq. C4 to obtain the total D'Alambertian  $C_3+C_4=$

$$[i\partial^2 A_r/\partial r^2 + i\partial^2 A_r/\partial t^2] + [j\partial^2 A_0/\partial r^2 + j\partial^2 A_0/\partial t^2] + ii(\partial A_r/\partial r)^2 + ij(\partial A_r/\partial r)(\partial A_0/\partial r) + ji(\partial A_0/\partial r)(\partial A_r/\partial r) + jj(\partial A_0/\partial r)^2 + ii(\partial A_r/\partial t)^2 + ij(\partial A_r/\partial t)(\partial A_0/\partial t) + ji(\partial A_0/\partial t)(\partial A_r/\partial t) + jj(\partial A_0/\partial t)^2$$

Since  $ii=-1, jj=-1, ij=-ji$  the middle terms cancel leaving  $[i\partial^2 A_r/\partial r^2 + i\partial^2 A_r/\partial t^2] +$

$$[j\partial^2 A_0/\partial r^2 + j\partial^2 A_0/\partial t^2] + ii(\partial A_r/\partial r)^2 + jj(\partial A_0/\partial r)^2 + ii(\partial A_r/\partial t)^2 + jj(\partial A_0/\partial t)^2$$

Plugging in C2 and C4 gives us cross terms  $jj(\partial A_0/\partial r)^2 + ii(\partial A_r/\partial t)^2 = jj(\partial(-A_r)/\partial r)^2 + ii(\partial A_r/\partial t)^2$

$$= 0. \text{ So } jj(\partial A_r/\partial r)^2 = -jj(\partial A_0/\partial t)^2 \text{ or taking the square root: } \partial A_r/\partial r + \partial A_0/\partial t = 0 \quad (C5)$$

$$i[i\partial^2 A_r/\partial r^2 + i\partial^2 A_r/\partial t^2] = 0, \quad j[j\partial^2 A_0/\partial r^2 + j\partial^2 A_0/\partial t^2] = 0 \text{ or } \partial^2 A_\mu/\partial r^2 + \partial^2 A_\mu/\partial t^2 + .. = 1 \quad (C6)$$

A4 and A5 are **Maxwell's equations** (Lorentz gauge formulation) in free space, if  $\mu=1,2,3,4$ .

$$\square^2 A_\mu = 1, \quad \square \bullet A_\mu = 0 \quad (C7)$$

This looks like the Lorentz gauge formalism but it is actually a fundamental field equation (not interchangeable with some other as in gauge theories) hence it is *no gauge at all* and we have also avoided the Maxwell overdeterminism problem (8eq, 6 unknowns  $E_i, B_i$ ). Must use Newpde 4D orthogonalization here. Amplitudes of physical processes in QED in the noncovariant Coulomb gauge coincide with those in the covariant Lorenz gauge. The Aharonov–Bohm effect depends on a line integral of  $\mathbf{A}$  around a closed loop, and this integral is not changed by  $\mathbf{A} \rightarrow \mathbf{A} + \nabla\psi$  which doesn't change  $\mathbf{B} = \nabla \times \mathbf{A}$  either. So formulation in the Lorentz gauge mathematics works (but again C7 is no longer a gauge).

### Geodesics

Recall equation 17.  $g_{00} = 1 - 2e^2/rm_e c^2 \equiv 1 - eA_0/mc^2 v^0$ . We determined  $A_0$ , (and  $A_1, A_2, A_3$ ) in appendix A4, eq. A2. We plug this  $A_i$  into the geodesics

$$\frac{d^2 x^\mu}{ds^2} = -\Gamma_{\nu\lambda}^\mu \frac{dx^\nu}{ds} \frac{dx^\lambda}{ds} \quad (5.9)$$

where  $\Gamma^{mij} \equiv (g^{km}/2)(\partial g_{ik}/\partial x^j + \partial g_{jk}/\partial x^i - \partial g_{ij}/\partial x^k)$ . So from the first order Taylor expansion of our

above  $g_{ij}$  quaternion ansatz  $g_{ii} \equiv \eta_{ii} + h_{ii} = 1 - \frac{eA_i(x,t)}{m_e c^2 v^i}, i \neq 0, \quad (5.10)$

$$A'_0 \equiv e\phi/m_e c^2, \quad g_{00} \equiv 1 - \frac{e\phi(x,t)}{m_e c^2} = 1 - A'_0, \quad \text{and define } g'_{\alpha\alpha} \equiv 1 - A'_\alpha/v_\alpha, (\alpha \neq 0) \text{ and}$$

$g''_{\alpha\alpha} \equiv g'_{\alpha\alpha}/2$  for large and near constant  $v$ , see eq. 14 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 4.24 into equation 4.23, the geodesic equations gives:

$$\begin{aligned} -\frac{d^2 x^1}{ds^2} &= \Gamma_{11}^1 v_1 v_1 + \Gamma_{12}^1 v_1 v_2 + \Gamma_{13}^1 v_1 v_3 + \Gamma_{10}^1 v_0 v_1 + \Gamma_{21}^1 v_2 v_1 + \Gamma_{22}^1 v_2 v_2 + \Gamma_{23}^1 v_2 v_3 + \Gamma_{20}^1 v_2 v_0 + \\ &\Gamma_{31}^1 v_3 v_1 + \Gamma_{32}^1 v_3 v_2 + \Gamma_{33}^1 v_3 v_3 + \Gamma_{30}^1 v_3 v_0 + \Gamma_{01}^1 v_0 v_1 + \Gamma_{02}^1 v_0 v_2 + \Gamma_{03}^1 v_0 v_3 + \Gamma_{00}^1 v_0 v_0 = \\ &\frac{g^{11}}{2} \left( \frac{\partial g'_{11}}{\partial x^1} \right) v_1 + \frac{g^{11}}{2} \left( \frac{\partial g'_{11}}{\partial x^2} \right) v_2 + \frac{g^{11}}{2} \left( \frac{\partial g'_{11}}{\partial x^3} \right) v_3 + \frac{g^{11}}{2} \left( \frac{\partial g'_{11}}{\partial x^0} \right) v_0 + \\ &\frac{g^{11}}{2} \left( \frac{\partial g'_{11}}{\partial x^2} \right) v_2 - \frac{g^{11}}{2} \left( \frac{\partial g'_{22}}{\partial x^1} \right) v_2 + 0 + 0 + \frac{g^{11}}{2} \left( \frac{\partial g'_{11}}{\partial x^3} \right) v_3 + 0 - \frac{g^{11}}{2} \left( \frac{\partial g'_{33}}{\partial x^1} \right) v_3 + 0 + \\ &\frac{g^{11}}{2} \left( \frac{\partial g'_{11}}{\partial x^0} \right) v_0 + 0 + 0 - \frac{g^{11}}{2} \left( \frac{\partial g'_{00}}{\partial x^1} \right) v_0 + O\left(\frac{A_i dv}{v^2 dt}\right) = v_2 \left( \frac{\partial g''_{11}}{\partial x^2} - \frac{\partial g''_{22}}{\partial x^1} \right) + v_3 \left( \frac{\partial g''_{11}}{\partial x^3} - \frac{\partial g''_{33}}{\partial x^1} \right) + \\ &\left( \frac{\partial g''_{11}}{\partial x^\alpha} v_\alpha + \frac{\partial g''_{11}}{\partial x^0} v_0 \right) - \left( \frac{\partial g''_{00}}{\partial x^1} \right) v_0 + O\left(\frac{A_i dv}{v^2 dx}\right) \approx - \left( \frac{\partial g''_{00}}{\partial x^1} \right) v_0 + v_2 \left( \frac{\partial g''_{11}}{\partial x^2} - \frac{\partial g''_{22}}{\partial x^1} \right) + \end{aligned}$$

$v_3 \left( \frac{\partial g''_{11}}{\partial x^3} - \frac{\partial g''_{33}}{\partial x^1} \right) + O \left( \frac{A_i dv}{v^2 dt} \right) \approx \frac{e}{m_\tau c^2} \left( -\vec{\nabla} \phi + \vec{v} X (\vec{\nabla} X \vec{A}) \right)_x + O \left( \frac{A_i dv}{v^2 dr} \right)$ . Thus we have the

*Lorentz force equation* form  $\left( - \left( \frac{e}{m_\tau c^2} \right) \left( \vec{\nabla} \phi + \vec{v} X (\vec{\nabla} X \vec{A}) \right) \right)_x$  plus the derivatives of  $1/v$  which are

of the form:  $A_i (dv/dr)_{av}/v^2$ . **This new term  $A(1/v^2)dv/dr$  is the pairing interaction (5.11)** so SC.

## C5 Other 45°+45° Rotations (Besides above quadrants IV→I)

### Proca eq

In the 1<sup>st</sup> to 2<sup>nd</sup>, 3<sup>rd</sup> to 4<sup>th</sup> quadrants the  $A_u$  is already there as a single  $v$  in the rotation the mass is in both quadrants and in the end we multiply by the  $A_u$  so get the  $m^2 A_u^2$  term in the Proca eq. for the  $W^+, W^-$ . The mass still gets squared for the 2<sup>nd</sup> to 3<sup>rd</sup> quadrant rotation  $Z_0$ .

For the **composite e, v** on those required large  $z=0$  eq.16 rotations for  $C \approx 0$ , and for stability  $r=r_H$  for  $2P_{1/2}$  (I→II, III→IV, II→III) unless  $r_H=0$  (IV→I) are:

**Ist→IInd quadrant rotation** is the  $W^+$  at  $r=r_H$ . Do similar math to C2-C7 math and get instead a Proca equation The limit  $\varepsilon \rightarrow 1 = \tau$  (D13) in  $\xi_1$  at  $r=r_H$ . since Hund's rule implies  $\mu = \varepsilon = 1S_{1/2} \leq 2S_{1/2} = \tau = 1$ . So the  $\varepsilon$  is negative in  $\Delta\varepsilon/(1-\varepsilon)$  as in case 1 charged as in appendix A1 case 2.

$E = 1/\sqrt{(\kappa_{00})} - 1 = [1/\sqrt{(1-\Delta\varepsilon/(1-\varepsilon)-r_H/r)}] - 1 = [1/\sqrt{(\Delta\varepsilon/(1-\varepsilon))}] - 1$ .  $E_t = E + E = 2/\sqrt{(\Delta\varepsilon/(1-\varepsilon))} = W^+$  mass.

$E_t = E - E$  gives E&M that also interacts weakly with weak force.

**IIIrd →IV quadrant rotation** is the  $W^-$ . Do the math and get a Proca equation again.

$E = 1/\sqrt{(\kappa_{00})} - 1 = [1/\sqrt{(1-\Delta\varepsilon/(1-\varepsilon)-r_H/r)}] - 1 = [1/\sqrt{(\Delta\varepsilon/(1-\varepsilon))}] - 1$ .  $E_t = E + E = 2/\sqrt{(\Delta\varepsilon/(1-\varepsilon))} = W^-$  mass.

$E_t = E - E$  gives E&M that also interacts weakly with weak force.

**II → III quadrant rotation** is the  $Z_0$ . Do the math and get a Proca equation.  $C_M$  charge cancelation. B14 gives  $1/(1+\varepsilon)$  gives 0 charge since  $\varepsilon \rightarrow 1$  to case 1 in appendix C2.

$E = 1/\sqrt{(\kappa_{00})} - 1 = [1/\sqrt{(1-\Delta\varepsilon/(1+\varepsilon)-r_H/r)}] - 1 = [1/\sqrt{(\Delta\varepsilon/(1+\varepsilon))}] - 1$ .  $E_t = E + E = 2/\sqrt{(\Delta\varepsilon/(1+\varepsilon))} - 1 = Z_0$  mass.

$E_t = E - E$  gives E&M that also interacts weakly with weak force. Seen in small left handed polarization rotation of light.

**IV→I quadrant rotation** through those 2 neutrinos gives 2 objects.  $r_H=0$

$E = 1/\sqrt{\kappa_{00}} - 1 = [1/\sqrt{(1-\Delta\varepsilon/(1+\varepsilon))}] - 1 = \Delta\varepsilon/(1+\varepsilon)$ . Because of the +- square root  $E = E + E$  so  $E$  rest mass is 0 or  $\Delta\varepsilon = (2\Delta\varepsilon)/2$  reduced mass.

$E_t = E + E = 2E = 2\Delta\varepsilon$  is the pairing interaction of SC. The  $E_t = E - E = 0$  is the 0 rest mass photon Boson. Do the math (eq.C2-C7) and get Maxwell's equations. Note there was no charge  $C_M$  on the two  $v$  s. Note we get SM particles out of composite  $e, v$  using required eq.9 rotations for

## C6 Object B Effect On Inertial Frame Dragging (from appendix B)

The fractal implications are that we are inside a cosmological positron inside a proton  $2P_{3/2}$  at  $r=r_H$  state. The cosmological object (electron) we are inside of is a positron and call it object A which orbits electron object B with a given distant 3<sup>rd</sup> object C. Object B is responsible for the mass of the electron since it's frame dragging creates that Kerr metric  $(a/r)^2 = m_e c^2$  (B9) result used in eq.D9. So Newpde ground state  $m_e c^2 \equiv \langle H_e \rangle$  is the fundamental Hamiltonian eigenvalue defining idea for composite  $e, v$ ,  $r=r_H$  implying Fermi 4 point  $E = \int \psi^\dagger H \psi dV = \int \psi^\dagger \psi H dV = \int \psi^\dagger \psi G$

Recall for composite e,v all interactions occur inside  $r_H$   $(4\pi/3)\lambda^3=V_{rH}$ .  $\frac{1}{v^{1/2}} = \psi_e = \psi_3 \frac{1}{v^{1/2}} = \psi_v = \psi_4$  so 4pt  $\iiint_0^{r_H} \psi_1\psi_2\psi_3\psi_4 dV = 2G \iiint_0^{r_H} \psi_1\psi_2 \frac{1}{v^{1/2}} \frac{1}{v^{1/2}} V$   
 $\equiv \iiint_0^{r_H} \psi_1\psi_2 G \equiv \iiint_0^{r_H} \psi_1\psi_2 (2m_e c^2) dV_{rH} = \iiint_0^{V_{rH}} \psi_1 (2m_e c^2) \psi_2 dV_{rH}$  (A8)

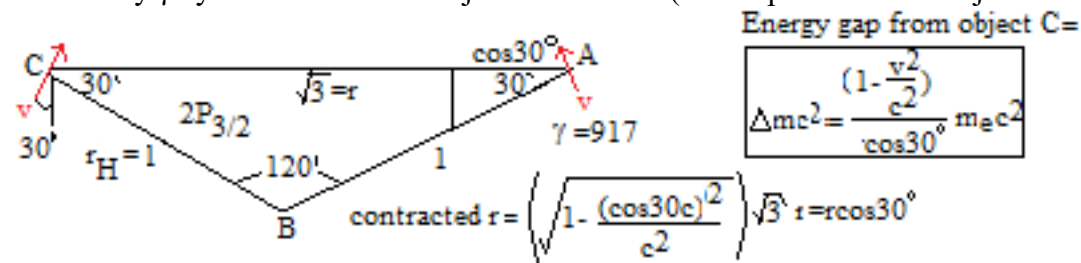
**Object C adds** its own spin (eg., as in 2<sup>nd</sup> derivative eq.A1) to the electron spin (1,IV quadrants) and the W associated with the  $2P_{3/2}$  state at  $r=r_H$  thereby adds a derivative in a neutrino quadrant (fig.4) thereby including neutrinos in the Fermi 4pt. So 2<sup>nd</sup> derivative

$$\Sigma((\gamma^\mu \sqrt{\kappa_{\mu\mu}} dx_\mu) - i\kappa)(\gamma^\nu \sqrt{\kappa_{\nu\nu}} dx_\nu + i\kappa)\chi = \Sigma((\gamma^\mu \sqrt{\kappa_{\mu\mu}} dx_\mu) - i\kappa)\psi \text{ so } \frac{1}{2}(1 \pm \gamma^5)\psi = \chi. \quad (A9)$$

In that regard the expectation value of  $\gamma^5$  is speed and varies with  $e^{i3\phi/2}$  in the trifolium. The spin $^{1/2}$  decay proton  $S_{1/2} \propto e^{i\phi/2} \equiv \psi_1$ , the original ortho  $2P_{1/2}$  particle is chiral  $\chi = \psi_2 \equiv \frac{1}{2}(1 - \gamma^5)\psi = \frac{1}{2}(1 - \gamma^5 e^{i3\phi/2})\psi$ . Initial  $2P_{1/2}$  electron  $\psi$  is constant. Start with initial ortho state  $\chi$ . These  $\gamma^5$  terms then modify equation A8 to read  $= \iiint_0^{V_{rH}} \psi_1\psi_2 (2m_e c^2) dV_{rH} = \iint \psi_{S1/2}^* (2m_e c^2 V_{rH}) \chi dV_\phi =$   
 $K \int \langle e^{i\frac{\phi}{2}} [\Delta \varepsilon V_{rH}] (1 - \gamma^5 e^{i\frac{3\phi}{2}}) \psi \rangle d\phi = K G_F \int \langle e^{i\phi/2} - \gamma^5 i e^{i(4/2)\phi} \rangle d\phi = K G_F \left( \frac{2e^{i\phi}}{i} \Big|_0^{2\pi+C} - \frac{2\gamma^5 e^{i4\phi}}{i4} \Big|_0^{2\pi+C} \right) = k(1/4 + i\gamma^5) = k(.225 + i\gamma^5 0.974) = k(\cos 13^\circ + i\gamma^5 \sin 13^\circ)$  **deriving the 13° Cabbibo angle.** With previously mentioned CP result (direct evidence of fractal universe) get CKM matrix

### C7 Object C Effect on Inertial Frame Dragging and $G_F$ found by using eq.C8 again (N=1 ambient cosmological metric)

**Review of  $2P_{3/2}$**  Next higher fractal scale ( $X10^{40}$ ), cosmological scale. Recall from B9  $m_e c^2 = \Delta \varepsilon$  is the energy gap for object B vibrational stable eigenstates of composite 3e (vibrational perturbation  $r$  is the only variable in Frobenius solution, part II Ch.8,9,10) proton. Observer in object A.  $\Delta m_e c^2$  gap = object C scissors eigenstates. is what we see at object A but  $\Delta m_e c^2$  gets boosted by  $\gamma$  by rotation into the object B direction. (to compare with the object B  $m_e c^2$  gap).



From fig 7  $r^2 = 1^2 + 1^2 + 2(1)(1)\cos 120^\circ = 3$ , so  $r = \sqrt{3}$ . Recall for the positron motion  $\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} = 917$ .

So start with the distances we observe which are the Fitzgerald contracted  $AC =$

$r_{CA} = 1 \sqrt{1 - \frac{\cos^2 30^\circ c^2}{c^2}} \sqrt{3} = .866 = \cos 30^\circ = CA$  and Fitzgerald contracted  $AB = r_{BA} = x/\gamma = 1/\gamma$  so for Fitzgerald contracted  $x=1$  for AB (fig7). We can start at  $t=0$  with the usual Lorentz transformation for the time component.

$$t' = \gamma(ct - \beta x) = \gamma m_e c^2.$$

since time components are Lorentz contracted proportionally also to  $m_e c^2$ , both with the  $\gamma$  multiplication.

In the object A frame of reference we see  $\Delta m_e c^2$  which is the average of left and right object C motion effect. We go into the AB frame of reference to compare the object B  $m_e c^2$  with this  $\Delta m_e c^2$ . Going into the AB frame automatically boosts  $\Delta m_e c^2$  to  $\gamma \Delta m_e c^2$ . So start from a already Fitzgerald contracted  $x/\gamma$ . Next do the time contraction  $\gamma$  to that frame:

$$t'' = k\gamma \Delta m_e c^2 = \gamma \beta r_{AB} = \gamma \beta \left(\frac{x}{\gamma}\right) = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}} \beta \left(\sqrt{1-\frac{v^2}{c^2}} \sqrt{1}\right) = \beta$$

with k defining the projection of tiny  $\Delta m_e c^2$  “time” CA onto BA =  $\cos\theta$  = projection of BA onto CA. But  $m_e c^2$  is the result of object B of both of the motion and inertial frame dragging reduction (D9) so its  $\gamma$  is large. To make a comparison of  $\Delta E$  to AB mass  $m_e c^2$  CA is rotated and translated to the high speed AB direction and distance with its large  $\gamma$  so thereby *object C becomes mathematically object B* with the same k because of these projection properties of: CA onto BA. So we define projection k from projection of  $m_e c^2$ : So again

$$t' = \gamma(ct - \beta x) = k m_e c^2 = t'' = k m_e c^2 = \gamma \beta r_{CA} = \left(\frac{1}{\sqrt{1-\frac{v^2}{c^2}}}\right) \beta \left(\sqrt{1-\frac{\cos^2 30^\circ v^2}{c^2}} \sqrt{3}\right) = \gamma \beta \cos 30^\circ$$

Take the ratio of  $\frac{k\gamma \Delta m_e c^2}{k m_e c^2}$  to eliminate k: thus

$$\frac{k\gamma \Delta m_e c^2}{k m_e c^2} = \frac{\gamma \beta \left(\frac{x}{\gamma}\right)}{\gamma \beta r_{CA}} = \frac{1\beta 1}{\gamma \beta \cos 30^\circ} = \frac{1}{\gamma \cos 30^\circ} \quad \text{so}$$

$$\Delta m_e c^2 = \frac{\beta m_e c^2}{\beta \cos 30^\circ \gamma^2} = \frac{\left(1-\frac{v^2}{c^2}\right) m_e c^2}{\cos 30^\circ} \quad (\text{A10})$$

allowing us to finally compare the energy gap caused by object C ( $\Delta m_e c^2$ ) to the energy gap caused by object B ( $m_e c^2$ , C8). So to summarize  $\Delta E = (m_e c^2 / ((\cos 30^\circ)^2 917^2)) = m_e c^2 / 728000$ . So the energy gap caused by object C is  $\Delta E = (m_e c^2 / ((\cos 30^\circ)^2 917^2)) = m_e c^2 / 728000$ . The weak interaction thereby provides the  $\Delta E$  perturbation ( $\int \psi^* \Delta E \psi dV$ ) inside of  $r_H$  creating those Frobenius series (partII)  $r \neq 0$  states, for example in the unstable equilibrium  $2P_{1/2}$  electrons  $m_e$ . so in the context of those  $e, \nu$  rotations giving  $W$  and  $Z_0$ . The  $G$  can be written for E&M decay as  $(2m_e c^2) X V_{r_H} = 2m_e c^2 [(4/3)\pi r_H^3]$ . But because this added object C rotational motion is eq.A9 Fermi 4 point it is entirely different than a mere ‘weak’ E&M. So for weak decay from equation A8 it is  $G_F = (2m_e c^2 / 728,000) V_{r_H} = G_F = 1.4 \times 10^{-62} \text{ J}\cdot\text{m}^3 = 9.9 \times 10^{-4} \text{ MeV}\cdot\text{F}^3$  **the strength of the Fermi 4pt weak interaction constant** which is the coupling constant for the Fermi 4 point weak interaction integral. Note  $2m_e c^2 / 729,000 = 1.19 \times 10^{-19} \text{ J}$ . So  $\Delta E = 1.19 \times 10^{-19} / 1.6 \times 10^{-19} = .7 \text{ eV}$  which  $\pm$  that  $r$  perturbation (instability) states in the Frobenius solution (partII) and so weak decay. is our  $\Delta E$  gap for the weak interaction (from operator H) inside the Fermi 4pt. integral for  $G_F$ .

The perturbation  $r$  in the Frobenius solution is caused by this  $\Delta H$  in ( $\int \psi^* \Delta H \psi dV$ ) with available phase space  $\psi^* = \psi_p \psi_e \psi_\nu$  for  $\psi = \psi_N$  decay where  $\psi_e$  and  $\psi_\nu$  are from the factorization. The neutrino adds a  $e^2(0)$  to the set of  $e^2 10^{40N}$  electron solutions to Newpde  $r_H$  with electron charge  $\pm e$  and intrinsic angular momentum conservation laws  $S = 1/2$  holding for both  $e$  and  $\nu$ . The neutrino mass increases with nonisotopic homogenous space-time (sect.3.1 and our direction of motion here) whereas that Kerr metric  $(a/r)^2$  term (B9) in general is isotropic and homogenous and so only effects the electron mass.

## C8 NONhomogeneous and NONisotropic Space-Time



Recall 2D N=1 and that 2D N=0 (perturbation) orientations are not correlatable so we have 2D+2D=4D degrees of freedom. But this is all still embedded in the same complex (2D) plane. So this theory is still geometrically complex 2D Z then. Recall the  $\kappa_{\mu\nu} = g_{\mu\nu}$  metrics (and so  $R_{ij}$  and R) were generated in section 1.

In that regard for 2D for a homogenous and isotropic  $g_{ij}$  we have identically  $R_{\mu\mu} = \frac{1}{2}g_{\mu\mu}R = 0$  (3.1.1)  $\equiv$  source  $= G_{00}$  since in 2D  $R_{\mu\mu} = \frac{1}{2}g_{\mu\mu}R$  identically (Weinberg, pp.394) with  $\mu=0, 1\dots$  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 transverse wave 2D object (eg., the  $2P_{1/2}$  electron in the neutron). In an isotropic homogenous space time  $G_{00}=0$ . Also from sect.2 eqs. 7 and 8 (9) occupy the same complex 2D plane. So eqs. 7+8 is  $G_{00} = E_c + \sigma \cdot p_r = 0$  so  $E_c = -\sigma \cdot p_r$

So given the negative sign in the above relation the **neutrino chirality is left handed**.

But if the space time is not isotropic and homogenous then  $G_{00}$  is not zero and the **neutrino gains mass**.

### **C9 Derivation of the Standard Electroweak Model from Newpde but with No Free parameters**

Since we have now derived  $M_W, M_Z$  and their associated Proca equations, and Dirac equations for  $m_\tau, m_\mu, m_e$  etc., and  $G, G_F, ke^2$  Maxwell's equations, etc. we can now write down the usual Lagrangian densities that implies these results. In the formulation  $M_Z = M_W / \cos\theta_W$  you can find the Weinberg angle  $\theta_W, g \sin\theta_W = e, g' \cos\theta_W = e$ ; solve for  $g$  and  $g'$ , etc., We will have thereby derived the standard model from first principles (i.e., postulate 0). **It no longer contains free parameters.**

Note  $C_M =$  Figenbaum pt really is the U(1) charge and equation 16 rotation is on the complex plane so it really implies SU(2) (C1) with the sect.1.2 2D eqs. 7+8 =  $G_{00} = E_c + \sigma \cdot p_r = 0$  gets the left handedness. Recall the genius of the SM is getting all those properties (of  $\chi, Z_0, W^+, W^-$ ) from SU(2)XU(1)<sub>L</sub> so we really have completely derived the electroweak standard model from eq.16 which comes out of the Newpde given we even found the magnitude of its input parameters (eg.,  $G_F$  (appendix C7), Cabbibo angle C6).

### **Appendix D Counting actual quanta numbers N (instead of just n energy level 2<sup>nd</sup> quantization states |n>)**

**D1** Recall from equation 11  $\left[ \left( \frac{dr+dt}{ds} \right) \right] \delta z = \frac{ds}{ds} \delta z = (1) \delta z$  In that "implied iteration of the first application  $\left[ \left( \frac{dr+dt}{ds} \right) + \left( \frac{dr+dt}{ds} \right) \right] \delta z = 2 \frac{ds}{ds} \delta z = 2(1) \delta z$  For all the rotations in fig.4 (except the eq.11 IVth to Ist quadrants: in eq.6.1 each quadrant rotation provides one derivative for each  $\nu$ )  $\left[ \left( \frac{dr+dt}{ds} \right) + \left( \frac{dr+dt}{ds} \right) \right] \delta z = 2 \frac{ds}{ds} \delta z = 2(1) \delta z$ . Equation 11 (sect.1) then counts units N of each 2 half integer  $S = \frac{1}{2}$  angular momentums = 1 unit of electrons (spin 1 for W and Z) off the light cone. For the rotation in the eq.11 IVth to Ist quadrants (each quadrant rotation provides one derivative for each  $\nu$ ) at 45°  $dr=dt$  (on the light cone in fig.4) so for Hamiltonian H:  $2H\delta z = 2(dt/ds)\delta z = 2(\frac{1}{2})\delta z = (1)\hbar\omega\delta z = \hbar k\delta z$  on the diagonal so that  $E = p_r = \hbar\omega$  for the two  $\nu$  energy components, universally. Thus we can state the most beautiful result in physics that  $E = N\hbar f$  for the energy of light with N equal N monochromatic photons. Thus this eq.11c counting N does not require the (well known) quantization of the E&M field with SHM (sect.6.10 below). Which seemed to me

at least a adhoc process on the face of it since the Maxwell equations have nothing to do with SHM.

Given this comes from equation 11, these numbers are thereby “observables”. We have come full circle, getting eq.11 ‘observables’ and using equation 11 to define our inputs into the ‘1’ in  $1=1+0, 1=1X1, 0=0X0$  as an observable (Newpde electrons), thereby starting our entire derivation all over again..

All defined numbers, and resulting symbols and rules, that are larger than 1 ( $N>1$ ) we define as “applications” given our ultimate Occam’s Razor attribute of the postulate of 0. Note applications can be arbitrarily complicated.

**D2 Postulate 0 also implies the underlying 1,0 relationship and  $n>1$  “applications”**

**Review** Postulate 0: No need for a complicated definition because there is nothing there to define! The null set would be simpler and ultimate occam's razor but you don't postulate it, since it is subset of every set anyway.

So by the process of elimination we arrive at the ultimate Occam's razor *postulate*  $real\neq 0$ , the very next level up.

But we need to define the algebra first and use it to write the postulate0. So define

1) *numbers*  $1\equiv 1+0$  and  $0\equiv 0X0, 1\equiv 1X1$  as *symbol*  $z=zz$ : the *simplest* algebraic definition of 0. So  
 2) **Postulate** *real number 0 if  $z'=0$  and  $z'=1$  plugged into  $z'=z'z'+C$  (eq.1) results in some  $C=0$  constant (ie  $\delta C=0$ ).*

This is our *entire* (Ultimate Occam’s Razor **postulate(0)**) *theory*

**Application:** (i.e., *plug*  $z=1,0$  into eq.1 as required by above theory.)

**Plug in  $z=0=z_0=z'$  in eq1.** The equality sign in eq.1 demands we substitute  $z'$  on left (**eq1**) into right  $z'z'$  repeatedly and get iteration  $z_{N+1}=z_N z_N + C$ . If  $C=1$  and  $z_N=1$  then  $z_{N+1}=2$ . If  $C=2$  and  $z_N=1$  then  $z_{N+1}=3$ , etc., . So the *numbers*  $z_N$  possibly are larger than 1 so the larger  $1+1\equiv 2, 1+2\equiv 3$ , etc (*defined* to be  $a+b=c$ ) and define rules of algebra on these *numbers* like  $a+b=b+a$  (eg., ring-field) with no new axioms. So postulate 0 also *generates* the big *numbers* and thereby the algebra we can now use:

If we state different rules than the standard ring-field algebra rules we still get the same physics but using these different math rules in the physics laws.

Postulate 1 also gets us set theory. For example  $1\cup C\equiv 1+C$  (If  $A\cap B=\emptyset$ ). with algebraic definition of 1  $z=zz$  having both 1,0 as solutions so defining negation  $\sim$  with  $0=1-1$  Thus we can define intersection  $\cap$  with  $\sim((A\cup B)\sim B\sim A)\equiv A\cap B$ . So we have defined both union  $\cup$  and intersection  $\cap$  so we have derived set theory.

So in postulate 1  $z=zz$  why did 0 come along for the ride? The deeper reason in set theory is that  $\emptyset$  is an element of every set. Note  $\emptyset$  and 0 aren't really new postulates since they postulate literally “nothing”. So we just derived set theory from the postulate of 1.

**D2 Alternative ways of adding 2D+2D→4D**

Recall from section 1 that adding the  $N=0$  fractal scale 2D  $\delta z$  perturbation to  $N=1$  eq.7 2D gives curved space 4D. So  $(dx_1+idx_2)+(dx_3+idx_4)\equiv dr+idt$  given (eqs5,7a)  $dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$  if  $dr^2\equiv dx^2+dy^2+dz^2$  (3D orthogonality) so that  $\gamma^r dr\equiv \gamma^x dx+\gamma^y dy+\gamma^z dz, \gamma^i\gamma^j+\gamma^j\gamma^i=0, i\neq j, (\gamma^i)^2=1$ , rewritten (with curved space  $\kappa_{\mu\nu}$  eq.14-17)

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

But there are alternatives to this 3D orthogonalization method. For example satisfying this 4D Clifford algebra and complex orthogonalization requirement is a special case of any 2  $x_i x_j$  in eq.3 (directly from postulate1): Imposing orthogonality thereby creates 6 pairs of eqs.3&5. So each particle carries around it's own  $dr+idt$  complex coordinates with them on their world lines. Alternatively this 2D  $dr+idt$  is a 'hologram' 'illuminated' by a modulated  $dr^2+dt^2=ds^2$  'circle' wave (as 2nd derivative wave equation operators from eq.11 circle) since 4Degrees of freedom are imbedded on a 2D  $(dr,dt)$  surface here, with observed coherent superposition output as eq.16 solutions. A more direct way is to simply write the 4Degrees of freedom on the 2D surface as  $dr+idt=(dr_1+idt_1)+(dr_2+idt_2)=(dr_1,\omega dt_2),(dr_2,idt_2)=(x,z,y,idt)=(x,y,z,idt)$ , where  $\omega dt=ds$  is the z direction spin $1/2$  component  $\omega$  (angular velocity) axial vector of the Newpde lepton (eqs.7-9); which we get anyway from lepton equation Newpde.

### **Δ Modification of Usual Elementary Calculus $\epsilon, \delta$ 'tiny' definition of the limit.**

Recall that: given a number  $\epsilon > 0$  there exists a number  $\delta > 0$  such that for all  $x$  in  $S$  satisfying  $|x-x_0| < \delta$

we have

$$|f(x)-L| < \epsilon$$

Then write  $\lim_{x \rightarrow x_0} f(x) = L$

Thus you can take a smaller and smaller  $\epsilon$  here, so then  $f(x)$  gets closer and closer to  $L$  even if  $x$  never really reaches  $x_0$ . "Tiny" for  $h \rightarrow L_1$  and  $f(x+h)-f(x) \rightarrow L_2$  then means that  $L=0=L_1$  and  $L_2$ . 'Tiny' is this difference limit.

### **Hausdorf (Fractal) s dimensional measure using $\epsilon, \delta$**

Diameter of  $U$  is defined as  $|U| = \sup\{|x-y| : x, y \in U\}$ .  $E \subset \cup_i U_i$  and  $0 < |U_i| \leq \delta$

$$H_\delta^s(E) = \inf \sum_{i=1}^{\infty} |U_i|^s$$

analogous to the elementary  $V=U^s$  where of  $s=3$ ,  $U=L$  then  $V$  is the volume of a cube  $\text{Volume}=L^3$ . Here however 's' may be noninteger (eg., fractional). The volume here would be the respective Hausdorf outer measure.

The infimum is over all countable  $\delta$  covers  $\{U_i\}$  of  $E$ .

To get the Hausdorf outer measure of  $E$  we let  $\delta \rightarrow 0$   $H^s(E) = \lim_{\delta \rightarrow 0} H_\delta^s(E)$

The restriction of  $H^s$  to the  $\sigma$  field of  $H^s$  measurable sets is called a Hausdorf s-dimensional measure.  $\text{Dim } E$  is called the Hausdorf dimension such that

$$H^s(E) = \infty \text{ if } 0 \leq s < \text{dim } E, \quad H^s(E) = 0 \text{ if } \text{dim } E < s < \infty$$

So if  $s$  implies a zero  $H$  or infinite  $H$  it is not the correct dimension. This rule is analogous to the definition of the (fractal) Mandelbrot set itself in which a  $C$  that gave infinity is rejected by the definition  $\delta C=0$  we can model as a binary pulse ( $z=zz$  solution is binary  $z=1,0$ ) with

**Review** Recall from eq.7 that  $dr+dt=ds$ . So combining in quadrature eqs 7&11

$\text{SNR} \delta z = (dr/ds+dt/ds) \delta z = ((dr+dt)/ds) \delta z = (1) \delta z$  (11c,append) and so having come *full circle* back to postulate 1 as a real eigenvalue ( $1 \equiv$  Newpde electron). For all the rotations in fig.4 (except the eq.11 IVth to Ist quadrants: in eq.B1 each quadrant rotation provides one derivative for each  $v$ )  $\left[ \left( \frac{dr+dt}{ds} \right) + \left( \frac{dr+dt}{ds} \right) \right] \delta z = 2 \frac{ds}{ds} \delta z = 2(1) \delta z$  Equation 11 (sect.1) then counts units  $N$  of each 2 half integer  $S=1/2$  angular momentums= $1=2$  units of electrons (spin1 for  $W$  and  $Z$ ) off the light

cone. Alternatively diagonal  $ds = \sqrt{2}dr$  in  $\int \left( \frac{dr}{\sqrt{2}dr} + \frac{dr}{\sqrt{2}dr} \right)^2 dV = 1$  For the rotation in the eq.11 IVth to Ist quadrants (each quadrant rotation provides one derivative for each  $v$ ) at  $45^\circ$   $dr=dt$  (on the light cone in fig.4) so for Hamiltonian  $H: 2H\delta z = 2(dt/ds)\delta z = 2^{(1/2)}\delta z = (1)\hbar\omega\delta z = \hbar c k \delta z$  on the diagonal so that  $E = p_r = \hbar\omega$  for the two  $v$  energy components, universally. Thus we can state the most beautiful result in physics that  $E = Nhf$  for the energy of light with  $N$  equal  $N$  monochromatic photons. Replaces 2nd quantization of 2 given allowed Newpde  $10^{82}$  electrons (appendix A2) So we really do have a binary physics signal. So, having come *full circle* then: **(postulate 0  $\Leftrightarrow$  Newpde)**

**Digital communication analogy:** Binary ( $z=zz$ ) 1,0 signal with white noise  $\delta C=0$  in  $z'+C=z'z'$ . Recall the algebraic definition of 1 is  $z=zz$  which has solutions 1,0.(11c). Boolean algebra. Also you could say white noise  $C$  has a variation of zero ( $\delta C=0$ ) making it easy to filter out (eg., with a Fourier cutoff filter). So you could easily make the simple digital communication analogy of this being a binary ( $z=zz$ ) 1,0 signal with white noise  $\delta C=0$  in  $z'+C=z'z'$ . (However the noise is added a little differently here ( $z+C=zz$ ) than in statistical mechanics signal theory (eg., There you might use deconvolved signal=convolution integral [(transfer function)signal]dA)). where the 'signal' actually would equal  $z+C$ , not the usual  $(2J_1(r)/r)^2$  psf So this is not quite the same math as in signal theory statistics statistical mechanics.)

The Whole Shebang:

**This theory is 0**

Postulate real number **0** if  $z'=0$  and  $z^2=1$  plugged into  $z'=z'z'+C$  (**eq.1**) results in some  $C=0$  constant (ie  $\delta C=0$ )

**Plug 0** into **eq.1** and get the Mandelbrot set

**Plug 1** into **eq.1** and get the Dirac eq.

Dirac plus Mandelbrot gets the Newpde

So Ultimate Occam's razor postulate(**0**) implies ultimate math-physics

So this theory is **0**. Hold that thought.

