It's Broken, fix it

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Key words, Mandelbrot set, Dirac equation, Metric

Abstract In that regard Dirac in 1928 made his equation(1) flat space(2). But space is not in general flat, there are forces.

So over the past 100 years people have had to try to make up for that mistake by adding ad hoc convoluted gauge force after gauge force until fundamental theoretical physics became a mass of confusion, a train wreck, a junk pile. So all they can do for ever and ever is to rearrange that junk pile with *zero actual progress* in the most fundamental theoretical physics* ,.. forever. We died.

By the way note that Newpde(3) $\gamma^\mu \sqrt{(\kappa_{\mu\mu})}\partial\psi/\partial x_\mu=(\omega/c)\psi$ is NOT flat space (4) so it cures this problem (5).

References

(1) $\gamma^\mu\partial\psi/\partial x_\mu=(\omega/c)\psi$

(2)Spherical symmetry: $(\gamma^x \sqrt{\kappa_{xx}}dx+\gamma^y \sqrt{\kappa_{yy}}dy+\gamma^z \sqrt{\kappa_{zz}}dz+\gamma^t \sqrt{\kappa_{tt}}idt)^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$
$\kappa_{xx}=\kappa_{yy}=\kappa_{zz}=\kappa_{tt}=1$ is flat space, Minkowski, as in his Dirac equation(1).

(3) Newpde: $\gamma^\mu \sqrt{(\kappa_{\mu\mu})}\partial\psi/\partial x_\mu=(\omega/c)\psi$ for e,ν. So we didn't just drop the $\kappa_{\mu\nu}$ (as is done in ref.1)

(4) Here $\kappa_{oo}=1-r_H/r=1/\kappa_{rr}$, $r_H=(2e^2)(10^{40N})/(mc^2)$. The **N**=..**-1,0,1**,.. fractal scales (next page)

(5)This Newpde κ_{ij} contains a Mandelbrot set(6) $e^2 10^{40N}$ **N**th fractal scale source(fig1) term (from eq.13) that also successfully **unifies theoretical physics.** For example:

For **N**=-1 (i.e.,$e^2X10^{-40}\equiv Gm_e^2$) κ_{ij} is then by inspection(4) the Schwarzschild metric g_{ij}; so we just derived General Relativity and the gravity constant G from Quantum Mechanics in one lineWow

For **N**=1 (so $r<r_C$) Newpde zitterbewegung expansion stage explains the universe expansion (For $r>r_C$ it's not observed, per Schrodinger's 1932 paper.).

For **N**=1 zitterbewegung harmonic coordinates and Minkowski metric submanifold (after long time expansion) gets the De Sitter ambient metric we observe (D16, 6.2).

For **N**=0 Newpde $r=r_H$ $2P_{3/2}$ state composite 3e is the baryons (QCD not required) and Newpde $r=r_H$ composite e,ν is the 4 Standard electroweak Model Bosons (4 eq.12 rotations→appendixA) for **N=0** the higher order Taylor expansion(terms) of $\sqrt{\kappa_{ij}}$ gives the anomalous gyromagnetic ratio and Lamb shift *without* the renormalization and infinities (appendix D3): This is very important

So κ_{uv} provides the general covariance of the Newpde. Eq. 4 even provides us space-time r,t.

So we got all physics here by *mere inspection* of this (curved space) Newpde with no gauges!

We fixed it.

So where does that Newpde come from that fixed it? It is well known to all mathematicians that the real numbers (ie rationals & irrationals) can be constructed from Cauchy completeness i.e. real# sets as rational Cauchy sequence limits. All we did in this article is write down a definition of the trivial real#0 as a special case of a rational Cauchy sequence since real#0 also implies important fundamental theoretical physics (eg., See 'results', 'summary' below)

In that regard the simplest algebraic definition of 1 (and **0**) is z=zz. So z=**1,0;** given also the *list* 1≡1+0, 0X1≡0, etc as *definitions* of their respective symbolic relations; (eg., c=a+b,c=ab) with that **1**≡1+0≡1∪0 implying that if 0 is real then so is **1**. Thus given the algebraic definition of 1 is z=zz+0 (z=**1,0**)

postulate real number 1 holds when z=**1** and **z=0** are substituted (plugged) into z'=z'z'+C eq1 results in *some* C=0 constant(ie δC=0). Thus

•Plug in **z=0**=z_o=z' To find ***all*** **C** substitute z' on left (**eq1**) into right z'z' repeatedly and get iteration $z_{N+1}=z_N z_N$-C. Constraint **δC=0** requires we reject the Cs for which -δC=δ(z_{N+1}-$z_N z_N$) =δ(∞-∞)≠0. The Cs that are left over define the **Mandelbrot set** C_M=C with asubset C=0,fractal scales δz'=10^{40N}δz,N=integer So **z=0** fractal scales have their own δz that perturb that **z=1** so put z=**1**+δz in **eq.1** to get δz+δzδz=C (3)

Then solve equation 3 as a quadratic equation so δz=$(-1\pm\sqrt{1+4C})/2$=dr+idt if C< -¼ (**complex**) (4)

Thus Mandelbrot set iteration for *extremum* C=C_M=-¼ is a rational# Cauchy seq. -¼, -3/16, -55/256, .,0 confirming the trivial real#0 *special case of* Cauchy completeness. Thus also **1** in above 1≡1∪0 is a real # .

Define N≤0 as 'observable' fractal scales. Thus define the 'observer' fractal scales as N≥1 so that |δz|>>1.

•Plug in **z=1** in z'=1+δz in **eq1**, So **δC=0**= (plug in eq3)=δ(δz+δzδz)=δδz(1)+δδz(δz)+(δz)δδz= (use|δz|>>1) ≈δ(δzδz)=0=(plug in eq.4) =δ[(dr+idt)(dr+idt)] = δ[(dr^2-dt^2)+i(drdt+dtdr)]=0 (5)

=2D δ[(Minkowski metric, c=1)+i(Clifford algebra→eq.7a)] (≡Dirac eq)

Factor eq.5 real δ(dr^2-dt^2)=δ[(dr+dt)(dr-dt)] =0=[[δ(dr+dt)](dr-dt)]+[(dr+dt)[δ(dr-dt)]] =0 (6)

so -dr+dt=ds,-dr-dt=ds≡ds_1(→±**e**) Squaring&eq.5 gives circle.in e,v (dr,dt) 2nd,3rd quadrants (7)

& dr+dt=ds, dr-dt=ds, dr±dt=0, light cone (→ν,$\bar{\nu}$) in same e,v (dr,dt) plane 1st,4th quadrants (8)

& dr+dt=0,dr-dt=0 so dr=dt=0 defines vacuum (9)

Those quadrants give *positive* scalar drdt of eq.7 (if *not* vacuum) imply the eq.5 *non* infinite extremum imaginary≡drdt+dtdr=0≡$\gamma^i dr\gamma^j dt+\gamma^j dt\gamma^i dr=(\gamma^i\gamma^j+\gamma^j\gamma^i)drdt$ so $(\gamma^i\gamma^j+\gamma^j\gamma^i)=0$, i≠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 and C_M just fall (pop) out of eq.1, amazing!

•**Both z=0,z=1** together (in eq1))using orthogonality to get (2D+2Dcurved space). Thus (z=1)+(z=0)= (dx_1+idx_2)+(dx_3+idx_4)≡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(1) $\gamma^r dr\equiv\gamma^x dx+\gamma^y dy+\gamma^z dz$, $\gamma^j\gamma^i+\gamma^j\gamma^i=0$, i≠j,$(\gamma^i)^2=1$, rewritten ($\kappa_{ii}$ from N=0 C_M perturbation of N=1 eq.7) $(\gamma^x\sqrt{\kappa_{xx}}dx+\gamma^y\sqrt{\kappa_{yy}}dy+\gamma^z\sqrt{\kappa_{zz}}dz+\gamma^t\sqrt{\kappa_{tt}}idt)^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$. Multiply both sides by $1/ds^2$ and $\delta z^2\equiv\psi^2$ use circle -i∂δz/∂r=(dr/ds)δz inside brackets( ) get 4D QM $\gamma^\mu(\sqrt{\kappa_{\mu\mu}})\partial\psi/\partial x_\mu=(\omega/c)\psi$≡Newpde for e,*ν*, $\kappa_{oo}=1-r_H/r=1/\kappa_{rr}$, $r_H=e^2X10^{40N}/m$ (**N**=. -1,0,1.,). So **Postulate** 1→**Newpde**

Results: of (merely plugging z'=0,z'=1 into eq.1) **postulate1**: (1) backups: davidmaker.com

Newpde: N=0,stable r=r_H composite(part II) 3e $2P_{3/2}$ is baryons(QCD not required), r=r_H, e,*ν* is the SM. Also N=-1 is GR. Expansion stage of N=1 scale $\delta z'=\delta z e^{i\omega 10^{-40N}t}$ Dirac eq zitterbewegung oscillation is the cosmological expansion, the 3rd order Taylor expansion component(1) of $\sqrt{\kappa_{oo}}$ gets the anomalous gyromagnetic ratio so don't need the renormalization infinities.It is apparent wewill get all of physics here

Math: We use that **1**+c≡1∪c to define above *list-define* (ring-field) algebra and note again that iteration gives a Cauchy sequence limit of real# eigenvalues, so we get the rel# math as well with no new axioms.

So (with the math&physics) we understand *everything* (eg GR, cosmology, QM,e,*ν* SM, baryons, rel#).

•So the *simplest idea imaginable* 1 implies all *fundamental math-physics.* no more, no less(eg our 4D)

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

Note that the postulate really is just 1 since the C goes to zero (as a limit with δC=0),fig6).

Summary: This Theory is 1 The rest is a (rel#1) definition.

Theory Postulate 1 — Real# 1 **definition**: is defined algebraically if z=**1** and z=**0** (plugged) into z=zz+C eq1 gives some C=0 constant(ie δC=0) So

can plug (δC=0 &) **z=0** into **eq1** iteration(to get ***all*** C) get 2D (complex) **Mandelbrot** set C_M=C (fractal scale N)

(this iteration also results in a Cauchy sequence confirming 1 is a real# comes from our above '1' definition.)

plug (δC=0 &) **z=1** into **eq1** get 2D **Dirac** equation ((N=1)≡'observer') perturbing N=0 (z=1) "observables"

combine **both** 2D+2D=4D **Newpde** using $(dx_1+idx_2)_{z=0}+(dx_3+idx_4)_{z=1}$=dr+idt & dr 3D orthogonalization

therefore (So we get all of physics and 1+C→1∪ algebra and Real#math (1 such C_M iteration is Cauchy)

postulate 1→ Newpde **everything** that is physical, no more, no less. See backups at davidmaker.com eg.,in introduction. Ultimate Occam's razor postulate 1 so ultimate physics theory, So understand universe completely

Backups for (postulate1→Newpde)

Postulate re#1 is defined algebraicaly if **z=1** and **z=0** (plugged) into z=zz+C eq1 gives *some* C=0 constant(ie δC=0). So

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Plug in **z=0**=z_o=z' To find ***all*** **C** substitute z' on left (**eq1**) in the into right z'z' repeatedly and get iteration $z_{N+1}=z_Nz_N$-C. Constraint **δC=0** requires we reject the Cs for which $-\delta C=\delta(z_{N+1}-z_Nz_N)=\delta(\infty-\infty)\neq 0$. The Cs that are left over define the **Mandelbrot set** C_M=C (with C=0 a subset) eg.$\delta z'=10^{40N}\delta z$, N=integer

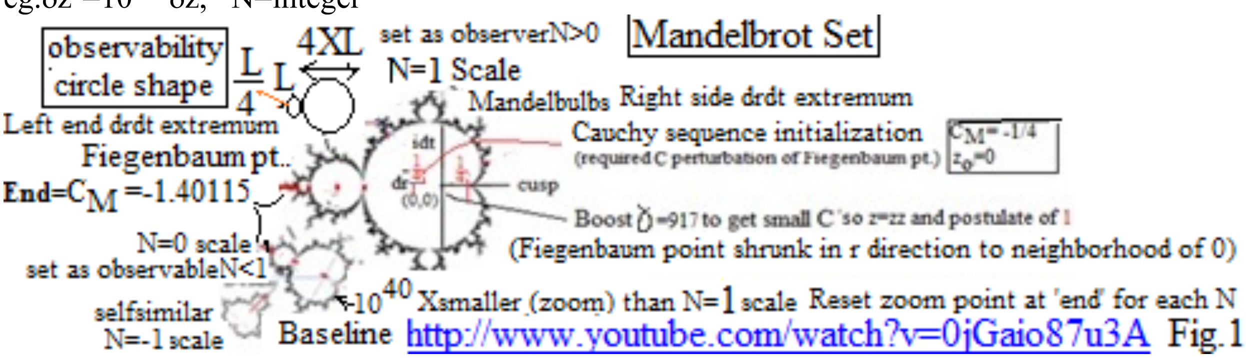

Fig.1

So N≥1 fractal scale(≡observer) z=0 perturbs N≤0 smaller ≡observable (z=1) with its own δz. So **z=1** in z'=**1**+δz in **eq.1** get δz+δzδz=C (3) so $\delta z=(-1\pm\sqrt{1+4C})/2$=dr+idt if C< -¼(**complex**) (4)

The iteration also results in a Cauchy seq. confirming 1 is a real#comes from our '1' definition

Plug in **z=1** in z'=**1**+δz in **eq1** gives for *required* observer N≥1 so |δz|>>1 (observerables≡ N≤0) that **δC=0**= (plug in eq3)=δ(δz+δzδz)= δδz(1)+δδz(δz)+(δz)δδz≈δ(δzδz)=0=

=(plug in eq.4)=. $\delta[(dr+idt)(dr+idt)]=\delta[(dr^2-dt^2)+i(drdt+dtdr)]=0$ (5)

=2D (Minkowski metric, c=1)+i(Clifford algebra→eq.7a) (≡Dirac eq)

Factor eq.5 real $\delta(dr^2-dt^2)=\delta[(dr+dt)(dr-dt)]=0=[[\delta(dr+dt)](dr-dt)]+[(dr+dt)[\delta(dr-dt)]]=0$ (6)

so $-dr+dt=ds, -dr-dt=ds\equiv ds_1$(→±**e**) Squaring&eq.5 gives circle.in e,ν (dr,dt) 2nd,3rd quadrants (7)

& $dr+dt=ds$, $dr-dt=ds$, $dr\pm dt=0$, light cone (→ν,ν) in same e,ν (dr,dt) plane 1st,4th quadrants (8)

& $dr+dt=0, dr-dt=0$ so $dr=dt=0$ defines vacuum (9)

Quadrants give *positive* scalar drdt of eq.7 (if *not* vacuum) imply the eq.5 *non* infinite extremum imaginary≡$drdt+dtdr=0\equiv\gamma^i dr\gamma^j dt+\gamma^j dt\gamma^i dr=(\gamma^i\gamma^j+\gamma^j\gamma^i)drdt$ so $(\gamma^i\gamma^j+\gamma^j\gamma^i)=0$, i≠j(from releq5 $\gamma^i\gamma^i=1$)(7a

Thus from eqs5,7a: $ds^2=dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$

We square eqs.7 or 8 or 9 $ds_1^2=(dr+dt)(dr+dt)=(-dr-dt)(-dr-dt=[dr^2+dt^2]+(drdt+dtdr)\equiv ds^2+ds_3=ds_1^2$. **Circle**≡$\delta z=dse^{i\theta}=dse^{i(\Delta\theta+\theta_o)}=dse^{i((\cos\theta dr+\sin\theta dt)/(ds)+\theta_o)}$, $\theta_o=45°$ (δz in fig.7). We define $k\equiv dr/ds$, $\omega\equiv dt/ds$, $\sin\theta\equiv r$, $\cos\theta\equiv t$. $dse^{i45°}\equiv ds'$.Take ordinary derivative dr (since flat space) of 'Circle' $\frac{\partial\left(ds e'^{i\left(\frac{rdr}{ds}+\frac{tdt}{ds}\right)}\right)}{\partial r}=i\frac{dr}{ds}\delta z$ so $\frac{\partial(dse^{i(rk+wt)})}{\partial r}=ik\delta z$, $k\delta z=-i\frac{\partial\delta z}{\partial r}$ (11).

(So given δz≡ψ, F≡k then from eq.11 $\langle F\rangle^*=\int(F\psi)^*\psi d\tau=\int\psi^*F\psi d\tau=\langle F\rangle$. Therefore k is Hermitian). Also from right side real# Cauchy seq. starting at –¼ rational #iteration, is the same as the the Mandelbrot set iteration(7), Ch.2,sect.2,with small C 0=limit making *real eigenvalues* (eg.,noise) likely. Thus the Mandelbrot set iteration here did double duty also as proof of the real number eigenvalues in eq.11. The observables $dr\to k\to p_r$ condition gotten from eq.11 **operator formalism**(10) thereby converts eq.7-9 into Dirac eq. pdes (4XCircle extreme in left side fig.1 thereby implies circle observability eq11 which we can then pull out of the zoom. Note this is then the N=0 curved space δz in eq12 allowing us to define N=0 as the "observables" fractal scale and N=1 as the "observer" scale with its eq5 flat space instead so with no 'observables' to observe). Cancel that $e^{i45°}$coefficient (45°=π/4) then multiply both sides of eq.11 by ħ and define δz≡ψ, p≡ħk. Eq.11: the familiar '**observables**' p_r in $p_r\psi=i\hbar\frac{\partial\psi}{\partial r}$ (11). Repeat eq.3 for the τ, μ respective δz lobes in fig.6 so they each have their own neutrino *ν*: Lepton generations

δC=0 Extremum on *Circle* 4X sequence shapes (fig1) In Mandelbrot set pulls it out of zoom clutter because of the above 4X *circle* observability sequence in fig1

δC=0 gives that 45° extreme but it also applies to *local* constants (extremum peaks and valleys) because $\delta C=\left(\frac{\partial C}{\partial r}\right)_t dr+\left(\frac{\partial C}{\partial t}\right)_r idt=0$. So for that fig.1 4X sequence of circles drdt= $darea_M\neq0$ (so eq.11 observables) the real δC=0 extremum given the decreasing circle radius sequence $\lim_{m\to\infty}\frac{\partial C}{\partial area_m}dr_m$=KX0 =0 (since $dr_\infty\approx0$) at Fiegenbaum point $=f^\alpha=(-1.40115.,i0)=C_M$≡end and is the *ultimate realization of δC=0.* So random circles in the zoom don't do δC=0. Note if a circle (or many circles) is rotated (U), translated (D), shrunk (S) equally in both dimensions (i.e., $(\partial x^j/\partial x'^k)f^j=f^k\equiv\begin{bmatrix}f_{1N}\\f_{2N}\end{bmatrix}=S_N\begin{bmatrix}U_{11}&U_{12}\\U_{21}&U_{22}\end{bmatrix}\begin{bmatrix}f\\0\end{bmatrix}+\begin{bmatrix}D_{1N}\\D_{2N}\end{bmatrix}$) it is still a circle, eq.11 still holds, so *it's still an observable* as seen in the N fractal scale zoom. Thus you can pick out from that zoom these fig.1 Mandelbrot set extremum 4Xdiameter circles as the only o**bservables** *and* δC=0 extremum geometry in all that clutter. Reset the zoom, restart at such $S_NC_M=10^{40N}C_M$ in eq.13..

Real eq.5 implies Minkowski metric and so Lorentz transformation boosts γ on scale N

For N=0 observable Postulate1 *also* implies a small C in eq.1 which implies a eq.5 Lorentz contraction (9) $1/\gamma$ boosted frame of reference (fig.6) in N=0 eq.3 small $C=C_M/\gamma\equiv C_M/\xi_1=\delta z'$ $z=1+\delta z$ and $\delta C_M=(\delta\xi)\delta z+\xi\delta\delta z=0$. So must add N=0 curved space perturbation δz' in eqs.11,12

for z=1 δz is small so δξ and ξ can be large (**unstable large mass τ+μ,** sectD4). (11a)

for **z=0** |δz| is large so δξ and ξ can be small (**stable small mass: electron** ground state δz(11b)

For N=1 δz=dr gets small relative to 1 at high energy Lorentz boost δz but still keeps $dr^2-dt^2=ds^2$ constant so merely results in slightly modified eq.7: $(dr-\delta z')+(dt+\delta z')\equiv dr'+dt'=ds$ (12)

since ds must remain a constant implying angle perturbation from $\theta_o=45°$on the above **ds Circle**

For N_{ob}=0 (observer at N=1) and eq. 7 dr+dt=ds the r,t axis' are the max extremum for ds^2, and the ds^2 at 45° is the min extremum ds^2 so each Δθ=±45° is pinned to an axis' so extreme Δθ≈±45°=δz'. So in eq.12 the 4 rotations 45°+45°=90° define 4 Bosons (see **appendix A).** But **for N=-1** 45°-45° $N_{ob}<0$ then contributes so you also have other (smaller and infinitesimal N=-1) fractal scale extreme δz'(eg.,tiny Fiegenbaum pts so N=1 dr=r, for N_{ob}=-1) so metric coefficient $\kappa_{rr}\equiv(dr/dr')^2=\quad(dr/(dr-(C_M/\xi_1)))^2=1/(1-r_H/r)^2=A_1/(1-r_H/r)+A_2/(1-r_H/r)^2$. The partial fractions A_I can be split off from RN and so $\kappa_{rr}\approx1/[1-((C_M/\xi_1)r))]$ (13)

(C_M defined to be e^2 charge, $\gamma\equiv\xi_1$ mass). So: $ds^2=\kappa_{rr}dr'^2+\kappa_{oo}dt'^2$ (14)

From eq.7a $dr'dt'=\sqrt{\kappa_{rr}}dr'\sqrt{\kappa_{oo}}dt'=drdt$ so $\kappa_{rr}=1/\kappa_{oo}$ (15)

We can then do a rotational dyadic coordinate transformation of $\kappa_{\mu\nu}$ to get the Kerr metric which is all we need for our applications(9). Recall also from eqs5,7a that $dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$

Both z=0,z=1 together using orthogonality to get (2D+2Dcurved space). Thus (z=1)+(z=0)= $(dx_1+idx_2)+(dx_3+idx_4)\equiv dr+idt$ given $dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$ *if* $dr^2\equiv dx^2+dy^2+dz^2$ (orthogonality) so that $\gamma^r dr\equiv\gamma^x dx+\gamma^y dy+\gamma^z dz$, $\gamma^j\gamma^i+\gamma^j\gamma^i=0$, $i\neq j$,$(\gamma^i)^2=1$ (B2), rewritten (with eq14)

$(\gamma^x\sqrt{\kappa_{xx}}dx+\gamma^y\sqrt{\kappa_{yy}}dy+\gamma^z\sqrt{\kappa_{zz}}dz+\gamma^t\sqrt{\kappa_{tt}}idt)^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$. Multiply both sides by $1/ds^2$& $(\delta z/\sqrt{dV})^2\equiv\psi^2$ and using operator eq 11 inside the brackets( ) get **Newpde**

$\gamma^\mu(\sqrt{\kappa_{\mu\mu}})\partial\psi/\partial x_\mu=(\omega/c)\psi$ for e,ν, $\kappa_{oo}=1-r_H/r=1/\kappa_{rr}$ $r_H=e^2X10^{40N}/m$ (**N**=. -1,0,1.,) (16)

$=C_M/\xi_1$ (from* eq.13) C_M=Fiegenbaum point. Also $C_M/\xi=r_H=$

*small C so big ξ=γ boost so z=zz so **postulate 1**. So we really did just postulate 1. So

Postulate 1→Newpde

* C_M/ξ_1 is ξ small C boost for z=zz so postulate1 from Newpde $r=r_H$ $2P_{3/2}$ stable state. See fig6.

The 4 eq.12 Newpde e,ν rotations at $r=r_H$ are the 4 W^+,γ,W^-,Z_o SM Bosons (appendixA).

So Penrose's intuition(6) was right on! There *is* physics in the Mandelbrot set, all of it.

2.1 Oscillation of δz(≡ψ) on a given fractal scale

From Newpde (eg., eq.1.13 Bjorken and Drell) $i\hbar\frac{\partial\psi}{\partial t}=\frac{\hbar c}{i}\left(\alpha_1\frac{\partial\psi}{\partial x^1}+\alpha_2\frac{\partial\psi}{\partial x^2}+\alpha_3\frac{\partial\psi}{\partial x^3}\right)+$ $\beta mc^2\psi=H\psi$. For electron at rest: $i\hbar\frac{\partial\psi}{\partial t}=\beta mc^2\psi$ so: $\delta z=\psi_r=w^r(0)e^{-i\varepsilon_r\frac{mc^2}{\hbar}t}$ ε_r=+1, r=1,2; ε_r=-1, r=3,4.): This implies an oscillation frequency of $\omega=mc^2/\hbar$. which is fractal here. So the N=1 eq.12 the 45° line has this ω oscillation as a (that eq.7-9 δz variation) rotation. On our own fractal cosmological scale 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 superposition of speeds implying a separation of variables result: $i\hbar\frac{\partial\psi}{\partial t}=\beta\sum_N(10^{40N}(\omega t)_{\varepsilon+\Delta\varepsilon})\psi\ =\beta\sum_N(10^{40N}m_{\varepsilon+\Delta\varepsilon}c^2/\hbar)\psi$). By the way fractal scale N=1 the 45° small Mandelbulb chord ε (Fig6) is now, given this ω, getting larger with time so 1-t α ε. But the tauon 68.74° is stationary so its mass can be set to 1. So at this time (relative to the tauon) the muon =ε=.06, electron Δε=.0005899. So cosmologically for stationary

N=2 $\delta z=\sqrt{\kappa_{oo}}dt=e^{-i\varepsilon_r\frac{mc^2}{\hbar}t}\rightarrow e^{i(\varepsilon+\Delta\varepsilon)}$(17)

But seen from inside at N=1 (D18) $E=1/\sqrt{\kappa_{oo}}=1/\sqrt{(1-r_H/r)}$ then $r<r_H$ & E becomes imaginary in

$e^{iEt/h}=\delta z=\sqrt{\kappa_{oo}}dt=e^{-i\varepsilon_r\frac{mc^2}{\hbar}t}\rightarrow e^{(\varepsilon+\Delta\varepsilon)}$ (17a)

This N=0 and N=-1 δz is the source of the small rotation in eq.12. Later we see that N=0 high energy scattering drives the δδz term (/ds) to the big Δ45° exreme (so preferred) jumps (appendixA).

2.2 ambient metric ε (inertial frame dragging reduction) inputs. Eq.D9 is ambient metric which means N=1 observer for these ε masses

Postulate 1 (observable) requires that C≈0 in equation 1. Note also that the real component of eq.5 is the Minkowski metric implying these γ boosts. Recall eq.3 δz+δzδz=C. So for N=1 observer |δz|>>1 so δzδz=C. Given eq.3 for N=0 |δz|>>|δzδz|, C≈δz sect.1for N=0. Note also our above circle e electron -dr Δε intersection ground state -dr is at 45° (2nd&3rd quadrants) for minimum ds^2). So following the energy increase for Newpde states μ then is not a constant in time because of N=1 eq.12 angle Newpde zitterbewegung variable time contribution (eq.17) to the δz chord perturbation of the 45° (fig6 below). For next higher energy the 68.7° $=\text{Arctan}(\delta z/C_M)$ is from eq.4 quadratic equation solution at the Fiegenbaum point.(so it gives our 2*fundamental* excited state Mandelbulb) mass τ that does not change over cosmological time in N=1 allowing us to normalize it to 1). Note these are identical to eq.7-9 of the section 1 eq.3 application for the τ, μ respective δz lobes in fig.6 so they each have their own neutrino *v*.eq.7,8,9 with its electron' and neutrino still the core equations even for the muon and tauon thereby deriving the 3 generations of leptons.

Stability of composite 3e: (Newpse stable $2P_{3/2}$ at $r=r_H$ state)

We can actually calculate m_p from the quantization of the magnetic flux $h/2e=\Phi_0=BA$ (partII) using the Newpde ground state z=0 three electron (S_1,S_2,S_3), e=e+e-e states of the Newpde with LS coupling minimal energy (**J**=L+S=1-½-½+½ =**½**) with two orbiting relativistic positrons γm_e for $2P_{3/2}$ at $r=r_H$, so $3e=(\gamma m_e+\gamma m_e)=m_p$ S*tability* is implied by $(dt'^2=(1-r_H/r)dt^2)$ since clocks stop (dt'=0) at $r=r_H$. That 3rd mass also reverses the pair annihilation with virtual pair creation inside the r_H 2D area given $\sigma=\pi r_H^2\approx(1/20)$barns which is the reason why only composite 3e or its multiples gives stability.

Note these 2D τ,μ Mandelbulbs can be on a flat 2D (z=1) or this spherical 2D shell (z=0)

That makes this spherical shell at $r=r_H$ the only other stable 2D space (in addition to these z=1 flat 2D) Newpde groung state to define these Mandelbulbs on. Thus high energy 2D τ+μ Mandelbulbs provide 3e stability in μ and 3e in τ so $\mu+\tau=3e+3e=(\gamma m_e.+\gamma m_e)_\tau+(\gamma m_e.+\gamma m_e)_\mu$ as 2 $2P_{3/2}$ orbitals with S and L inside the horizon r_H so unobserved so all that is seen from the outside is (no longer the inside 2P) net J=S'=½**.**

For N=0 observable

z=0, $r=r_H$ **11b**, the high energy $r=r_H$ 2D spherical shell then is a domain of these same 2D Mandelbulbs μ, τ giving on the 2D shell: $\mu+\tau=3e+3e=(\gamma m_e.+\gamma m_e)_\tau+(\gamma m_e.+\gamma m_e)_\mu=3e+3e=m_p+m_p$. two body motion equipartition of energy of the intereacting positrons in each of two **baryons** each with **J=S'= ½.** Eq 11b so for each positron $\delta z'=r_H=C_M/\xi_o=C_M/m_e$ in eq.12.

z=1, **11a**, **$r'_H<<r_H$** (so not that shell) because for z=1 $\xi_1>>\xi_o$ $\lambda=h/mc$=Compton wavelength, $2\pi r'_H=\lambda$,. $m=\xi_1$. Again 3e for each of 2D free space domain high energy quasi stable μ,τ,: $\tau+\mu=3e+3e$= 2 free space **leptons** each with **J=S'=½. 11a** so $\delta z=r'_H=C_M/\xi_1=C_M/(\tau+\mu)$ (18) in eq12

For N=1 observer eq.3 implies $C=\delta z\delta z/\xi$ so that $\xi=C/\delta z\delta z$= **C**/(Mandelbulb radius)^2=mass (from fig.6). or as a fraction of τ, with $2m_p=\tau+\mu+e=\xi_1$ electron $\Delta\varepsilon$=.00058 (19)

Postulate 1 implied finally

But γ (observer) =γ (observable) so for the N=0 observable we got the γ from the N=1 observer case in $r_H=C_M/\gamma=C_M/\xi=C$ for small C and so postulate1. Thus we really did just **postulate** 1.

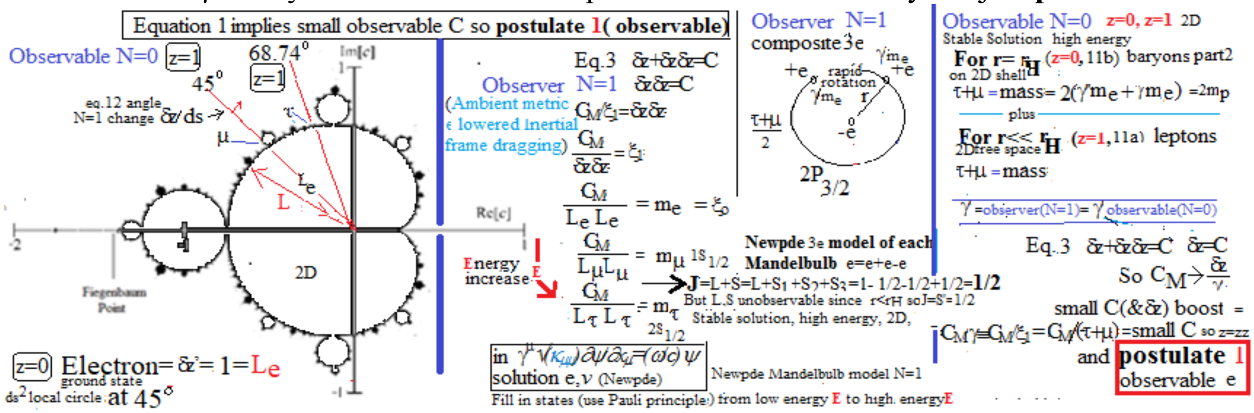

Fig.6 **Conclusion.** So the **smallC** at the end was required. So we really did just **postulate 1**

So we just do ***what is simplest*** (let Occam be your guide), just **postulate** 1: the physics (Newpde) will then follow, top down:

* **Ultimate Occam's Razor** (observable)

It means here *ultimate* simplicity, the *simplest* idea imaginable. So for example z=zz is *simpler* than z=zzzz. Therefore 1 in this context (uniquely algebraically defined by z=zz) is this ultimate Occam's razor **postulate** since 0 (also from z=zz) postulates literally *nothing*.

2.3 Left end small drdt (eq.6) extremum Fiegenbaum point Fractalness

The Fiegenbaum point (11a) is the only part of the Mandlebrot set we use. At the Fiegenbaum point (imaginary) time $X10^{-40}=\Delta$ and real −1.40115. Since $|C_M|>>0$ in eq.2 postulated eq.1 z=zz implies a boosted SR Lorentz transformation universal reference frame to random (since this transformation cancels noise C in eq.2, fig6), small C_M subset $C\approx\delta z'$ (from eq.3) =real distance =real$\delta z/\gamma$ =1.4011/$\gamma=C_M/\gamma\equiv C_M/\xi_1$ using large ξ_1. Note at the Fiegenbaum point distance 1.4011/γ shrinks a lot but time $X10^{-40}\gamma$ doesn't get much bigger since it was so small to begin with at the Fiegenbaum point. Eq.1 then means we have Ockam's razor optimized **postulated** 1. Given the New pde r_H we only see the $r_H=e^2 10^{40N}/m$ sources from our N=0 observer baseline. We never see the $r<r_H$ http://www.youtube.com/watch?v=0jGaio87u3A which explores the Mandelbrot set interior near the Fiegenbaum point. Reset the zoom start at such extremum $S_N C_M=10^{40N}C_M$ in eq.13. 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 $3^{2.7X62}=10^N$ so 172log3=N=82. So there are 10^{82} splits. So there are about 10^{82}splits per initial split. But each of these Mandelbrot set Fiegenbaum points is a $C_M/\xi\equiv r_H$ in electron (eq.13 above). So for each larger electron there are **10^{82} constituent**

electrons. Also the scale difference between Mandelbrot sets as seen in the zoom is about $\mathbf{10^{40}}$**, the scale change** between the classical electron radius and 10^{11}ly with the C noising giving us our fractal universe.
Recall again we got from eq.3 δz+δzδz=C with quadratic equation result:
$\delta z = \frac{-1\pm\sqrt{1-4C}}{2}$. is real for noise C<¼ creating our noise on the N=0 th fractal scale. So ¼=(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+δz 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 Fiegenbaum point neighborhood internal structure to become randomized (as our present universe is) but the number of electrons (10^{82}) remains invariant. See appendix D mixed state case2 for further organizational effects.
$N=r^D$. So the **fractal dimension=** D=logN/logr=log(splits)/log(#r_H in scale jump) =log10^{80}/log10^{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 $r_1=r_H=2e^2/m_ec^2$, N=0th, $r_2=r_H=2GM/c^2$ is defined as the N=1 th where $M=10^{82}m_e$ with $r_2=10^{40}r_1$ So the Fiegenbaum pt. gave us a lot of physics:
eg. **#of electrons in the universe, the universe size, temp.**

Iteration Math

Mandelbrot set iteration sequence z_n C_M=-¼, z_0=0 same as Cauchy seq. since it begins with rational number -¼, allowing the (C' uncertainty) dr neighborhood of 0 to have a nonzero probability of being a real number and thereby giving real eigenvalues to the equation 11 operator formalism after the small C' boost to get observability around dr=0. dr=0.
So δz≈zero (N=0 fractal scale) is a real number which makes the z=1 in z=1+δz ≈1+0 a real number thereby confirming our original postulate real #1. The postulate 1 also gives the *list-define* math (B2) *list* cases 1∪1≡1+1≡2, *define* a=b+c (So no other math axioms but 1.)
That means the **mathematics *and* the physics** come from (**postulate 1→Newpde**): *everything*.
Recall from eq.7 that dr+dt=ds. So combining in quadrature eqs 7&11 SNRδz=(dr/ds+dt/ds)δz =((dr+dt)/ds)δz=(1)δz (11c,append) and so having come *full circle* back to sect.1 postulate 1 as a real eigenvalue (1≡Newpde electron). So, having come *full circle* then: (**postulate 1⇔ Newpde**), back to our section 1. So we rewrite our title:
"The Ultimate Occam's razor theory (ie 1) is *the same as* the ultimate math-physics theory (ie Newpde)".

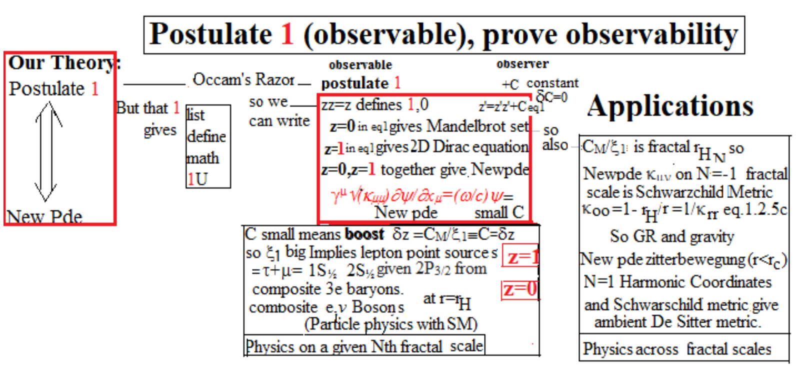

fig.5

2.4 Results: Recall from ultimate Occam's razor **Postulate** 1 we got the Newpde. We note in reference 5 on the first page that we also get the *actual* physics with the Newpde. Thus the usual postulating of hundreds of Lagrange densities(fig.11), free parameters, dimensions, etc., is senseless.

For example (appendixC) *Newpde* composite 3e $2P_{3/2}$ at $r=r_H$ is the proton: That B flux quantization(C3) implies a big proton mass implying 2 high speed $\gamma=917$ positrons and so the Fitzgerald **contracted E field lines *are* the strong force**: we finally understand the strong force! (bye,bye QCD). So these *two* positrons then have big mass *two body* motion(partII) so also **ortho(s,c,b) and para(t) Paschen Back excited (hadron multiplet) states** understood (partII) N=0 extreme perturbation rotations of N=1 eq.12 implies Composite e,ν at $r=r_H$ giving **the electroweak SM** (appendixA) **Special relativity** is that eq.5 Minkowski result. **With the Eqs.16 Newpde ψ (**appendix C) **we finally understand Quantum Mechanics** for the first time and eq.4 **gave us a first principles derivation of r,t space-time** for the first time. That Newpde $\kappa_{\mu\nu}$ metric (In eq.14), on the N=-1 next smaller fractal scale(1) so $r_H=10^{-40}2e^2/m_ec^2\equiv 2Gm_e/c^2$, is the Schwarzschild metric since $\kappa_{oo}=1-r_H/r=1/\kappa_{rr}$ (15): we **just derived General Relativity(gravity) *from* quantum mechanics in one line**. The Newpde zitterbewegung expansion component ($r<r_C$) on the next larger fractal scale (N=1) is the universe expansion sect.2.1: **we just derived the expansion of the universe in one line.** The third order terms in the Taylor expansion of the Newpde $\sqrt{\kappa_{\mu\nu}}$ give those precision QED values (eg.,Lamb shift sect.D) allowing us to **abolish the renormalization and infinities.**

So there is no need for those many SM Lagrangian density postulates (fig11) anymore, just **postulate**1 instead.

Intuitive Notion (of postulate 1⇔Newpde)

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}Xscale change(fig.2) So we have found (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!

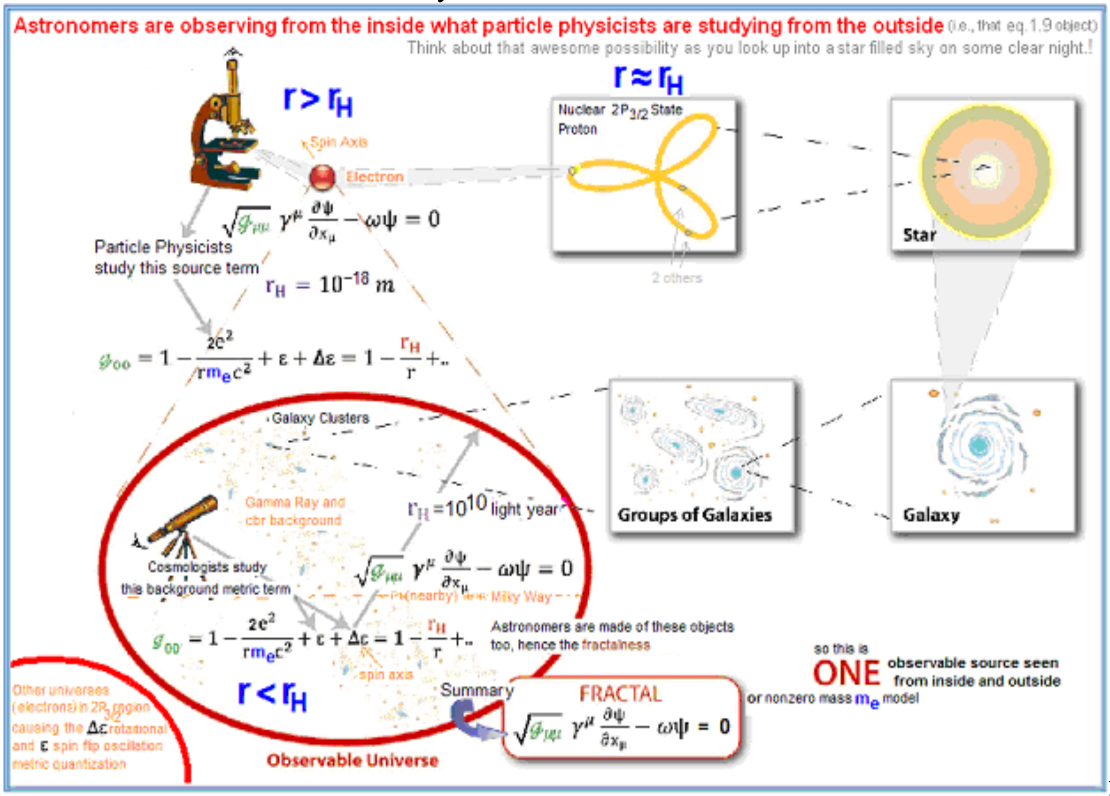

fig2

(↑lowest left corner) Object B caused perturbation structure jumps: void→galaxy→globular,,etc.

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) Fiegenbaum point is a subset (containing that 10^{40}Xselfsimiilar 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." Mandelbrot set iteration sequence z_n C_M=-¼, z_0=0 same as Cauchy seq. since it begins with rational number -¼, allowing the (C' uncertainty) dr neighborhood of 0 to have a nonzero probability of being a real number and thereby giving real eigenvalues to the equation 11 operator formalism after the small C' boost to get observability around dr=0. dr=0. So δz≈zero (N=0 fractal scale) is a real number which makes the z=1 in z=1+δz ≈1+0 a real number therby confirming our original postulate real #1

(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) **appendix A** for finite **larger N_{ob}=0 required extremum to extremum rotations (jumps) at high interaction COM energies (analogous to a hydrogen atom principle quantum number N=1 to N=2 jump)**

Recall from sect.1 eq.3 that δC= δ(δz+δzδz)=δδδδz(1)+ δδz(δz)+(δz)δδz= δC=0 so C is split between δδz noise and δzδz classical invariance ds^2 proper time.

Recall at N=0 the N=1 |δz|>>1 &C_M>>1. So δzδz≈C_M there. So equation 5 holds then. But $\frac{\delta z\prime}{ds} = \pm 45°$ (π/4) extremum to extremum observable N=0 (SM) is also a solution for observer N=1 at high interaction COM energies. N=-1 is part of the *more general* N_{ob}<0 eq.13-15 case of sect.1 that also allows infintismal perturbations.

So for high interaction energies as the γ boosted observer δz/γ , C/γ, gets smaller than the huge N=1 scale (so higher energy, smaller wavelength, beam probes) δδz(1)/ds noise angle gets relatively larger (relative to δ(δzδz)/ds, sect.1) until finally the next smaller N=0 (and next smaller one after that, N=-1) is N=0 fractal scale in that sect.1 big angle ±45° required extremum solution (Recall 'extremum's are our solutions.) 45°=π/4≈ 1≈δz'/ds(observable) = $C_M$end/ds≡θ (in equation 12). So here all four θ±45°X2 rotations of **Composite e,*ν*** implied by eq.12. So we have the N=0 solutions for δz' angle perturbation of N=1 for big scattering energies. So observer γ=observed γ

I→II, II→III,III→IV,IV→I required extremum to extremum rotations in eq.7-9 plane Give SM Bosons at high interaction COM energies. N_{ob}=0

For z=0 δz' is big in z'=1+δz and so we have again ±45° min ds and so two possible 45° rotations so through a total of two quadrants for ±δz' in eq.12. one such rotation around an around a axis (SM) and the other around a diagonal (SC). Note in fig.3 dr,dt is also a rotation. and so has an eq.11 rotation operator observable θ. Thus from equation 11 for (θ) angle rotations θδz≡(dr/ds)δz= −i∂(δz)/∂r for the first 45°rotation. So we got through one Newpde derivative for each 45° rotation. For the next 45° rotation in fig.4 it is then a second derivative $\theta\theta\delta z' = e^{i\theta p}e^{i\theta'}\delta z = e^{i(\theta p+\theta)}\delta z$= (dr/ds)((dr/ds)dr')=-i∂(−i∂(dr'))/∂r)∂r= $-\partial^2(dr')/\partial r^2$ large angle rotation in figure 3. In contrast for z=1, δz' small so 45°-45° 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°+45° (fig.4) then $\theta\theta\delta z' = (d^2/dr^2)z' + (d^2/dt^2)\delta z'$ (A1)

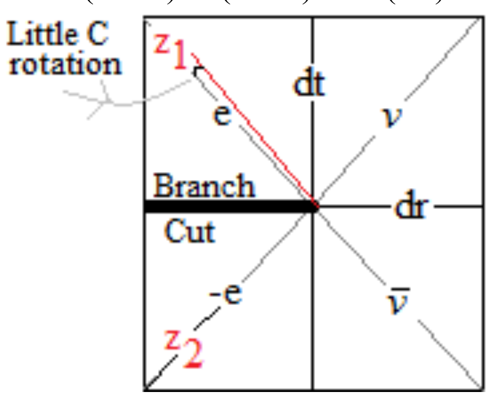

fig.3

fig.3. for **45°-45°** So two body (e,ν) singlet ΔS=½-½ =0 component so pairing interaction (sect.4.5).Also ortho ΔS=½+½=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°+45° rotations so eq.16 implies Bosons accompany our leptons (given the δz'), **so these leptons exhibit "force".**

Newpde r=r_H, z=0, 45°+45 rotation of composites e,*ν* 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° rotation to the next Reimann surface of eq.12, eq.A1 $(dr^2+dt^2)z''$ from some initial extremum angle(s) θ. Eq.12 solutions imply complex 2D plane Stern Gerlach dichotomic rotations using eq.A1 thereby using Pauli matrices σ_i algebra, which maps one-to-one to the quaternionA algebra. Using eq.12 we start at some initial angle θ and rotate by 90° the noise rotations are: $C=\delta z''= [e_L,\nu_L]^T \equiv \delta z'(\uparrow)+\delta z'(\downarrow) \equiv \psi(\uparrow)+\psi(\downarrow)$ has a eq.12 infinitesimal unitary generator $\delta z''\equiv U=1-(i/2)\varepsilon n^*\sigma)$, $n\equiv\theta/\varepsilon$ in $ds^2=U^tU$. But in the limit $n\rightarrow\infty$ we find, using elementary calculus, the result $\exp(-(i/2)\theta^*\sigma) =\delta z''$. We can use any axis as a branch cut since all 4 are eq.16 large extremum so for the 2nd rotation we move the branch cut 90° 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 $(dr^2+dt^2 +..)\delta z'' =(dr^2+dt^2+..)e^{quaternionA}$Bosons because of eq.A1.

A2 Then use eq. 12 and quaternions to rotate δz” since the quaternion formulation is isomorphic to the Pauli matrices. $dr'=\delta z_r=\kappa_{rr}dr$ for **Quaternion** A $\kappa_{ii}=e^{iAi}$.

Appendix A Quaternion ansatz $\kappa_{rr}=e^{iAr}$ instead of $\kappa_{rr}= (dr/dr')^{2.}$ in eq.14. N=0.

A1 for the eq.12:large θ= 45°+45° rotation (for N=0 so large $\delta z'=\theta r_H$). Instead of the equation 13,15 formulation of κ_{ij} for small δz’ (z=1) and large θ=45°+45° we use A_r in dr direction with $dr^2=x^2+dy^2+dz^2$. So we can again use 2D (dr,dt)) $E=1/\sqrt{\kappa_{oo}}=1/\sqrt{e^{iAi}}.=e^{i-A/2}$. 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 ε negative means r_H is also negative. Since it is $e_1*e_2 =r_H$. So $1/\kappa_{rr}=1+(-\varepsilon+r_H/r)$ is ± and $1-(-\varepsilon+r_H/r)$ 0 charge. (A0)

For baryons with a 3 particle r_H/r may change sign without third particle ε changing sign so that at $r=r_H$. Can normalize out the background ε in the denominator of $E=(\tau+\varepsilon)/\sqrt{(1+\varepsilon+\Delta\varepsilon-r_H/r)}$ for Can normalize out the background ε 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 λ 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,*ν* eq.9.23 $\pi^\pm,\pi^o$. For large $l/\sqrt{\Delta\varepsilon}$ energies given small $r=r_H$, Here 1+ε is locally constant so can be normalized out as in

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

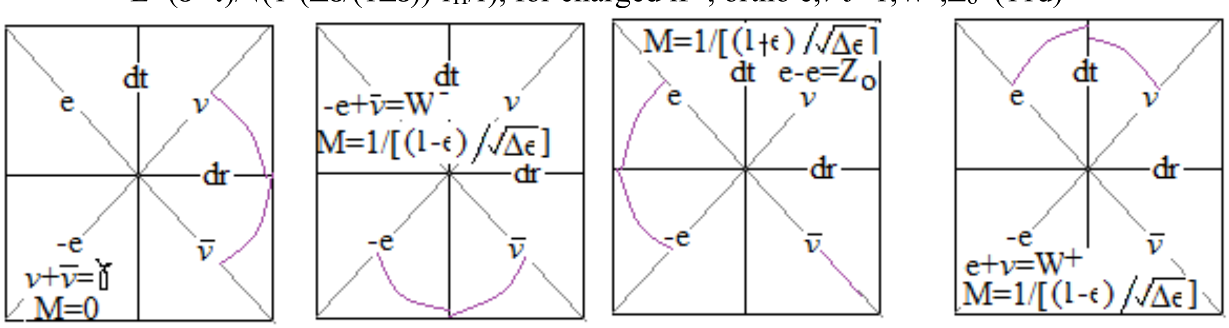

fig4

Fig.4 applies to eq.9 **45°+45°**=90° case: **Bosons.**

A2 These quadrants were defined in eq.7-9 and used in eq.12. The Appendix A4 derivation applies to the far right side figure. Recall from eq.12 z=0 result C_M=45°+45°=90°, gets Bosons. 45°-45°= leptons. The *ν* in quadrants II(eq.5) and III (eq.9). e in quadrants I (eq.7) and IV (eq.7). Locally normalize out 1+ε (appendix D). For the **composite e,*ν*** on those required large z=0 eq.9 rotations for C→0, and for stability $r=r_H$ (eg.,for $2P_{1/2}$, I→II, III→IV,IV→I) unless $r_H=0$ (II→III)

Example:

A4 Quadrants IV→I rotation eq.A2 $(dr^2+dt^2+..)e^{\text{quaternion } A}$ =rotated through C_M in eq.16. example C_M in eq.A1 is a 90° CCW rotation from 45° through *ν* and anti *ν*

A is the 4 potential. From eq.9b we find after taking logs of both sides that $A_o=1/A_r$ (A2)

Pretending we have a only two i,j quaternions but still use the quaternion rules we first do the r derivative: From eq. A1 $dr^2\delta z=(\partial^2/\partial r^2)(\exp(iA_r+jA_o))=(\partial/\partial r[(i\partial A_r\partial r+\partial A_o/\partial r)(\exp(iA_r+jA_o)]$ $=\partial/\partial r[(\partial/\partial r)iA_r+(\partial/\partial r)jA_o)(\exp(iA_r+jA_o)+[i\partial A_r/\partial r+j\partial A_o/\partial r]\partial/\partial r(iA_r+jA_o)(\exp(iA_r+jA_o)+$ $(i\partial^2 Ar/\partial r^2+j\partial^2 A_o/\partial r^2)(\exp(iA_r+jA_o)+[i\partial A_r/\partial r+j\partial A_o/\partial r][i\partial A_r/\partial r+j\partial/\partial r(A_o)]\exp(iA_r+jA_o)$ (A3)

Then do the time derivative second derivative $\partial^2/\partial t^2(\exp(iA_r+jA_o)=(\partial/\partial t[(i\partial A_r\partial t+\partial A_o/\partial t)$ $(\exp(iA_r+jA_o)]=\partial/\partial t[(\partial/\partial t)iA_r+(\partial/\partial t)jA_o)(\exp(iA_r+jA_o)+$ $[i\partial A_r/\partial r+j\partial A_o/\partial t]\partial/\partial r(iA_r+jA_o)(\exp(iA_r+jA_o)+(i\partial^2 A_r/\partial t^2+j\partial^2 A_o/\partial t^2)(\exp(iA_r+jA_o)$ $+[i\partial A_r/\partial t+j\partial A_o/\partial t][i\partial A_r/\partial t+j\partial/\partial t(A_o)]\exp(iA_r+jA_o)$ (A4)

Adding eq. A2 to eq. A4 to obtain the total D'Alambertian A3+A4=

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

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

Plugging in A2 and A4 gives us cross terms $jj(\partial A_o/\partial r)^2+ii(\partial Ar/\partial t)^2=jj(\partial(-A_r)/\partial r)^2+ii(\partial Ar/\partial t)^2$ =0. So $jj(\partial A_r/\partial r)^2=-jj(\partial A_o/\partial t)^2$ or taking the square root: $\partial A_r/\partial r+\partial A_o/\partial t=0$ (A5)

$i[\partial^2 A_r/\partial r^2+i\partial^2 A_r/\partial t^2]=0$, $j[\partial^2 A_o/\partial r^2+i\partial^2 A_o/\partial t^2]=0$ or $\partial^2 A_\mu/\partial r^2+\partial^2 A_\mu/\partial t^2+..=1$ (A6)

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

$$\Box^2 A_\mu=1,\ \Box\bullet A_\mu=0 \quad \text{(A7)}$$

The Lorentz gauge is the only gauge hence it is no gauge at all and we have 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 **A** around a closed loop, and this integral is not changed by A→A+∇ψ which doesn't change B=∇XA either. So formulation in the Lorentz gauge mathematics works so it is no longer a gauge, we are gaugeless.

A5 Other 45°+45° Rotations (Besides above quadrants IV→I)

For the **composite e,*ν*** on those required large z=0 eq.12 rotations for C≈0, and for stability $r=r_H$ for $2P_{½}$ (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 A2-A7 math and get instead a Proca equation The limit ε→1=τ (D13) in ξ_1 at $r=r_H$.since Hund's rule implies $\mu=\varepsilon=1S_{½}\le 2S_{½}=\tau=1$. So the ε is negative in Δε/(1-ε) as in case 1 charged as in appendix C1 case 2.

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

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

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

II → III quadrant rotation is the Z_o. Do the math and get a Proca equation. C_M charge cancelation. D14 gives 1/(1+ε) gives 0 charge since ε→1 to case 1 in appendix C2.

$E=1/\sqrt{(\kappa_{oo})}-1=[1/\sqrt{(1-\Delta\varepsilon/(1+\varepsilon)-r_H/r)}]-1=[1/\sqrt{(\Delta\varepsilon/(1+\varepsilon))}]-1$. $E_t=E+E=2/\sqrt{(\Delta\varepsilon/(1+\varepsilon))}-1=Z_o$ 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/√κ_{oo} -1=[1/√(1-Δε/(1+ε)]-1=Δε/(1+ε). Because of the +- square root E=E+-E so E rest mass is 0 or Δε=(2Δε)/2 reduced mass.

Et=E+E=2E=2Δε is the pairing interaction of SC. The E_t=E-E=0 is the 0 rest mass photon Boson. Do the math (eq.A2-A7) 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

A6 Object B Effect On Inertial Frame Dragging (from appendix D)

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 3rd object C. Object B is responsible for the mass of the electron since it's frame dragging creates that Kerr metric $(a/r)^2=m_ec^2$ (D9) result used in eq.D9. So Newpde ground state m_ec^2 ≡<H_e> is the fundamental Hamiltonian eigenvalue defining idea for composite e,v, r=r_H implying Fermi 4 point E= $\int\psi^tH\psi dV=\int\psi^t\psi HdV=\int\psi^t\psi G$

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 $\iiint_0^{r_{rH}}\psi_1\psi_2\psi_3\psi_4 dV=2G\iiint_0^{r_H}\psi_1\psi_2\frac{1}{V^{1/2}}\frac{1}{V^{1/2}}V$

$$\equiv\iiint_0^{r_H}\psi_1\psi_2 G\equiv\iiint_0^{r_H}\psi_1\psi_2(2m_ec^2)dV_{rH}=\iiint_0^{V_{rH}}\psi_1(2m_ec^2)\psi_2 dV_{r_H}\quad\text{(A8)}$$

Object C adds it own spin (eg., as in 2nd 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 thec Fermi 4pt. So 2nd derivative

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

In that regard the expectation value of γ^5 is speed and varies with $e^{i3\phi/2}$ in the trifolium. The spin½ decay proton $S_{1/2}\propto e^{i\phi/2}\equiv\psi_1$, the original ortho $2P_{1/2}$ particle is chiral $\chi=\psi_2\equiv\tfrac{1}{2}(1-\gamma^5)\psi=\tfrac{1}{2}(1-\gamma^5e^{i3\phi/2})\psi$. Initial $2P_{1/2}$ electron ψ is constant. Start with initial ortho state χ. These γ^5 terms then modify equation A8 to read $=\iiint_0^{V_{rH}}\psi_1\psi_2(2m_ec^2)dV_{rH}=\iint\psi_{S1/2}^*(2m_ec^2V_{rH}))\chi dV_\phi=$ $K\int\langle e^{i\frac{i\phi}{2}}\left[\Delta\varepsilon V_{r_H}\right]\left(1-\gamma^5e^{i\phi\frac{3}{2}}\right)\psi\rangle\,d\phi=KG_F\int\langle e^{i\phi/2}-\gamma^5ie^{i(4/2)\phi}\rangle d\phi=KG_F\left(\frac{2e^{i\phi}}{i}\Big|_0^{2\pi+C}-\frac{2\gamma^5e^{i4\phi}}{i4}\Big|_0^{2\pi+C}\right)$ = k1(1/4+iγ^5)= k(.225+i$\gamma^5$0.974) =k(cos13°+iγ^5sin13°) **deriving the 13° Cabbibo angle**. With previously mentioned CP result(direct evidence of fractal universe) get CKM matrix

A7 Object C Effect on Inertial Frame Dragging and G_F found by using eq.A8 again (N=1 ambient cosmological metric)

Review of $2P_{3/2}$ Next higher fractal scale (X10^{40}), cosmological scale. Recall from D9 m_ec^2 =Δε is the energy gap for object B vibrational stable iegenstates of composite 3e (vibrational perturbation r is the only variable in Frobenius solution, partII Ch.8,9,10) proton. Observor in objectA. From fig.7 vsin30°+vsin30°=v. From fig 7 $r^2=1^2+1^2+2(1)(1)\cos120°=3$, so r=√3.

Recall for the positron motion $\gamma=\frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$=917. So Fitzgerald contract $r_{CA}=\sqrt{1-\frac{\cos^2 30°c^2}{c^2}}\sqrt{3}=$ .866=cos30°. The E field in the forward or backward direction of the CA line (the weakest) due to a charge moving away is E'=$(1-v^2/c^2)$E=$(1/\gamma^2)$E = $(1/917^2)$E (from Feynman's lectures) where

$E=q/r^2$. For circular motion in the proton around the central electron $\frac{mv^2}{r} = qE$ **so that** $\Delta mc^2 = KE = \frac{mv^2}{2} = qr_{CA}E_{CA}\frac{1}{2}$ $=((1/\gamma^2)q^2/r^2_{CA})(r_{CA}))½= (1/\gamma^2)q(q/1^2))(1)½/r_{CA} =((1/\gamma^2)/r_{CA})[(qE_{AB}r_{AB})½]$ $=((1/\gamma^2)/r_{CA})(m_ec^2) =\Delta mc^2$ in summary =object C scissors eigenstates.

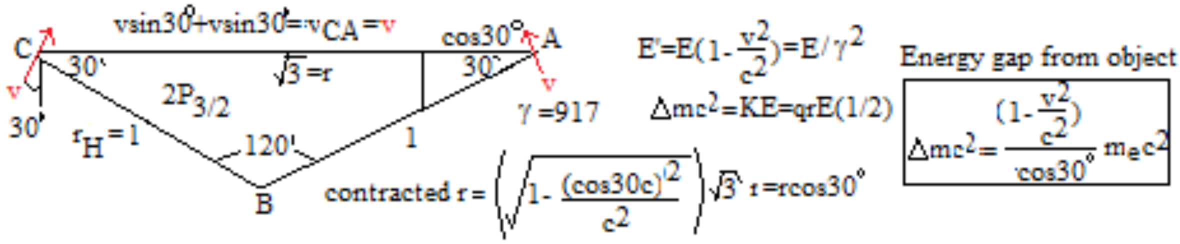

Fig7 Allowing us to finally compare the energy gap caused by object C to the energy gap caused by object B (A8). So to summarize $Eqr=\Delta E= (m_ec^2/((\cos30°)917^2) =m_ec^2/728000$. So the energy gap caused by object C is $\Delta E=(m_ec^2/((\cos30°)917^2) =m_ec^2/728000$. The weak interaction occurs inside of r_H with those electrons m_e. The G can be written for E&M decay as $(2mc^2)XVr_H= 2mc^2 [(4/3)\pi r_H^3]$. 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 $G_F= (2m_ec^2/728,000)Vr_H=$**$G_F$** $=1.4X10^{-62}$ J-m^3 =.9X10^{-4} MeV-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 $2m_ec^2/729,000=1.19X10^{-19}$J .So $\Delta E=1.19X10^{-19}/1.6X10^{-19}$=.7eV which is our ΔE gap for the weak interaction inside the Fermi 4pt. integral for G_F.

A8 Derivation of the Standard 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_τ,m_μ,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 θ_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.,postulate1). **It no longer contains free parameters.**

Note C_M=Figenbaum pt really is the U(1) charge and equation 12 rotation is on the complex plane so it really implies SU(2) (A1) with the sect.3.2 2D eqs. 7+8 = $G_{oo}=E_e+\sigma\bullet p_r=0$ gets the left handedness. Recall the genius of the SM is getting all those properties (of χ,,Z_o,$W^{+,}W^-$) from $SU(2)XU(1)_L$ so we really have completely derived the electoweak standard model from eq.12 which comes out of the Newpde given we even found the magnitude of its itnput parameters (eg., G_F (appendix A7), Cabbibo angle A6).

Appemdix B ultimate Occam's razor (observable) also implies the underlying rela#math

N=0 **postulate** 1 (observable) can also be used in a list-define math to get the *real number* algebra (without all those many Rel#math axioms).Eg., $1\cup1\equiv1+1$ (Ch.2).

Postulate 1 (observable) so ***observer*** C so $1\cup C\equiv1+C$. with algebraic definition of 1 z=zz having both 1,0 as solutions so defining negation ~with 0=1-1 Thus we can define $\sim((A\cup B)\sim B\sim A)\equiv A\cap B$. So we have drfined intersection $\cap$ so we have derived set theory.

So in postulate 1 z=zz why did 0 come along for the ride? There is a deeper reason in set theory**.**

Note $\varnothing$ and 0 aren't really new postulates since they postulate literaly "nothing".

Recall we just derived set theory from the postulate of 1 (observable).

The null set ∅ is the subset of every set. In the more fundamental set theory formulation {∅}⊂{all sets}⇔{0}⊂{1} since ∅=∅∪∅⇔0+0=0, {{1}∪ ∅}={1}⇔1+0=1.
So **list** 1∪1≡1+1≡2, 2∪1≡1+2≡3,..all the way up to 10^{82} (see Fiegenbaum point) and **define** all this list as a+b=c, etc., to create our algebra and numbers which we use to write equation 1 z=zz+C, δC=0 for example. Recall every set has the null set as a subset.

B2 2D+2D→4D

Note adding the N=0 fractal scale 2D δz perturbation to N=1 eq.7 2D gives curved space 4D. So $(dx_1+idx_2)+(dx_3+idx_4)$ ≡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 $\gamma^r dr\equiv\gamma^x dx+\gamma^y dy+\gamma^z dz$, $\gamma^j\gamma^i+\gamma^j\gamma^i=0$, i≠j,$(\gamma^i)^2=1$, rewritten (with curved space $\kappa_{\mu\nu}$ eq.13-15) $(\gamma^x\sqrt{\kappa_{xx}}dx+\gamma^y\sqrt{\kappa_{yy}}dy+\gamma^z\sqrt{\kappa_{zz}}dz+\gamma^t\sqrt{\kappa_{tt}}idt)^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$.
More fundamentlly satisfying this 4D Clifford algebra and complex orthogonalization requirement is a special case of any 2 x_ix_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 ωdt≡dz is the z direction spin½ component ω (angular velocity) axial vector of the Newpde lepton (eqs.7-9); which we get anyway from lepton equation eq.16.

N=-1 and dimensionality

Note the N=-1 (GR) is yet another δz perturbation of N=0 δz' perturbation of N=1 observer thereby adding at least 1 independent parameter dimemsion 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 E&M included. Note these fractal N=-1 fractal scale wound up balls at $r_H=10^{-58}$m are a lot smaller than the Planck length. But if only N=1 observer and N=-1 are used (no N=0) we still have the usual 4D.

Appendix C

Quantum Mechanics *Is* The Newpde ψ ≡δz (for each N fractal scale)

The postulste of 1 is the source of other properties of δz=ψ in addition to those provided by just the Newpde. For example recall the solution to (postulate 1) z=zz is 1,o. In z=1-δz, δz*δz is (defined as) the probability of z being o. Recall z=o is the $\xi_o=m_e$ solution(12b) to the new pde so δz*δz is the probability we have just an electron (11b,11c). Note z=zz also thereby conveniently provides us with an automatic normalization of δz. Note also that (δz*δz)/dr is also then a one dimensional probability 'density'. So Bohr's probability density "postulate" for ψ*ψ (≡(δz*δz)) is derived here. It is not a postulate anymore. (So Bohr was very close to the postulate of 1, and so using z=zz here.)

Note the electron-positron eq.7 has *two* compoents(i.e., dr+dt &dr-dt,) that both solve eq.5 (and therefore eq.3) t*ogether* as in the $\delta z\equiv\psi=\frac{1}{\sqrt{2}}(|\uparrow\downarrow> -|\downarrow\uparrow>)$ singlet state relation with spin S of two electrons $(\mathbf{S}_1+\mathbf{S}_2)^2=S^2$ This singlet ψ can be used as a paradigm-model of the iconic idler-signal (Alice and Bob) singlet QM $\delta(p_A-p_B)$ conservation law state, in the Bell's inequality formulation.. We could then label these two parts of eq.7 *observer* and *object* with associated eq.7 wavefunctions ψ_1, ψ_2 and singlet ψ. Thus we observe ψ_1 (signal) and and so infer that there is both ψ_2 (idler from eq.7) and so our singlet wavefunction ψ. So we 'collapsed' our wavefunction to ψ by observing it. Then apply the same mathematical reasoning to every other such analog $\delta z\equiv\psi=\frac{1}{\sqrt{2}}(|\uparrow\downarrow> -|\downarrow\uparrow>)$ singlet cases (eg.,H,V polarized photon emission) and we will also have thereby derived Bell's inequalities This is then a derivation of the wave function collapse part of the Copenhagen interpretation of Quantum Mechanics from eq.7 and so from the first principles **postulate** 1.

But this (Copenhagen interpretation) wave function collapse is actually a tivial principle (i.e.,so it could be the wave function ψ is trivially just what you measure) except, as EPR pointed out, in this kind of conservation law singlet case laboratory initialization paradigm ψ. To actually know the initial S_1+S_2 in this $\delta z=\psi=\frac{1}{\sqrt{2}}(|\uparrow\downarrow> -|\downarrow\uparrow>)$ QM singlet state is actually a **rare (laboratory setting) case** and so it's spooky superluminal collapse is not a universeal attribute (that being the new fad taking over theoretical physics) of all observed particles. So even the core Bertlmann's socks situation is rare and without it Bell'inequalities don't apply and so in that case there is no such spookiness.

Also recall from appendix A dr^2+dt^2 is a second derivative *operator* wave equation (A1,eq.11) that holds all the way around the circle (even for the eq.10 vacuum solutions), gives waves. In eq.12, error magnitude C (sect.2.3) is also a δz' angle measure on the dr,idt plane. One extremum ds (z=0) is at 45° so the largest C is on the diagonals (45°) where we have eq.5 extremum holding: particles. So a wide slit has high uncertainty, so large C (rotation angle) so we are at 45° (eg., particles, eq.16 photoelectric effect). For a *small slit* we have less uncertainty so smaller C, not large enough for 45°, so only the *wave equation* A1 holds (small slit diffraction). Thus we derived wave particle duality here. So complenarity is derived here, not postulated. Recall wave equation eq.A1 iteration of the New pde with eq.11 operator formalism. So dr/ds=k in the sect.1 $\delta z=dse^{i\theta}$ θ exponent then becomes $k=2\pi/\lambda$. Multiplying both sides by ħ with $\hbar k\equiv mv$ as before we then have the DeBroglie equation that relates particle momentum to wavelength in quantum mechanics. Equation 8a (sect.1) then counts units N of $(dt/ds)=\hbar\omega=\hbar ck$ on the diagonal so that $E=p_t=\hbar\omega$ for all energy components, universally. Thus this eq.11a counting N does not require the (well known) quantization of the E&M field with SHM. First, set the unit of distance r_H on our baseline fractal scale: (eq.1 **N**=0. See figure 1 attachment.). The 4X Mandelbrot set formulation allows only these finite extremum.

δz≡ψ

Appendix D. N=1 observer (eq.13,14,15 give our **Newpde metric $\kappa_{\mu\nu}$** at $r<r_H$, $r>r_H$)

Found GR from eq.13 and eq.14 so we can now write the Ricci tensor R_{uv} (and self similar perturbation Kerr metric since frame dragging decreased by external object B, sect.A6). Also for fractal scale N=0, $r_H=2e^2/m_ec^2$, and for N=-1 $r'_H=2Gm_e/c^2=10^{-40}r_H$.

Nonzero Generic maximally symmetric (MS) ambient metric (meaning N=1) generated by object B

N=2 big guy sees us from the outside and so sees a sine oscillation eq.17. To see what we see(N=1) he multiplies sin by i and u by 'i' since we are inside (so since in eq. 17->17a then -isiniu→sinhu). So start simple with complete frame dragging suppression eq.13, 15 but with ambient metric (provided by later **perturbation** a<<r **provided by some rotation)** metric ansatz: $ds^2=-e^{\lambda}(dr)^2-r^2d\theta^2-r^2\sin\theta d\phi^2+e^{\mu}dt^2$ so that $g_{oo}=e^{\mu}$, $g_{rr}=e^{\lambda}$. From eq. $R_{ij}=0$ for spherical symmetry in free space

R_{11}= ½μ''- ¼λ'μ'+ ¼(μ')^2-λ'/r =0 (D1)
R_{22}=e$^{-\lambda}$[1+½ r(μ'-λ')]-1=0 (D2)
R_{33}=sin^{2}θ{e$^{-\lambda}$[1+½r(μ'-λ')]-1}=0 (D3)
R_{oo}=e$^{\mu-\lambda}$[-½μ''+¼ λ'μ'-¼(μ')^2- μ'/r]= 0 (D4)
R_{ij}=0 if i≠j

(eq. D1 -D4 from pp.303 Sokolnikof(8)): Equation D2 is a mere repetition of equation D3. We thus have only three equations on λ and μ to consider. From equations D1, D4 we deduce that λ'=-μ' so that radial λ=-μ+constant =-μ+C where C represents a possible ~constant ambient metric contribution which could be imaginary in the case of the slowly oscillating ambent metric of nearby object B. So e$^{-\mu+C}$=e$^{\lambda}$. Then D2 can be written as:

$$e^{-C}e^{\mu}(1+r\mu')=1 \qquad (D5)$$

Set e$^{\mu}$=γ. So e$^{-\lambda}$ =γe^{-C} and so integrating this first order equation (equation.D11) we get:

$$\gamma=-2m/r+e^C \equiv e^{\mu}=g_{oo} \text{ and } e^{-\lambda}=(-2m/r+e^C)e^{-C} \quad =1/g_{rr} \qquad (D6)$$

From equation D6 we can identify radial C with also rotational Kerr metric oblateness perturbation Mandlebulb component here (D8 below) of Mandelbrot set Fig.6 eq.18 2m/r=r_H/r=C_M/ξr=e^{-C}= e$^{-(\varepsilon+\Delta\varepsilon)}$ =τ+μ+Δε.(eq.17a). We end up being at the horizon r_H in equation D8. So 2m/r is set equal to e^C in eq. D6. So at the end, at the horizon r_H,in eq.D8, 2m/r is set equal to e^C =e$^{-(\varepsilon+\Delta\varepsilon)}$ =in D6. So κ_{oo}=1- e$^{-(\varepsilon+\Delta\varepsilon)}$-2m/r. from eq.17. Given external object B oscillating zitterbewegung for r<r_C then e$^{-(\varepsilon+\Delta\varepsilon)}$-⟶ e$^{-i(\varepsilon+\Delta\varepsilon)}$ so that κ_{oo}=1- e$^{-i(\varepsilon+\Delta\varepsilon)}$-2m/r (D7) So: e$^{-\lambda}$=1/$\kappa_{rr}$=1/(1-2m'/r)

Perturbative self similar rotation providing the above ambient metric Generated by object B N=1 observer scale

Our new pde has spin S 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** (dθdt T violation so (given CPT) then **CP violation)**

$$ds^2=\rho^2\left(\frac{dr^2}{\Delta}+d\theta^2\right)+\left(r^2+a^2\right)\sin^2\theta d\phi^2-c^2dt^2+\frac{2mr}{\rho^2}\left(a\sin^2\theta d\theta-cdt\right)^2, \qquad (D8)$$

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

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

$\rho^2(r,\theta)\equiv r^2+a^2\cos^2\theta$; $\Delta(r)\equiv r^2-2mr+a^2$, r^2≡r^2+a^{2}cos^{2}θ, r'^{2}≡r^2+a^2 .Inside r_H a<<r, r>>2m

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

The (r^/r')^2 term is

$$\frac{(r')^2}{(r^\wedge)^2}=\frac{r^2+a^2}{r^2+a^2cos^2\theta}=\frac{1+\frac{a^2}{r^2}}{1+\frac{a^2}{r^2}cos^2\theta}\approx 1/g_{rr}(\approx g_{oo})$$ From D7: ξ_1 =e$^{i(\varepsilon+\Delta\varepsilon)}$ for $e^C=e^{i(\varepsilon+\Delta\varepsilon)}$

=τ+μ+Δε=zitterbewegung from D6. 2m/r+e^C

$$\left(1+\frac{a^2}{r^2}\right)\left(1-\frac{a^2}{r^2}cos^2\theta\right)+..=1-\frac{a^4}{r^4}cos^2\theta-\frac{a^2}{r^2}cos^2\theta+\frac{a^2}{r^2}+..=1+\frac{a^2}{r^2}(1-cos^2\theta)+.$$

$$=1+\frac{a^2}{r^2}sin^2\theta+..\equiv 1+\frac{\frac{a^2}{r^2}u^2}{2}=(D7,17)=1+e^C=1+e^{i(\varepsilon+\Delta\varepsilon)}=.$$

(Replace a^2/r^2 Kerr object B term with inertial frame D7 dragging mass ξ_1. In eq.D8 subtract $2mr/(r')^2=r_H/r_H$). In From eq.17a general the closer object B is the larger e^C is.

$=1+\xi_1-\frac{r_H}{r_H}=e^C=1+\varepsilon+\Delta e+..$ $=e^{i(\varepsilon+\Delta\varepsilon)}$ (D9)

So this is a Kerr metric inertial frame dragging suppression due to outside object B of magnitude $((a/r)\sin\theta)^2 = 1/g_{rr}=e^{i\varepsilon}$ from D7 in the proper frame. In the N=1 observer scale at $r=r_H$. Inside object A. ε also changes with time (Mercuron equation D15).

Object B oscillation sound wave observed compression in Shapely, Bootes, rarefaction in Eridanis.

D2 Examples of this ambient metric. N=0 Composite 3e

Introduction: N=0 Frobenius solution is for constant ψ (and so constant ε) just inside r_H. Equations D6,D7,D9 provide the $e^{i(\varepsilon+\Delta\varepsilon)}$ contributions from each maximal symmetry ε source, with the B flux quantization causing the nε quantization of the ambient metric. There appear to be 2 B field sources, the two fast moving positrons (are right on r_H and so are close to these boundaries) creating that huge internal magnetic field. So for the inside 1+2(ε +Δε) get added and we normalize the maximal symmetry B field away for the observer 2nd positron by dividing by 1+ε.

In contrast for just *outside* r_H the flux is canceled out because of the frequent creation and annihilation events inside resulting in a Faraday's law B flux change cancellation application that gives the Meisner effect zero point energy (eq.9.22) pion ε' cloud who's energy is thereby added to $2m/r=r_H/r$ as implied by eq. D6. Thus:

For z=0 *just inside* r_H, the *two* positrons *each* have constant ψ (N=0 ch.8,9) inside r_H. So from eq.D9 divide κ_{rr} by 1+ε+ε=1+2ε.=e^C So $\frac{1}{\kappa_{rr}}=(1)(1+2\varepsilon)\equiv 1+2(\varepsilon+\Delta\varepsilon)$ (D9a)

Note negative potential energy here. Normalize out the κ_{oo} magnetic field maximal symmetry of the observer by multplying κ_{oo} by 1+ε =e^{-C} for the magnetic (see partII flux of B)

$$\frac{1}{\left(\frac{1+2\varepsilon+\Delta\varepsilon}{1+\varepsilon}-2m/\xi_0 r\right)}dr^2+(1-2m/r\xi_0)dt^2=\frac{1}{\left(1+\frac{\varepsilon}{1+\varepsilon}-2m/\xi_0 r\right)}dr^2+\left(1-\frac{2m}{r\xi_0}\right)dt^2$$

$$=\frac{1}{(1+\varepsilon'-2m/\xi_0 r)}dr^2+\left(1-\frac{2m}{r\xi_0}\right)dt^2\,,\qquad \varepsilon'\equiv\varepsilon/(1+\varepsilon). \qquad \text{(D10)}$$

For z=0 just outside r_H, Since randomly the B field disappears (dB/dt≠0) due to that creation-annihilation we have a Faraday's law Meisner effect. With outside r_H B results, just divide by 1+ε" (D9) for zero point energy ε"=.08 $\pi^{\pm}$ of eq.9.22 (partII) which has to itself increase and decrease with (see D9) each of these annihilation events and $\pi^{\pm}$ exists just outside r_H (from our Frobenius solution): $\frac{1}{(1+\varepsilon''-2m/\xi_0 r)}dr^2+\big((1-2m/\xi_0 r)\big)dt^2=ds^2$ (D11)

For z=0→z=1 $r>>r_H$ then free space boost sect.2 $\xi_0\to\tau$. Define $\varepsilon'\equiv\frac{\varepsilon}{1+\varepsilon}$. Must normalize again (for local ambient metrc Δε change contributions) so multiply by $\frac{1}{1+\varepsilon'}$ (see D9 for z=1 outside)

$$\frac{1}{\left(1+\frac{\Delta\varepsilon}{1+\varepsilon}-2m/\xi_1 r\right)}dr^2+(1-2m/r\xi_1)dt^2=\frac{1}{\left(1+\frac{\Delta\varepsilon}{1+\varepsilon}-2m/\xi_1 r\right)}dr^2+\left(1-\frac{2m}{r\xi_1}\right)dt^2 \qquad \text{(D12)}$$

D3 A N=0 Application example: (mentioned on first page)

Separation Of Variables On New Pde

After separation of variables the "r" component of equation 16 (Newpde) can be written as:

$$\left[\left(\frac{dt}{ds}\sqrt{\kappa_{00}}m_p\right)+m_p\right]F-\hbar c\left(\sqrt{\kappa_{rr}}\frac{d}{dr}+\frac{j+3/2}{r}\right)f=0 \qquad \text{D13}$$

$$\left[\left(\frac{dt}{ds}\sqrt{\kappa_{00}}m_p\right)-m_p\right]f+\hbar c\left(\sqrt{\kappa_{rr}}\frac{d}{dr}-\frac{j-1/2}{r}\right)F=0. \qquad \text{D14}$$

Using the above Dirac equation component we find the anomalous gyromagnetic ratio Δgy for the spin polarized F=0 case. Recall the usual calculation of rate of the change of spin S gives dS/dt∝m∝gyJ 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 C5. 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 $(j+3/2)/\sqrt{\kappa_{rr}}\equiv 3/2+J(gy)$, where gy is now the gyromagnetic ratio. This makes our equation D13, D14 compatible with the standard Dirac equation allowing us to substitute the gy into the Heisenberg equations of motion for spin S: dS/dt∝m∝gyJ to find the correction to dS/dt. Thus again:

$[1/\sqrt{\kappa_{rr}}](3/2+J)=3/2+Jgy$, Therefore for J= ½ we have:

$[1/\sqrt{\kappa_{rr}}](3/2+½)=3/2+½gy=3/2+½(1+\Delta gy)$ D15

Then we solve for Δgy and substitute it into the above dS/dt equation.

Thus solve eq. D12, D15 with eq.19 values in $\sqrt{\kappa_{rr}}=1/\sqrt{(1+\Delta\varepsilon/(1+\varepsilon))}=1/\sqrt{(1+\Delta\varepsilon/(1+0))}=1/\sqrt{(1+.0005799/1)}$. Thus from equations C1,D13,D15,A0:

$[\sqrt{(1+.0005799)}](3/2+½)=3/2+½(1+\Delta gy)$. Solving for Δgy gives anomalous gyromagnetic ratio correction of the electron Δgy=.00116.

If we set ε≠0 (so Δε/(1+ε)) instead of Δε) in the same κ_{oo} in eq.16 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 D11

Composite 3e CASE 1: Plus $+r_H$, therefore is the proton + charge component. Eq.C1 &D11 ,A0 $1/\kappa_{rr}=1+r_H/r_H+\varepsilon''=2+\varepsilon''$. ε" =.08 (eq.9.22). Thus from eq.C7: $\sqrt{2+\varepsilon''}(1.5+.5)=1.5+.5(gy)$, gy=2.8

The gyromagnetic ratio of the proton

Composite 3e CASE 2: negative r_H, thus charge cancels, zero charge:

$1/\kappa_{rr}=1-r_H/r_H+\varepsilon''=\varepsilon''$ Therefore from equation D15 and case 1 eq.12 $1/\kappa_{rr}=1-r_H/r_H+\varepsilon''$

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

D4 Separation of Variables

After separation of variables the "r" component of equation 16 (Newpde) can be written as

$$\left[\left(\frac{dt}{ds}\sqrt{\kappa_{00}}m_p\right)+m_p\right]F-\hbar c\left(\sqrt{\kappa_{rr}}\frac{d}{dr}+\frac{j+3/2}{r}\right)f=0 \quad D16$$

$$\left[\left(\frac{dt}{ds}\sqrt{\kappa_{00}}m_p\right)-m_p\right]f+\hbar c\left(\sqrt{\kappa_{rr}}\frac{d}{dr}-\frac{j-1/2}{r}\right)F=0. \quad D17$$

Comparing the flat space-time Dirac equation to the left side terms of equations C5 and C6:

$(dt/ds)\sqrt{\kappa_{oo}}=(1/\kappa_{00})\sqrt{\kappa_{oo}}=(1/\sqrt{\kappa_{oo}})=\text{Energy}=E$ D18

Note for electron motion around hydrogen proton $mv^2/r=ke^2/r^2$ so $KE=½mv^2=(½)ke^2/r=PE$ potential energy in PE+KE=E. So for the electron (but not the tauon or muon that are not in this orbit) $PE_e=½e^2/r$. Here write the hydrogen energy and pull out the electron contribution. So in eq.B1 and D18 $r_{H'}=(1+1+.5)e^2/(m_\tau+m_\mu+m_e)/2=2.5e^2/(2m_pc^2)$. D19

Variation δ(ψ*ψ)=0 At $r=n^2a_o$

Next note for the variation in ψ*ψ is equal to zero at maximum ψ*ψ probability density where for the hydrogen atom is at $r=n^2a_o=4a_o$ for n=2 and the $\psi_{2,0,0}$ eigenfunction. Also recall eq.B1 eq.19,$\xi_1=m_Lc^2=(m_\tau+m_\mu+m_e)c^2=2m_pc^2$ normalizes ½ke² (Thus divide τ+μ by 2 and then multiply the whole line by 2 to normalize the $m_e/2$.result. ε=0 since no muon ε here.): Recall in eq.19 ξ_o has to be pulled in a Taylor expansion as an operator since it a separate observable. So substituting eqs.D16,C1 and eq.D12for κ_{00}, and B1,eq19 values in eq.D18:

$$E_e=\frac{(tauon+muon)(\frac{1}{2})}{\sqrt{1-\frac{r_{H'}}{r}}}-\left(tauon+muon+PE_\tau+PE_\mu-m_ec^2\right)\frac{1}{2}=$$

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

$$=\frac{2m_ec^2}{2}+2\frac{e^2}{4r}-2\frac{3}{8}\left(\frac{2.5}{rm_Lc^2}\right)^2m_Lc^2=m_ec^2+\frac{e^2}{2r}-2\frac{3}{8}\left(\frac{2.5e^2}{rm_Lc^2}\right)^2m_Lc^2$$

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

$$\Delta E=2\frac{3}{8}\left[\frac{2.5(8.89X10^9)(1.602X10^{-19})^2}{(4(.53X10^{-10}))2((1.67X10^{-27})(3X10^8)^2}\right]^2(2(1.67X10^{-27})(3X10^8)^2$$

=hf=6.626X10^{-34} 27,360,000 so that f=27MHz Lamb shift.
The other 1050Mhz comes from the zitterbewegung cloud.

Note: Need infinities if **flat space Dirac 1928 equation**. For flat space $\partial g_{ik}/\partial x^j=\mathbf{0}$ as a limit. Then must take field $g^{km}=1/0=\infty$ to get finite Christoffel symbol $\Gamma^m_{ij}\equiv(g^{km}/2)(\partial g_{ik}/\partial x^j+\partial g_{jk}/\partial x^i-\partial g_{ij}/\partial x^k)=(1/\mathbf{0})(\mathbf{0})$=*un*defined but still implying *non*zero acceleration on the left side of the geodesic equation: $\frac{d^2x^\mu}{ds^2}=-\Gamma^\mu_{\nu\lambda}\frac{dx^\nu}{ds}\frac{dx^\lambda}{ds}$ 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 C2,C3).
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^3 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 $G_{oo}=0$ for a 2D MS. Thus a vacuum really is a vacuum. Also that large $\xi_1=\tau(1+\varepsilon')$ in r_H in eq.14 is the reason leptons appear point particles (in contrast to the small ξ_0 in the composite 3e baryons).

D5 N=1 internal Observer cosmological physics from Observer at N=2

From Newpde (eg., eq.1.13 Bjorken and Drell) $i\hbar\frac{\partial\psi}{\partial t}=\frac{\hbar c}{i}\left(\alpha_1\frac{\partial\psi}{\partial x^1}+\alpha_2\frac{\partial\psi}{\partial x^2}+\alpha_3\frac{\partial\psi}{\partial x^3}\right)+\beta mc^2\psi=H\psi$. For electron at rest: $i\hbar\frac{\partial\psi}{\partial t}=\beta mc^2\psi$ so: $\delta z=\psi_r=w^r(0)e^{-i\varepsilon_r\frac{mc^2}{\hbar}t}$ ε_r=+1, r=1,2; ε_r=-1, r=3,4.): This implies an oscillation frequency of $\omega=mc^2/\hbar$. So the eq.12 the 45° line has this ω oscillation on that δz rotation. The next higher cosmological independent (but still connected by superposition of speeds) fractal scale N=1 the 45° small Mandelbulb chord ε (Fig6) is now getting smaller with time t α ε as in a separation of variables result: $i\hbar\frac{\partial\psi}{\partial t} = \beta\sum_N(10^{40N}(\omega t)_{\varepsilon+\Delta\varepsilon})\psi = \beta\sum_N(10^{40N}m_{\varepsilon+\Delta\varepsilon}c^2/\hbar)\psi$ and so for stationary N=1 $\delta z=\sqrt{\kappa_{oo}}dt= e^{-i\varepsilon_r\frac{mc^2}{\hbar}t} \rightarrow e^{i(\varepsilon+\Delta\varepsilon)}$ (18)

On our own fractal cosmological scale we are in the expansion stage of one such oscillation. Recall N>0≡observer. Here we find what that N=2 fractal scale observer sees what we see if sinμ->sinhμ for $r>r_H$ going to $r<r_H$ in $E=1/\sqrt{\kappa_{oo}}=1/\sqrt{(1-r_H/r)}$ since the E in $\delta z=e^{iEt}\equiv e^{i\mu}$ and so μ then becomes imaginary. Recall limit R_{ij} as r→0 is the source, where gravity creates gravity in the Einstein equations which becomes the modulation of the DeSitter ball. (6.14.2).

$R_{22}=e^{-\lambda}[1+½ r(\mu'-\nu')]-1$ with μ=ν (spherical symmetry) and μ'=-ν'. So as r→0 , ImR_{22}=.
$Im(e^{\mu}-1)=\mu$ +..= sinμ=μ+..for outside r_H imaginary μ for small r (at the source) so sinμ becomes a gravitational source (gravity itself can create gravity as a feedback mechanism). The N=2 observer then multiplies by i iR_{22}, -sinμ and μ to get R_{22}=-sinhμ to see what the N=2 observer sees that we see inside r_H so:

$R_{22}=e^{-\nu}[1+½ r(\mu'-\nu')]-1=-\sinh\nu=(-(e^{\nu}- e^{-\nu})/2)$, ν'=-μ' so
$e^{-\mu}[-r(\mu')]=-\sinh\mu-e^{-\mu}+1=(-(-e^{-\mu}+ e^{\mu})/2)-e^{-\mu}+1=(-(e^{-\mu}+e^{\mu})/2)+1=-\cosh\mu+1$. So given ν'=-μ'
$e^{-\nu}[-r(\mu')]= 1-\cosh\mu$. Thus
$e^{-\mu}r(d\mu/dr)]=1-\cosh\mu$

This can be rewritten as: $e^{\mu}d\mu/(1-\cosh\mu)=dr/r$ (D20)

The integration is from ξ_1= μ=ε=1 to the present day mass of the muon= .06 (X tauon mass). Integrating equation B from ε=1 to the present ε value we then get:

$\ln(r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-\ln[e^{\mu}-1]]2$ (D21)

then r_{bb}≈50Mkm≡mercuron (initial $r=r_H$ each baryon. Big bang 10^{82} baryons sect.2.3). Solve for r_{M+1}, as function of μ. Find present derivative, find du from Hubble constant normalize the number to 13.7 to find total time u. Find we are now at 370by. This long of time explains the cbr thermalization and mature galaxies at dawn(instead of ~200My after bb, it is 370by). The zitterbewegung (sound wave) of object B creates the condensation (at the Shapely concentration) and rarefaction void in Eridanus: we are astronomically observing here selfsimilar objectB sound waves *inside* of a proton.

After a large expansion from r_{bb} our eq.14 eq.15 Schwarzschild finally becomes **Minkowski** $ds^2=-dx_o^2+\Sigma_{i=1}^n dx_i^2$. The submanifold is $-x_0^2+\Sigma_{i=1}^n x_i^2=\alpha^2$

In static coordinates r,t: (the **New pde** zitterbewegung **harmonic coordinates** x_i for $r<r_H$)
$x_o=\sqrt{(\alpha^2-r^2)}\sinh(t/\alpha)$: (sinht is small t limit of equation D15. 5Tyears is the period>>370by)
$x_1=\sqrt{(\alpha^2-r^2)}\cosh(t/\alpha)$:
$x_i= rz_i$ 2≤i≤n z_i is the standard imbedding n-2 sphere. R^{n-1} which also implies the **De Sitter** metric: $ds^2=-(1-r^2/\alpha^2)dt^2+(1-r^2/\alpha^2)^{-1}dr^2+ d\Omega^2_{n-2}$ (D16) **our observed ambient metric**.

D6 **Mixed states of Δε and** ε N=−1 outside so $1S_{1/2}$ state with r

$_{HN=-1}$ $\Delta x\Delta(m_{N=-1}c)=\hbar/2$. $m_{N=-1}=10^{-40}m_e$. So Δx=10^5LY galaxy. $1S_{1/2}$ state may be flattened since such states are stable since $g_{oo}=\kappa_{oo}$.

From D13 metric source note Δε and ε operators so Δεε (operating on Newpde ψ_N) is a new state, a "mixed state" that in the next higher scale classical limit then is a grand canonical ensemble with nonzero chemical potential (i.e., a "mixture" of systems).2nd derivative of cosx= -cosx so $\Delta g_{00}=-g_{00}=\cos\Delta\varepsilon$. That $g_{oo}=\kappa_{oo}$ in the *halo of the Milky Way galaxy* is the fundamental equation of metric quantization for all the multiples of 100 metric quantization, but here for $r<r_H$. So in general $\kappa_{oo}=e^{i(me+mu)}$, m_e =.000058 is the electron mass (as a fraction of the Tauon mass.) which is the component in the resulting m_e,m_μ operator sequence.

Imaginary part R_{22} locally for 2D MS $R_{oo}=\Delta g_{oo}=\kappa_{00}(R/2)=\cos\Delta\varepsilon$ gives also the local mixed Δε,ε states of partIII metric quantization. Set $\cos(\Delta\varepsilon/(1-2\varepsilon))=\boldsymbol{\kappa_{00}=g_{oo}}$, $mv^2/r=GMm/r^2$ so $GM/r=v^2$ COM in the galaxy halo(circular orbits) (1/(1-2ε) term from D9a just inside r_H) so

Pure state Δε (ε *excited* $1S_{½}$ state of ground state Δε, so not same state as Δε)

$\mathrm{Rel}\kappa_{oo}=\cos\mu$ from D9 , A0

Case1 $1-2GM/(c^2r)=1-2(v/c)^2=1-(\Delta\varepsilon/(1-2\varepsilon))^2/2$ (D17)

So $1-2(v/c)^2=1-(\Delta\varepsilon/(1-2\varepsilon))^2/2$ so $=(\Delta\varepsilon/(1-2\varepsilon))c/2=.00058/(1-(.06)2)(3X10^8)/2$ =99km/sec ≈100km/sec (Mixed Δε,ε, states classically here are grand canonical ensembles with nonzero chemical potential.). For ringed (not hub) galaxies the radial value becomes 100/2=50km/sec.

Mixed state εΔε (Again $GM/r=v^2$ so $2GM/(c^2r)=2(v/c)^2$.)

Case 2 $g_{oo}=1-2GM/(c^2r)=\mathrm{Rel}\kappa_{oo}=\cos[\Delta\varepsilon+\varepsilon]=1-[\Delta\varepsilon+\varepsilon]^2/2=1-[(\Delta\varepsilon+\varepsilon)^2/(\Delta\varepsilon+\varepsilon)]^2/2=$
$1-[(\Delta\varepsilon^2+\varepsilon^2+2\varepsilon\Delta\varepsilon)/(\Delta\varepsilon+\varepsilon)]^2$

The $\Delta\varepsilon^2$ is just the above first case (Case 1) so just take the mixed state cross term $[\varepsilon\Delta\varepsilon/(\varepsilon+\Delta\varepsilon))]=c[\Delta\varepsilon/(1+\Delta\varepsilon/\varepsilon))]/2=c[\Delta\varepsilon+\Delta\varepsilon^2/\varepsilon+...\Delta\varepsilon^{N+1}/\varepsilon^N+.]/2=\Sigma v_N$. Note each term in this expansion is itself a (mixed state) operator. So there can't be a single v in the large gradient 2nd case so in the equation just above we can take $v_N=[\Delta\varepsilon^{N+1}/(2\varepsilon^N)]c$. (D18)

From eq. D18 for example $v=m100^N$km/sec. m=2,N=1 here (Local arm). In part III we list hundreds of examples of D18: (sun1,2km/sec, galaxy halos m100km/sec). The linear mixed state subdivision by this ubiquitous ~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, 100Xsmaller: globular clusters, 100Xsmaller solar systems, etc., So these smaller objects were also created by mixed state metric quantization (eq.D18) 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>18by)BCE. (see partIII)

Appendix E Δ Modification of Usual Elementary Calculus ε,δ 'tiny' definition of the limit.

Recall that: given a number ε>0 there exists a number δ>0 such that for all x in S satisfying

$|x-x_o| <\delta$

we have

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

Then write $\lim_{x\to x_o} f(x)=L$

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

Hausdorf (Fractal) s dimensional measure using ε, δ

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

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

analogous to the elementary $V=U^s$ where of s=3, U=L then V is the volume of a cube 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 δ covers{U_i} of E.

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

The restriction of H^s to the σ field of H^s measurable sets is called a Hausdorf s-dimensional measure. Dim E is called the Hausdorf dimension such that

$H^s(E) = \infty$ if 0≤s<dimE, $H^s(E)=0$ if dim E<s<∞

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 δC=0 we can model as a binary pulse (z=zz solution is binary z=1,0) with **zz=z (1) is the algebraic definition of 1 and can add real constant C** (so z'=z'z'-C, δC=0 (2)), z∈{z'}

Plug z'=1+δz into eq.2 and get δz+δzδz=C (3)

so $\delta z = (-1 \pm \sqrt{1+4C})/2$=dr+idt (4)

for C<-¼ so real line r=C is immersed in the complex plane.

z=z_o=**0** To find C itself substitute z' on left (eq.2) into right z'z' repeatedly & get $z_{N+1}=z_Nz_N$-C. δC=0 requires us to reject the Cs for which

-δC=δ(z_{N+1}-z_Nz_N)= δ(∞-∞)≠0**. z=zz** solution is **1,0** so initial gets the **Mandelbrot set** C_M (fig2) out to some ||Δ|| distance from C=0. Δ found from ∂C/∂t=0, δC≡δC_r=(∂C_M/∂(drdt))dr =0 extreme giving the Fiegenbaum point ||C_M|| = ||-1.400115..|| global max given this ||C_M|| is biggest of all.

If s is not an integer then the dimensionality it is has a fractal dimension.

But because the Fiegenbaum point Δ uncertainty limit is the r_H horizon, which is impenetrable (sect.2.5, partI), ε,δ are not dr/ds eq.11a observables for 0<ε,δ<r_H. Instead ε,δ >Δ =r_H =the next 10^{40}X smaller fractal scale Mandelbrot set at the Fiegenbaum point.

Appendix F

Review This is an Occam's razor *optimized* (i.e.,(δC=0, ||C||=noise)

POSTULATE OF 1 So

z=zz (1) is the algebraic definition of 1,o,**add real constant C (i.e., z'=z'z',δC=0) (2)**,z∈{z'}

Recall from eq.7 that dr+dt=ds. So combining in quadrature eqs 7&11 SNRδz=(dr/ds+dt/ds)δz =((dr+dt)/ds)δz=(1)δz (11c,append) and so having come *full circle* back to postulate 1 as a real eigenvalue (1≡Newpde electron). So we really do have a binary physics signal. So, having come *full circle* then: (**postulate 1⇔ Newpde**)

Digital communication anology: Binary (z=zz) 1,0 signal with white noise δC=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 (δC=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 δC=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.)