A generally covariant *generalization* of the Dirac equation that does not require gauges (Newpde)

Ultimate Occam's razor (observable)

Note an ultimate Occam's razor[*observable*(1) requires an *observer*(C)] i.e., it is just **1**+C.
So this bracketed Occam's razor *simplicity* requirement motivates every step. Thus* we merely

Postulate 1 with the *simplest* algebraic definition of 1 z=zz (Thus z=**1,0**) and most *simply* add the **C** in z'=z'z'+C with the *simplest* C a (at least local) constant (δC=0). Note the infinite number of unknown z',C (in z'=z'z'+C **eq.1**) and the single *known* C=0 (since z=zz+0 was postulated so z=1,0∈{z'}) that at least allows us to plug that z=**1,0** in for z' in z'=z'z'+C. So

z=**0**=z'=z_o in the iteration of **eq.1** using δC=0 ***generates*** the (2D)Mandelbrot set C=C_M=end**

(Need iteration to get all the Cs because of the δC=0 (appendix), end=10^{40N}X fractal scales)

z=**1**, z'=1+δz substitution into **eq.1** using δC=0 (N>0 ≡observer)gets eq5 so 2D Dirac eq.(e,*v*)

(Eq.5 gives the Minkowski (flat space) metric, Clifford algebra γ^i and eq.11 ***in one step.***)

These two **z=1** and **z=0** steps together (4D z=1 γ^i orthogonality) get the curved space 2D+2D=4D **Newpde** (3) and thus the 4D universe, no more and no less. So **postulate 1**→ **Newpde**!!!

(Newpde: $\gamma^\mu\sqrt{(\kappa_{\mu\mu})}\,\partial\psi/\partial x_\mu=(\omega/c)\psi$, κ_{oo}=1-r_H/r=1/κ_{rr}, r_H=($2e^2$)(10^{40N})/(mc^2). **N**=..**-1,0,1**,..fractal)

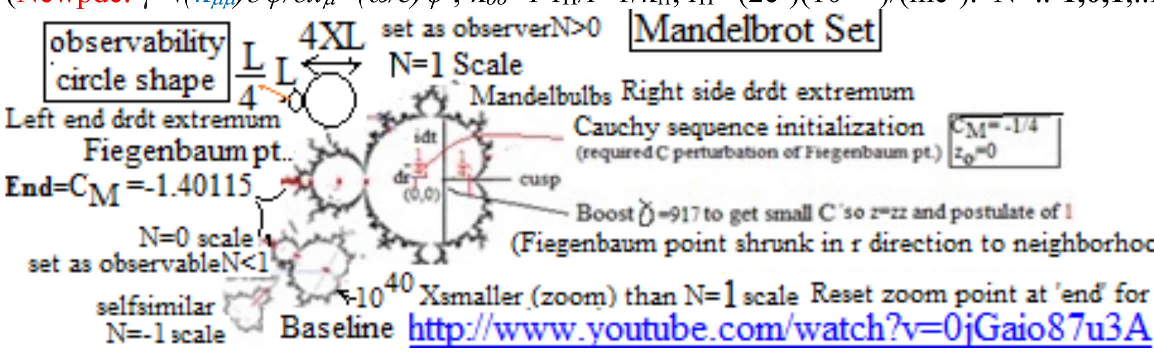

Fig.1

Note that the Newpde κ_{ij} contains a Mandelbrot set(6) $e^2 10^{40N}$ **N**th fractal scale source(fig1) term (from eq.13) that also just happens to successfully **unify theoretical physics.** For example:
For **N**=-1 (i.e.,e^2X10^{-40}≡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**=0 Newpde r=r_H $2P_{3/2}$ state composite 3e is the baryons (sect.2, partII) and Newpde r=r_H composite e,*v* is the 4 Standard electroweak Model Bosons (4 eq.12 rotations→appendixA)
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** 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!

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,*v*. So we didn't just drop the $\kappa_{\mu\nu}$ (as is done in ref.1)

(4) Here κ_{oo}=1-r_H/r=1/κ_{rr}, r_H =(2e^2)($10^{40\mathbf{N}}$) /(mc^2). The **N**=..**-1,0,1**,.. fractal scales (eqs.13,14,15)
(5) 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^{40N}Xselfsimiilar scale jump: Fig1)

* I found that there is a problem with the 1928 Dirac equation(1). In (spherical symmetry):
$(\gamma^x\sqrt{\kappa_{xx}}dx+\gamma^y\sqrt{\kappa_{yy}}dy+\gamma^z\sqrt{\kappa_{zz}}dz+\gamma^t\sqrt{\kappa_{tt}}idt)^2= \kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$ (1)
Dirac set $\kappa_{xx}=\kappa_{yy}=\kappa_{zz}=\kappa_{tt}=1$ so flat space(2) in his equation(1) when we know in general space is not flat, there are forces. So over the past 100 years (since 1928, ref.1) people have had to try to make up for that(flat space) 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 Dirac noticed this too and even, toward the end of his life, tried his hand at *fixing* κ_{ij} . See Chapter 15 of the Memorial Volume "Paul Adrian Maurice Dirac: R,eminiscences about a Great Physicist", edited by Behram N. Kursunoglu and Eugene Paul Wigner. There Dirac mentions "a different kind of Hamiltonian" which indeed would change κ_{ij}. Richard Feynman too felt very uncomfortable with "these rules of subtracting infinities" (renormalization, yet another unfortunate consequence of setting κ_{ii}=1) and called it a "shell game" and "hocus pocus, "Renormalization", Oct 2009). Even more recently, Lewis H. Ryder in his text "Quantum Field Theory" (edition 1996, page 390) lamented "there ought to be a more satisfactory way of doing things".

Well, we found it here: The N=0 higher order Taylor expansion terms(4) in $\sqrt{\kappa_{ij}}$ gives the anomalous gyromagnetic ratio and Lamb shift *without* the renormalization and infinities (appendix D3). It is of tremendous value to QM to not require renormalization anymore anywhere and yet still get those well known high precision (qed) quantitative results from a mere Taylor expansion(D4). This result, and that ultimate Occam's razor single postulate, creates a new paradigm that sets us back on course of seeking fundamental theoretical physics again (i.e., **postulate** 1).

This fundamental Newpde(3) is derivable, if κ_{ii} is known, from the part between brackets in: $(\gamma^x\sqrt{\kappa_{xx}}dx+\gamma^y\sqrt{\kappa_{yy}}dy+\gamma^z\sqrt{\kappa_{zz}}dz+\gamma^t\sqrt{\kappa_{tt}}idt)^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$. Dirac's 1928 guess of flat space $\kappa_{xx}=\kappa_{yy}=\kappa_{zz}=\kappa_{tt}=1$ (in his equation(1)) was *not* fundamental since in general space is not flat*, is curved so generally covariant. A *truly* fundamental κ_{ij} must instead be derived from

*** Ultimate Occam's Razor**
Note Ultimate Occam's Razor(UOR) observer (unknown C) must accompany ultimate Occam's razor known **1** (observable). UOR here means *ultimate* simplicity, the *simplest* idea imaginable. So for example z=zz is *simpler* than z=zzzz. Therefore 1 (In this UOR context uniquely algebraically defined by z=zz) is this ultimate Occam's razor **postulate** since 0 (also z=zz) postulates literally *nothing*. Recall the algebraic definition of postulate **1** as 1=1X1 with (since 0=0X0 is also in z=zz), 0X1=0,1=1+0 here defining the set {**1**,1+0}
contrasted with that UOR set {**postulated,unpostulated}≡{1,**1+C} since 1C=C is trivial and 1+C is not. UOR is most *simply* algebraically defined as {simple, unknown simple}) ≡ {postulate1; postulate1+unknownC} ≡ {z=zz; z'=z'z'+C,z∈{z'}} if unknown constant C (so δC=0). It is called "{simple,unknown simple}" because C could be 0 in z'=z'z'+C as well.

Ultimate Occam's razor (observable)

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Postulate 1 with the *simplest* algebraic definition of 1 z=zz (Thus z=**1,0**) and most *simply* add the **C** in z'=z'z'+C with the *simplest* C a (at least local) constant ($\delta C=0$). Note the infinite number of unknown z',C (in z'=z'z'+C **eq.1**) and the single *known* C=0 (since z=zz+0 was postulated so z=1,0∈{z'}) that at least allows us to plug that z=**1,0** in for z' in z'=z'z'+C. So

z=**0**=z'=z_o in the iteration of **eq.1** using $\delta C=0$ ***generates*** the (2D)Mandelbrot set C=C_M=end**

(Need iteration to get all the Cs because of the $\delta C=0$ (appendix), end=10^{40N}X fractal scales)

z=**1**, z'=1+δz substitution into **eq.1** using $\delta C=0$ (N>0 ≡observer)gets eq5 so 2D Dirac eq.(e,ν)

(Eq.5 gives the Minkowski (flat space) metric, Clifford algebra γ^i and eq.11 ***in one step.***)

These two **z=**1 and **z=0** steps together (4D z=1 γ^i orthogonality) get the curved space 2D+2D=4D **Newpde** (3) and thus the 4D universe, no more and no less. So **postulate 1**→ **Newpde**!!! (Newpde: $\gamma^\mu \sqrt{(\kappa_{\mu\mu})}\partial\psi/\partial x_\mu=(\omega/c)\psi$, κ_{oo}=1-r_H/r=1/κ_{rr}, r_H =(2e^2)(10^{40N})/(mc^2). **N**=..**-1,0,1**,..fractal)

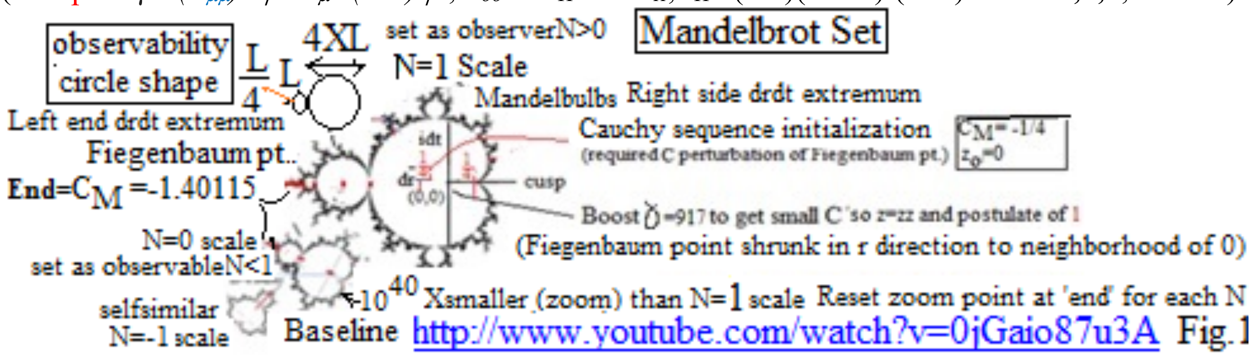

Fig.1

Results of our plugging z=z' into eq.1

All I did here is to postulate1 and **prove it's observable:** Eq.11: $p_x\psi=-i\hbar\partial\psi/\partial x$ is the well known ***observables*** (p) definition, ψ is from Newpde(3). So that 1 observable is the electron. Note also eq.11 *real number* eigenvalue observability (eg.,.dr noise) derived from our right side –¼ initiated Cauchy sequence(7), Ch.2,=reals: also our Mandelbrot set iteration sequence there!

Therefore N=0 **postulate** 1 can also be used in a list-define math to get the *real number* algebra (without all those many Rel#math axioms).Eg., 1∪1≡1+1 (B2,Ch.2). So we get both the physics (See ref.5) AND (rel#)mathematics from ONE postulate1, everything! We finally figured it out!

Compare and contrast

The core of mainstream physics is the Standard electroweak Model (SM) that gives us important results like Maxwell's equations and weak interaction theory that explain electricity and magnetism and some radioactive decays respectively. Add to that QCD that explains the nuclear force (NF) and baryons. General Relativity (GR) gives us gravity and mechanics. But they are not fundamental since they contain *many assumptions* (Lagrangian densities, free parameters, many dimensions, gauge symmetries,..etc.,) of unknown origin.

In contrast

what if you found instead a mathematical theory with only one *simple assumption* (eg., '1', defined from z=zz since 1=1X1) using a *single* simple math step (eg., just add C to 1) top down that got a *generally covariant generalization of the Dirac equation that does not require gauges(*Newpde, next page) that in turn gave these same results (i.e.,SM particles, NF, GR,QM in ref.5 & real#)? You will then have a truly *fundamental* theory. which is: **Postulate** 1

1+C

Algebraic definition of 1 is z=zz so (z=**1**,**0**), add constant C (so δC=0) to get z'=z'z'+C (**eq.1**)
z=zz postulated so z=**1**,**0**∈{z'}. (hence the **two step 1**,**0** plug in into z' in eq.1.)

Appendix Details of those two z=0, z=1 steps

First show that δz can be complex. Thus plug z'=**1**+δz into eq.1 and get δz+δzδz=C (3)

For real C<-¼ $\delta z = (-1 \pm \sqrt{1+4C})/2$=dr+idt (4)

is complex (for N=0 fractal scale. For N=1 observer δz'=10^{40N}δz=10^{40N}dr +10^{40N}idt=dr'+idt').

Eq.4 does *not* solve that 1+C problem, Again ,those **two steps** (later combined) solve it.

1st step:

z=0=z_o=z' To find *all* C substitute z' on left (eq.1) into right z'z' repeatedly and get iteration $z_{N+1}=z_Nz_N-C$. Constraint δC=0 requires us to reject the Cs for which -δC=δ($z_{N+1}-z_Nz_N$)= δ(∞-∞)≠0 gives the **Mandelbrot set** C_M.

2nd step:

z=1 in z'=**1**+δz in eq.1 get eq.3 (For N=1, |δz|>>1): δ(δz+δzδz)=δδz(1)+ δδz(δz)+(δz)δδz≈ ≈δ(δzδz)=0=(plug in eq.4)= δ[(dr+idt)(dr+idt)]= δ[(dr^2-dt^2) +i(drdt+dtdr)]=0 (5)

=(Minkowski metric(9))+i(Clifford algebra)

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 (→±**e**) dr+dt=ds, dr-dt=ds ≡ds_1 , for $(-dr-dt)^2=ds^2$→ Ist and IVth quadrant in fig3 (7)

Also note the positive scalar drdt of eq.7 (so *not* eq.10 vacuum) implies 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 Clifford algebra

$(\gamma^i\gamma^j+\gamma^j\gamma^i)=0$, i≠j. (7a)

(→light cone *ν*) dr+dt=ds, dr=-dt, for $(-dr-dt)^2=ds^2$→ III quadrant (8)

" " dr-dt=ds, dr=dt, for $(-dr-dt)^2=ds^2$→ II quadrant (9)

(→vacuum,z=1) dr=dt, dr=-dt so dt=0=dr (So eigenvalues of dt, dr=0 in eq.11) (10)

We square eqs.7,8,9 ds_1^2=(dr+dt)(dr+dt)=(-dr-dt)(-dr-dt =[dr^2+dt^2] +(drdt+dtdr) ≡$ds^2+ds_3=ds_1^2$. Since ds_3 (is max or min) and ds_1^2 (from eq.7,8,9) are invariant then so is **Circle** $ds^2=dr^2+dt^2=ds_1^2-ds_3$. (with this circularity being unaffected for a wide range 0→10^{40}X of |δz|>1 perturbations) also implying the rest of the Cifford algebra $\gamma^i\gamma^i=1$ in eq.7a, no sum on 'i'). Note this separate ds is a minimum at 45° given the eq.7 constraints and so Circle≡δz=$dse^{i\theta}$= $dse^{i(\Delta\theta+\theta_o)}$ = $dse^{i((\cos\theta dr+\sin\theta dt)/(ds)+\theta_o)}$, θ_o=45°.(δz in fig.6). We define k≡dr/ds, ω≡dt/ds, sinθ≡r, cosθ≡t.

$dse^{i45°}$≡ds'.Take ordinary derivative dr(since (flat space) of 'Circle' $\frac{\partial\left(dse'^{i\left(\frac{rdr}{ds}+\frac{tdt}{ds}\right)}\right)}{\partial r} = i\frac{dr}{ds}\delta z$ so $\frac{\partial\left(dse^{i(rk+wt)}\right)}{\partial r} = ik\delta z, \quad k\delta z = -i\frac{\partial\delta z}{\partial r}$ (11).

(<F>*= ∫(Fψ)*ψdτ=∫ψ*Fψdτ =<F> Hermitian) from right side real number Cauchy seq.starting at –¼ iteration case of the Mandelbrot set iteration(7), Ch.2,sect.2, with small C limit making *real eigenvalues* (eg.,noise) likely. The observables dr→k→p_r condition gotten from eq.11 **operator formalism(**10) thereby converting eq.7-9 into Dirac eq. pdes (4XCircle solution in left side fig.1 also implies observability). 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 becomes the familiar $p_r\psi = -i\hbar\frac{\partial\psi}{\partial r}$ (11)

Repeat eq.3 for τ, μ respective δz lobes in fig.6 so they each have their own neutrino *ν*.

δC=0 gives that 45° extreme but it also applies to *local* constants (extremum peaks and valleys): ****end** $\delta C = \left(\frac{\partial C}{\partial r}\right)_t dr + \left(\frac{\partial C}{\partial t}\right)_r idt = 0$. For that fig.1 4X sequence of circles drdt= $darea_M \neq 0$ (so eq.11a observables) the real δC=0 extremum from $\lim_{m\to\infty} \frac{\partial C}{\partial area_m} dr_m$=KX0 =0 (since $dr_\infty \approx 0$) at Fiegenbaum point $=f^\alpha$=(-1.40115.,i0)=C_M≡end. Random circles thus 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 $S_N C_M = 10^{40N} C_M$ in eq.13

z=1,z=0 steps combined (on Circle with small C boost):

Postulate1 *also* implies a small C in eq.1 which thereby implies a (Minkowski metric Lorentz contraction(9)) 1/γ boosted frame of reference(fig.6) in the eq.3 $C=C_M/\gamma \equiv C_M/\xi_1 = \delta z' = \Delta$ for next small smaller fractal scale $N_{ob}<0$ so δz'<<1 (composite 3e: sect.2 and PartII). For N=0 eq.5 (which is true only for N>0) and so eq.7 is not quite true (and δz in eq.11 perturbed). But we keep $\delta ds^2=0$ (circle) in eq.5, on the 4X circles so we must have an angle perturbation of big N=1 dr,dt for θ_o=45°on above **ds Circle** and so a slightly modified eq.7

$$(dr-\delta z')+(dt+\delta z')\equiv dr'+dt'=ds \qquad (12)$$

N_{ob}=0 extremum eq.12 rotations (observer at N=1, eq.7 dr+dt=ds constraint)

Recall 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=θmodulo45° is pinned to an axis' so extreme Δθ≈±45°=δz'. So in eq.12 the 4 rotations 45°+45°=90° define 4 Bosons (appendix A).

But for 45°-45° $N_{ob}<0$ then contributes so you also have other (smaller) fractal scale extreme δz'(eg.,tiny Fiegenbaum pts so N=1 dr=r, for $N_{ob}<0$) so metric coefficient $\kappa_{rr} \equiv (dr/dr')^2 = (dr/(dr-(C_M/\xi_1)))^2 = 1/(1-r_H/r)^2 = A_1/(1-r_H/r) + A_2/(1-r_H/r)^2$. The partial fractions A_I can be split off from RN and so $\kappa_{rr} \approx 1/[1-((C_M/\xi_1)r))]$ (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 GR applications(9). Note added 2D eq.12 δz perturbation $x_1,x_2 \rightarrow x_1,x_2,x_3,x_4$ are curved space independent x_i so 2D⊗2D=4D. But $(dx_1+idx_2)+(dx_3+idx_4) \equiv dr+idt$ with($dr^2=dx^2+dy^2+dz^2=(\gamma^x dx+\gamma^y dy+\gamma^z dz)^2$)orthogonalization from eq7a, eq.5 $dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$ =(eq.14)= $(\gamma^x \sqrt{\kappa_{xx}}dx+\gamma^y \sqrt{\kappa_{yy}}dy+\gamma^z \sqrt{\kappa_{zz}}dz+\gamma^t \sqrt{\kappa_{tt}}idt)^2 = \kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2 = ds^2$.Multiply both sides by $1/ds^2$& $(\delta z/\sqrt{dV})^2 \equiv \psi^2$ and using operator eq 11 inside the brackets ( ) implies the 4D**Newpde** $\gamma^\mu(\sqrt{\kappa_{\mu\mu}})\partial\psi/\partial x_\mu = (\omega/c)\psi$ for e,ν, $\kappa_{oo}=1-r_H/r=1/\kappa_{rr}$ $r_H = e^2 X10^{40N}/m$ (**N**=. -1,0,1.,) (16) $=C_M/\gamma$ (from sect.2) C_M=Fiegenbaum point. So: **postulate**1**→Newpde.** syllogism

*Still need 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 N=0 Small C boost circle observables. Note that real component of eq.5 is Minkowski metric implying possible Lorentz transformation Fitzgerald contraction C/γ boosted C frames of reference. From eq.3 for N=0:C≈δz and C→C/γ=C_M/γ≡C_M/ξ. So from eq.3 for N=0 in eq.12 C_M/ξ=δz (eq.17)
(C_M/ξ=δzδz for N=1) . So δC_M=0=δδzξ+δξδz=0 (N=0). If **z=0** then δz'=−1 is big for N=0. In δC_M=0=δδzξ+δξδz=0 for ξ small then δξ has to be small and so ξ is stable, electron ξ_o=Δε=ε. for **z=1** then δz is small on N=0 thus δξ and ξ are both big so unstable and large mass .
Recall N>0≡observer. The Laplace Beltrami method (D4)gives what the N>1 observer sees *we see* (huge N=1 cosmological motion) so we see it.

N=1 small C boost so postulate observable1 (e) Recall the Mandelbrot set in small C boost C_M=ξC sect.2. From eq.3 δz+δzδz=C or observer N=1 δzδz=C. The 68.7° is from eq3 quadratic equation at the Fiegenbaum point. with the limacon e intersection 45° from minimum ds^2. μ then is not a constant in time because of eq.12 angle New pde zitterbewegung contribution to the δz chord perturbation of the 45°. The electron is the 45° minimum L=1. The 45° intersection chord with that Mandelbulb is μ (fig6 below.). The 68.74° tiny Mandelbulb is the tauon. But what if we constructed instead from the limacon 'e' composite 3e $2P_{3/2}$ state at r=r_H requiring a mass constraint of $2m_p$ ≥ mass of the respective Hund rule free particle $2S_{1/2}$ (≡ the tauon τ) plus $1S_{1/2}$ (≡ muon μ) states? The reduced mass is then the proton that then also generates the γ boost on the m_e s that gives us that small C and the **postulate**1 (observable e).
45°electron |δz|=**1** in eq.11b so **1**/(Mandelbulb radius)^2=mass

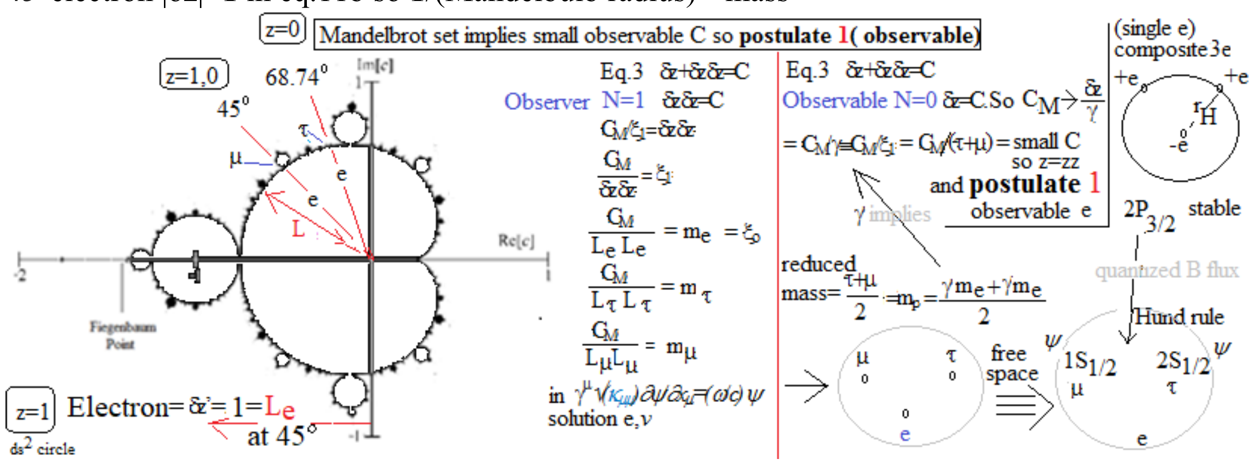

Fig.6 **Conclusion**
So the small C at the end was required. So we really did just **postulate 1**

3e Stability: We can actually calculate m_p from the quantization of the magnetic flux h/2e=Φ_0=BA..Using the Mandelbrot set $2m_p$ =τ+μ+e=ξ_1 (which just sets h) and the Mercuron equation D15 for μ and also use the location of object B to find the actual magnitude of m_e.(eqD9). Also *stability* is implied by (dt'^2=(1-r_H/r)dt^2) since clocks stop at r=r_H. That 3rd mass also reverses the pair annihilation with virtual pair creation inside the r_H volume given σ=πr_H^2≈(1/20)barns.which is the reason why only composite 3e gives stability and not other larger composites(except multiples of 3e itself). Note here we also derived baryon physics (m_p). The ground state m_e (from the 67.8° line on the Mandlebrot set) from z=1, ds at 45° as a fraction of the tauon mass m_e=ξ_0=Δε=.0005799. (18)

2.1 C=-¼ (right)min-max *Right end Big* limacon at z=-¼, Real eigenvalues(2)

On the right end minimum of the ||C|| maxima extremum of the Mandelbrot set we get the Mandelbrot set iteration formula starting from extremum $z_o=0$, $C_M=-\frac{1}{4}$ that is *also* uniquely a Cauchy sequence(2) of rational numbers (since the sequence started with a rational number -¼) then -¼=0X0- ¼ ; -3/16= (-¼) (-¼)–¼, etc., with limit 0 that implies that 0 in our (later) small C' uncertainty neighborhood limit application region has a nonzero probability of being a real number dr so we have **real eigenvalues** (in dr and so k in eq.11) for our later small C limit neighborhood (sect.3.1). Also since right side extremum –¼≥C (in relδz'$=rel\frac{\delta z}{\gamma}=\frac{C_M}{\gamma}=\frac{rel\frac{-1\pm\sqrt{1+4C}}{2}}{\gamma}=\frac{dr}{\gamma}$) and γdt=dt'≠0 so the Hamiltonian (operator) exists and so N=0 observability

.

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≈δz' (from eq.3) =real distance =realδz/γ =1.4011/γ=C_M/γ ≡C_M/ξ_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 **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) $=\log 10^{80}/\log 10^{40}=\log(10^{40})^2)/\log(10^{40})=2$. (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=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.**

2.2 Results: What makes this all work is **postulate 1** (z=zz so z=1,0). Add constant C (δC=0) and get z'=z'z'+C (eq1). z=zz postulated so z=1,0∈{z'}. (Get **Postulate**1→Newpde). Postulate 1 is the simplest idea imaginable: a Occam's razor theory. We *also* get the *actual* physics with the Newpde (Therefore the usual postulating of hundreds of Lagrange densities, 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 γ=917 positrons and so the Fitzgerald **contracted E field lines *are* the strong force**: we finally understand the strong force! So these two positrons then have big mass *two body* motion(partII) so **ortho(s,c,b) and para(t) excited (multiplet) states** understood**.** Eq.12 implies Composite e,*v* at $r=r_H$ is **the electroweak SM** (appendixA) **Special relativity** is that Minkowski result. **With the Eqs.16 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: **we just derived the expansion of the universe in one line.** The Newpde appendix C derivation of those precision QED values (eg.,Lamb shift sect.D) allow us to **abolish the renormalization and infinities.** So there is no need for those many Lagrangian density postulates anymore, just postulate1 instead.

Real# Mathematics from Postulate 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.) and Cauchy sequence proof (2)of real number eigenvalues (sect.2.1,Ch.2) from a Cauchy sequence of rational numbers as a special case of the Mandelbrot set iteration formula starting –¼ . 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 (11a,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**)

Mathematical Notion (of postulate 1⇔Newpde)

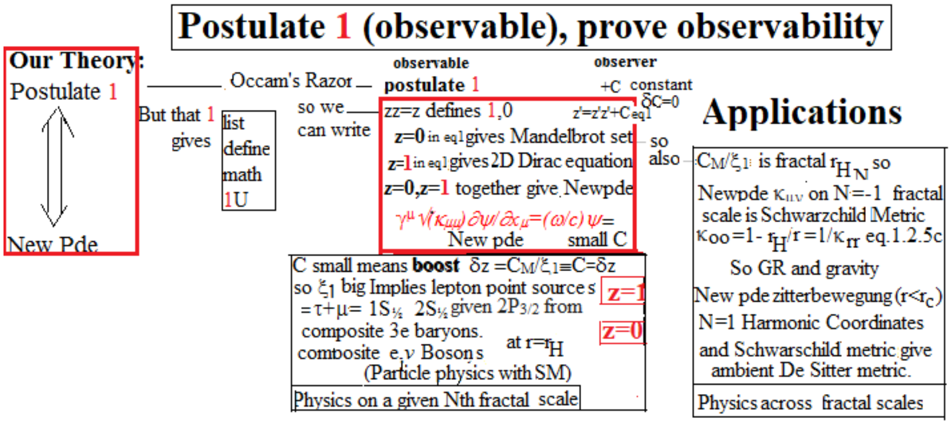

fig.5

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!

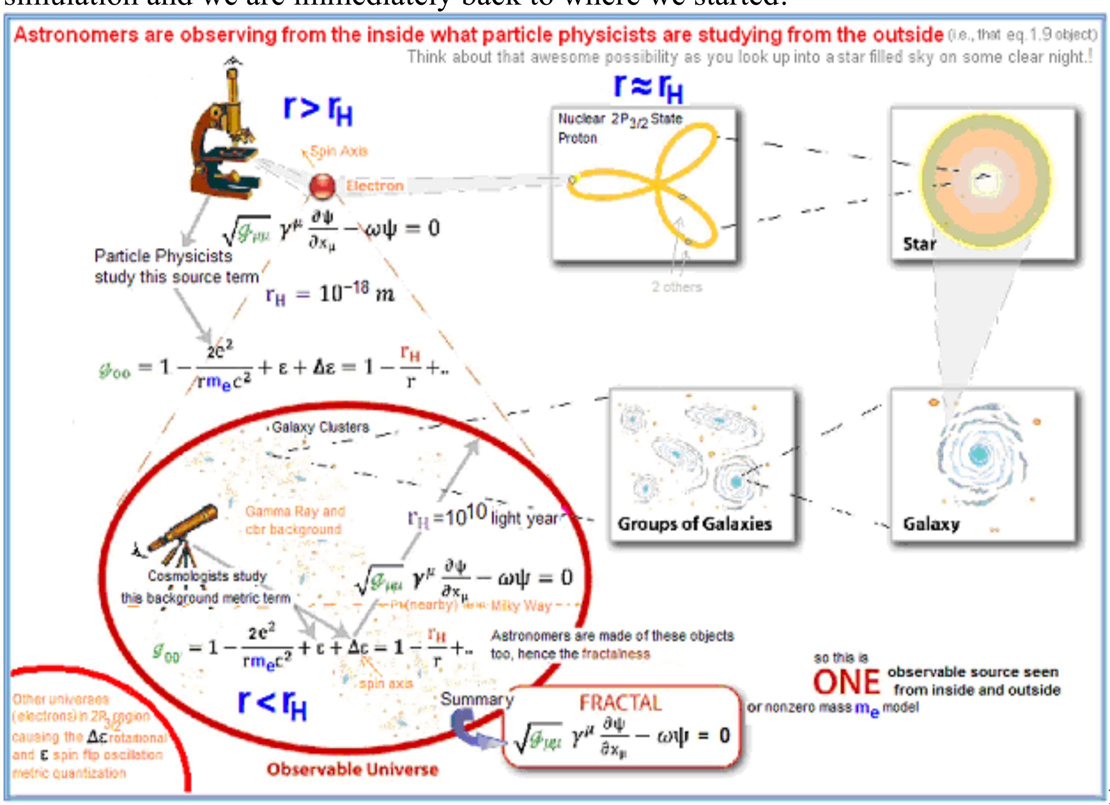

fig2

(↑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.
(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

Appendix A: z=0, N=0 (composite e,v at r=r_H from eq.12)

The New pde also has an associated field theory coming out of eq.12 implications with z=0 so large δz' angle (++45°extremum, sect.1)=θ. Since observer N>0, so arbitrarily large θ∝ δz>>1 so Δθ= θModulo45°. Here all four Δθ±45°X2 rotations of **Composite e,*v*** implied by eq.12.

A1 I→II, II→III,III→IV,IV→I rotations in eq.7-9 plane Give SM Bosons

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. 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. For z=1, δz' small so 45°-45° small angle rotation in figure 3. Do the same with the time t and get for z=0 rotation of 45°+45° (fig.4) then $\theta\theta\delta z'=(d^2/dr^2)z'+(d^2/dt^2)z'$ (A1)

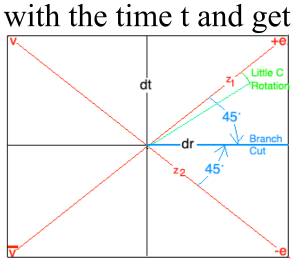

fig.3. for **45°-45°** eq.16 case: **leptons**

So ΔS=**½+½** =1 or ½-½=0. So ΔS=½+½=1 making 2 body (at r=r_H) S=1 Bosons. 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".**

A3 Newpde r=r_H, z=0, 45°+45 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° 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: $C=z''=[e_L,\bar{\nu}_L]^T \equiv z'(\uparrow)+z'(\downarrow) \equiv \psi(\uparrow)+\psi(\downarrow)$ has a eq.12 infinitesimal unitary generator $z''\equiv U=1-(i/2)\varepsilon n*\sigma)$, $n\equiv\theta/\varepsilon$ in $ds^2=U^tU$. But in the limit $n\rightarrow\infty$ we find, using elementary calculus, the result $\exp(-(i/2)\theta*\sigma)=z''$. 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 $(dr^2+dt^2+..)z''=(dr^2+dt^2+..)e^{\text{quaternionA}}$Bosons because of eq.A1. Then use eq. 12 to rotate: z'':

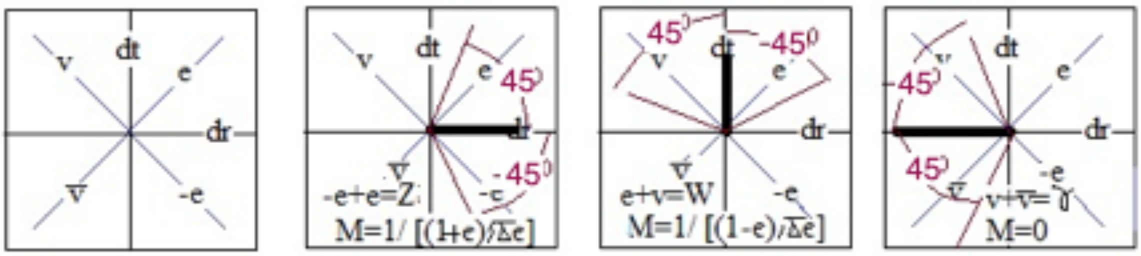

fig4

Fig.4 applies to eq.9 **45°+45°**=90° case: **Bosons.** 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 *v* 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,*v*** on those required large z=0 eq.9 rotations for $C\rightarrow0$, 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 II→III 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 *v* and anti*v*

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 $dr^2\delta z=(\partial^2/\partial r^2)(\exp(iA_r+jA_o))=(\partial/\partial r[(i\partial A_r\partial r+\partial A_o/\partial r)(\exp(iA_r+jA_o)]$ $=\partial/\partial r[(\partial/\partial r)iA_r+(\partial/\partial r)jA_o)(\exp(iA_r+jA_o)+[i\partial A_r/\partial r+j\partial A_o/\partial r]\partial/\partial r(iA_r+jA_o)(\exp(iA_r+jA_o)+$ $(i\partial^2Ar/\partial r^2+j\partial^2A_o/\partial r^2)(\exp(iA_r+jA_o)+[i\partial A_r/\partial r+j\partial A_o/\partial r][i\partial A_r/\partial r+j\partial/\partial r(A_o)]\exp(iA_r+jA_o)$ (A3)

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

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

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

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

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)

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

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

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

The Lorenz 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 works.

A5 Other 45°+45° Rotations (Besides above quadrants II→III)

For the **composite e,*v*** 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,IV→I) unless $r_H=0$ (II→III) 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/√(1-Δε/(1-ε)-r_H/r)]-1=[1/√(Δε/(1-ε))]-1. E_t=E+E=2/√(Δε/(1-ε))=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/√(1-Δε/(1-ε)-r_H/r)]-1=[1/√(Δε/(1-ε))]-1. E_t=E+E=2/√(Δε/(1-ε))=W- mass.
E_t=E-E gives E&M that also interacts weakly with weak force.
IVth → Ist 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/√(1-Δε/(1+ε)-r_H/r)]-1=[1/√(Δε/(1+ε))]-1. E_t=E+E=2/√(Δε/(1+ε))-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.
IInd→IIIrd quadrant rotation through those 2 neutrinos gives 2 objects. $r_H=0$
$E=1/\sqrt{\kappa_{oo}}$ -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 $m_ec^2 \equiv \langle H_e\rangle$ is the fundamental Hamiltonian eigenvalue defining idea for composite e,v, $r=r_H$ implying Fermi 4 point E= $\int\psi^tH\psi dV=\int\psi^t\psi HdV=\int\psi^t\psi G$
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 $\iiint_0^{r_{rH}}\psi_1\psi_2\psi_3\psi_4 dV=2G\iiint_0^{r_H}\psi_1\psi_2\frac{1}{V^{1/2}}\frac{1}{V^{1/2}}V$

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

Application of Eq.A8 To Ortho states (created by that $2P_{3/2}$ *2body* motion at $r=r_H$)
The composite 3e ortho state (partII) operator adds spin (eg., as in 2[nd] derivative eq.A1) so 2[nd] derivative $\Sigma((\gamma^{\mu}\sqrt{\kappa_{\mu\mu}}dx_{\mu})-i\kappa)(\gamma^{\nu}\sqrt{\kappa_{\nu\nu}}dx_{\nu}+i\kappa)\chi=\Sigma((\gamma^{\mu}\sqrt{\kappa_{\mu\mu}}dx_{\mu})-i\kappa)\psi$ so $\frac{1}{2}(1\pm\gamma^5)\psi=\chi$. 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 $\chi=\psi_2\equiv\frac{1}{2}(1-\gamma^5)\psi=\frac{1}{2}(1-\gamma^5 e^{i3\phi/2})\psi$. Initial $2P_{1/2}$ electron ψ is constant. Start with initial ortho state χ. These γ^5 terms then modify equation A8 to read $=\iiint_0^{V_{rH}}\psi_1\psi_2(2m_ec^2)dV_{rH}=\iint\psi_{S1/2}{}^*(2m_ec^2V_{rH}))\chi dV_{\phi}=K\int\langle e^{i\frac{i\phi}{2}}[\Delta\varepsilon V_{r_H}]\left(1-\gamma^5e^{i\phi\frac{3}{2}}\right)\psi\rangle\,d\phi=KG_F\int\langle e^{i\phi/2}-\gamma^5ie^{i(4/2)\phi}\rangle d\phi=KG_F\left(\frac{2e^{i\phi}}{i}\big|_0^{2\pi+C}-\frac{2\gamma^5e^{i4\phi}}{i4}\big|_0^{2\pi+C}\right)=$ $k1(1/4+i\gamma^5)=k(.225+i\gamma^5 0.974)=k(\cos 13°+i\gamma^5\sin 13°)$ **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

Review of $2P_{3/2}$ Next higher fractal scale (X10[40]), cosmological scale proton.Observor inobjectA

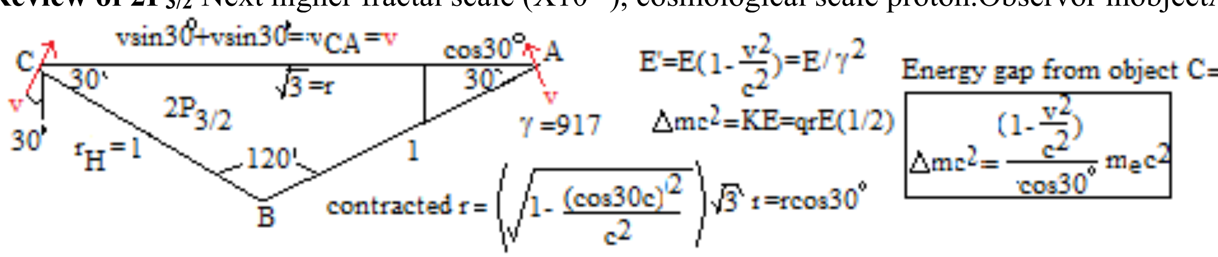

Fig5 Recall from D9 $m_ec^2=\Delta\varepsilon$ is the energy gap for object B vibrational stable iegenstates of composite 3e(partII). Recall for the positron motion $\gamma=\frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$=917 and $E=(1/917^2)E'$(from Feynman's lectures) in the forward or backward direction of the CA line (since vsin30°+vsin30°=v) 1/cosθ away from forward direction line(the weakest E field direction), toward the line in the object B direction. But object C is 30° from object B direction and ½Eqr =KE for circular motion with v 30° from object B direction object C scissors eigenstates of r/cosθ (= the only variable r in Frobenius solution) Ch.8,9 instabilities Also recall law of cosines $r^2=1^2+1^2+2(1)(1)\cos 120°=3$, So relative to the A-B line Fitzgerald contract $r=\sqrt{1-\frac{\cos^2 30°c^2}{c^2}}\sqrt{3}=.866=\cos 30°$. Making object C appear .866X closer than object B. So to make object C appear as the same distance as object B (to compare with m_ec^2) d*ivide* by cos30°. Allowing us to finally compare the energy gap caused by object C to the energy gap caused by object B. So $Eqr=\Delta E=(m_ec^2/((\cos 30°)917^2)=m_ec^2/728000$. So energy gap caused by object C is is $\Delta E=(m_ec^2/((\cos 30°)917^2)=m_ec^2/728000$. The weak interaction occurs inside of r_H with those electrons m_e. The G can be written for E&M decay as $(2mc^2)XVr_H=2mc^2[(4/3)\pi r_H^3]$.
So for weak decay from equation A8 it is $G_F=(2m_ec^2/728{,}000)Vr_H=$**$G_F$ the strength of the Fermi weak interaction constant** which is the coupling constant for the Fermi 4 point weak interaction. Note $2m_ec^2/729{,}000=1.19X10^{-19}$J.So $\Delta E=1.19X10^{-19}/1.6X10^{-19}=.7$eV which is our ΔE gap for the weak interaction inside the 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**

B2 List-Define Mathematics from postulate 1 (Chapter2 for details)

So in postulate 1 z=zz why did 0 come along for the ride? There is a deeper reason in set theory**.** Note ∅ and 0 aren't really new postulates since they postulate literaly "nothing".

More fundamental than the zz=z {1,0 }solutions is the set theory: {set,∅}

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 l**ist** 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. So from above set {1} (ξ_1 for z=1) has the 0 (ξ_o for z=0 ground state) as a subset. So $\xi_1=\xi_{2S½}+\xi_{1S½}+\xi_o=\tau+\mu+m_e$.(B1)

2D+2D→4D Orthgonality

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 GR applications(9). So from eqs.4,5,14,15 we found the relation between x_i,x_j pairs: $\left(\sum_{i=1}^{2}\gamma^i\sqrt{\kappa_{ii}}dx_i\right)^2=\sum_{i=1}^{2}\kappa_{ii}d^2x_i$ (14a). So given this added 2D. δz perturbation we get curved space 2D⊗2D=4D *independent* x_1,x_2 →x_1,x_2,x_3,x_4. So (dx_1+idx_2)+(dx_3+idx_4)≡dr+idt. One way to impose 4D orthogonality is $dr^2\equiv dx_1^2+dx_2^2+dx_3^2$ at least for r→∞. In that case the right side of eq.14a must have the 2 in the sum replaced by a 4 so that $(\gamma^x\sqrt{\kappa_{xx}}dx+\gamma^y\sqrt{\kappa_{yy}}dy+\gamma^z\sqrt{\kappa_{zz}}dz+\gamma^t\sqrt{\kappa_{tt}}idt)^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$ as a special case (of any 2 x_ix_j): Imposing orthogonality thereby creates 6 pairs of eqs.3&5 .So particles carry their dr+idt complex coordinates around with them (alternatively they are holograms illuminated by the $dr^{2+}dt^2=ds^2$ wave (as 2nd derivative wave equation operators)

Appendix C

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

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 to the new pde so δz*δz is the probability we have just an electron (sect.3). 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 eq.7 has *two* parts (i.e., dr+dt &dr-dt,) that solve eq.3 t*ogether*, same kind of $\delta(p_A-p_B)$ conservation relation as between Alice and Bob; signal, idler,Bell's stuff. We could then label these two parts *observer* and *object* with associated eq.7 wavefunctions δz≡ψ_1,

$\delta z \equiv \psi_2$. So if there is no observer eq.7 (So no ψ_1) then eq.3 doesn't hold at all and so there is no object "observed" wavefunction.ψ_2. Thus the object wave function ψ_2 "collapses" to the wavefunction 'observed' ψ_2 (or eq.5 and so **postulate** 1 does not even hold), if "observed" ψ_1 exists. Then apply the same mathematical reasoning to every other $\delta(pA-pB)$ situation and we will also have thereby derived Bell's theorem and its general cases. Thus we derived the Copenhagen interpretation of Quantum Mechanics QM mathematically, from eq.16 and so first principles **postulate** 1, not from the usual hand waving arguments.

Recall from appendix A dr^2+dt^2 is a second derivative *operator* wave equation(A1), 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.4 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.

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 $\hbar$ 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.

Quantum mechanics is also fractal. In that regard recall that (from sect.1) the postulate of 1 frame of reference (i.e.,small C) *only* allows (ground state) $r' = CM/\xi_1$ for stationary electron *and* composite 3e positron which implies γ=2X917. The central electron then sees the $r_H=2e^2/m_ec^2$. which is a factor of 2γ bigger

Fractal Planck's constant

Recall that $Gm_e^2/ke^2=6.67X10^{-11}(9.11X10^{-31})^2/9X10^9X1.6X10^{-19}=2.4X10^{-43}$. $2.4X10^{-43}X2m_p/me$ $=2.4X10^{-43}X(2(1836))=2.2X10^{-40}$. We rounded this to 10^{-40} which was read off the Mandelbrot set (observable circle) **zoom** as the ratio of the two successive Mandelbrot set lengths.

Recall in eq.12 $r_H=CM/\xi=ke^2/m_ec^2$. C_M is the Fiegenbaum point= -1.40115(10^{40N}), **N**=..,-1,0,1,.. =fractal scale, m_e=electron mass. Solve for m_e in $m_ec^2=ke^2/r_H$. From the Dirac equation (Newpde) double Einstein relation $hf=2m_ec^2$we then solve for h *outside* r_H.$h=(m_e/f)2c^2=10^{-40}h$ Note here then that h is directly proportional to C_M and C_M is fractal $\alpha 10^{40N}$ so Planck's constant is fractal h_N. Note for N=-1 m is small so v is large ($\approx$c). Next plug this result into the uncertainty principle $\Delta x\Delta(mc)\geq\hbar$. So

Different Fractal Quantum Mechanics implied by Mixed State Contributions Outside r_H

A) m_{N-1} *inside* r_{HN-1} uses h_{N-1} (eg.,[$\Delta x\Delta(m_{N-1})$]c=h_{N-1}). $h_{N-1}f=m_{N-1}c^2$). (Usual fractal result. Fractal universe implies $(10^{-40}\Delta x)(10^{-80}m_ec)=h10^{-120}$ $\propto$energy density accounting for that 10^{120}X descrepancy in the qed cosmological constant Λ with GR's (See also sect.7.6.).

B) m_{N-1} *outside* r_{HN-1} uses $h_{N=1}=10^{-40}h$. (eg., [$\Delta x\Delta(m_{N-1})c=h_{N=1}$ (largeΔx) $\Delta x10^{-80}m_ec=10^{-40}h$ then Δx is the size of the universe (~10^{12}LY) and tiny f the frequency of oscillation of the

universe. This is also our old Newpde N=1 case. But for the mixedstate muon $1S_{1/2}$ component $m\mu_{N-1}$, frame of reference f is about 10^5 year period oscillation and $\Delta x=\Delta r=10^5$LY is the size of a galaxy. Note this N=-1 case is gravitational.
Note also that $mv^2/r=kGM/r$ comes from a field with local cylindrical symmetry so that r cancels out allowing us to set $g_{oo}=\kappa_{oo}$ which results in orbital stability. So a mixed pancake shaped $1S_{½}$ state uncertainty cloud in the plane of the galaxy provides gravitational stability for planar structures of this size since it implies the cylindrical symmetry $g_{oo}=\kappa_{oo}$ case in the halo and so metric quantization stability for this shape.(see partIII). Other shapes can exist but they are not as stable and so eventually the flat $1S_{1/2}$ state prevails. Note (from partIII) 100km/sec is this S state metric quantization, 200km/sec P state (barred spiral) metric quantization (so internal square symmetry). If the galaxy Δr gets too large case B above is no longer realized and so the $1S_{1/2}$ state is gone and so the pancake cylindrical symmetry (shape) goes away and so $g_{oo}\neq\kappa_{oo}$ and so the cylindrical shape (metric quantization) stability goes away and so this flat spiral shape disappears and we only have an high entropy elliptical (galaxy) shape left.
So we have explained, with this Planck's constant analysis, why both the universe and (the evolution of) galaxies exist! Also we have shown that Planck's constant is fractal!
So given all these properties of eq.11 New pde ψ *we really have derived Quantum Mechanics.*

Appendix D. N=0 (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, $r_H=2e^2/m_ec^2$, for N=-1 $r'_H=2Gm_e/c^2=10^{-40}r_H$.

Nonzero Generic maximally symmetric (MS) ambient metric

So start 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

$$R_{11}=½\mu''-¼\lambda'\mu'+¼(\mu')^2-\lambda'/r=0 \quad (D1)$$

$$R_{22}=e^{-\lambda}[1+½\,r(\mu'-\lambda')]-1=0 \quad (D2)$$

$$R_{33}=\sin^2\theta\{e^{-\lambda}[1+½r(\mu'-\lambda')]-1\}=0 \quad (D3)$$

$$R_{oo}=e^{\mu-\lambda}[-½\mu''+¼\,\lambda'\mu'-¼(\mu')^2-\mu'/r]=0 \quad (D4)$$

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

(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 $\lambda'=-\mu'$ so that radial $\lambda=-\mu+$constant $=-\mu+C$ where $C=1+\varepsilon$ for our generic nonzero free space metric caused by object B (sect.A7) $C=\xi_1$ because it normalizes into the denominator of $r_H=C_M/\xi_1$ through D9 in sect.D2. So $e^{-\mu+C}=e^{\lambda}$. Then D2 can be written as:

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

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

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

From equation D6 we can identify radial C with also rotational oblateness perturbation $\Delta\varepsilon$ already a component here (D8 below).Mandelbrot set Fig.6 $2m/r=r_H/r=C_M/\xi r=e^{-C}=e^{-i(\varepsilon+\Delta\varepsilon)}$, $\kappa_{oo}=1-e^{-i(\varepsilon+\Delta\varepsilon)}-2m/r$; $e^{-\lambda}=1/\kappa_{rr}=1/(1-2m'/r)$ (D7)

Perturbative self similar rotation providing the ambient metric

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 **perturbation rotations** (dθdt T violation so (given CPT) then **CP violation)** $ds^2=\rho^2\left(\frac{dr^2}{\Delta}+d\theta^2\right)+\left(r^2+a^2\right)\sin^2\theta d\phi^2-c^2dt^2+\frac{2mr}{\rho^2}\left(a\sin^2\theta d\theta-cdt\right)^2$,D9.(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:

$\left(\frac{r^2+a^2cos^2\theta}{r^2-2mr+a^2}\right)dr^2+\left(1-\frac{2m}{r^2+a^2cos^2\theta}\right)dt^2$ θ≠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<<r, r>>2m

$$\left(\frac{(r^\wedge)^2}{(r')^2-2mr}\right)dr^2+\left(1-\frac{2mr}{(r^\wedge)^2}\right)dt^2+..=\left(\frac{1}{\frac{(r')^2}{(r^\wedge)^2}-\frac{2mr}{(r^\wedge)^2}}\right)dr^2+\left(1-\frac{2mr}{(r^\wedge)^2}\right)dt^2. \text{ (D8)}$$

The $(r^\wedge/r')^2$ term is

$\frac{(r')^2}{(r^\wedge)^2}=\frac{r^2+a^2}{r^2+a^2cos^2\theta}=\frac{1+\frac{a^2}{r^2}}{1+\frac{a^2}{r^2}cos^2\theta}\approx 1/g_{rr}(\approx g_{oo})$ (3e frame of refernce z=1: $\xi_1=1+\varepsilon+\Delta\varepsilon$ for Δε)=

$e^C=reale^{i(\varepsilon+\Delta\varepsilon)}$ =τ+μ+Δε=zitterbewegung from 5.1.6.2m/r+eC

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

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

(Replace a^2/r^2 Kerr object B term with inertial frame D7 dragging mass ξ_1. In eq.D8 Subtract $2mr/(r')^2=r_H/r_H$)

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

Kerr metric inertial frame dragging Newpde zitterbewegung oscillation suppression outside object B is $((a/r)\sin\theta)^2=1/g_{rr}=e^{i\varepsilon}$ from D7 in the proper frame. Inside object A $((a/r)\sin\theta)^2=1-\Delta\varepsilon$. Composite 3e frame of refernce Δε→1+ε +Δε (section 2). ε changes with time.

Object B oscillation observed compression in Shapely, rarefaction in Eridanis.

D2 Examples of this ambient metric

N=0 Composite 3e

For z=0 *just inside r_H,* the *two* positrons *each* have constant ψ (N=0 ch.8) inside r_H. So from eq.D9 divide κ_{rr} by 1+ε+ε=1+2ε. So $\frac{1}{\kappa_{rr}}=\left(1+\frac{e^2}{\xi_0 r}\right)(1+2\varepsilon)\equiv 1+2\left(\varepsilon+\Delta\varepsilon-\frac{e^2}{\xi_0 r}\right)$ (D9a

Also divide again by 1+ε for the magnetic field (see appendix C flux of B) maximal symmetry

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

$=\frac{1}{(1+\varepsilon'-2m/\xi_0 r)}dr^2+\left(1-\frac{2m}{r\xi_0}\right)dt^2$, ε'≡ε/(1+ε). (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): $\frac{1}{(1+\varepsilon''-2m/\xi_0 r)}dr^2+\left((1-2m/\xi_0 r)\right)dt^2=ds^2$ (D11)

For z=0→z=1 r>>r_H then ξ_0→τ . Define $\varepsilon' \equiv \frac{\varepsilon}{1+\varepsilon}$Must normalize again so multiply by $\frac{1}{1+\varepsilon'}$ (see D9 for z=1 outside

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

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+Δgy) D15

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

Thus solve eq. D12, D15 with eq.18 values in $\sqrt{\kappa_{rr}}$= 1/√(1+Δε/(1+ε))= 1/√(1+Δε/(1+0))= 1/√(1+.0005799/1). Thus from equations C1,D13,D15:

[√(1+.0005799)](3/2 + ½)= 3/2 + ½(1+Δgy). 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 $1/\kappa_{rr}$ =1+r_H/r_H +ε" = 2+ ε". 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 +ε"= ε " Therefore from equation D15 and case 1 eq.12 $1/\kappa_{rr}$ =1-r_H/r_H+ε"

$\sqrt{\varepsilon''}$ (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

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

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

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

$(dt/ds)\sqrt{\kappa_{oo}}=(1/\kappa_{00})\sqrt{\kappa_{oo}}=(1/\sqrt{\kappa_{oo}})$=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=n²aₒ

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 $\xi_1=m_Lc^2=(m_\tau+m_\mu+m_e)c^2=2m_pc^2$ normalizes ½ke^2 (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.17 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,eq18 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 $\partial g_{ik}/\partial x^j$=**0** as a limit. Then must take field g^{km} =1/0= ∞ 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**)=*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 Laplace Beltrami

The Laplacian of the metric tensor (in Newpde zitterbewegung harmonic local coordinates whose components satisfy Ricci tensor = $R_{ij}=-(1/2)\Delta(g_{ij})$ where Δ is the Laplace-Beltrami second derivative operator) is not zero and the right side is the metric source. Geometrically, the Ricci curvature is the mathematical object that controls the (commoving *observer*) *growth rate of the volume* of metric balls in a manifold in this case given by the New pde source zitterbewegung. Set the phase so real Δg_{ii} is small at time=0 (big bang from r_{bb}) then initial $\sin\theta_o=\sin 90°$. Given the $\varepsilon+\Delta\varepsilon$ on the right side of eq.D2 and eq.D9:

$R_{22}=½\Delta g_{22}=e^{i(\varepsilon+\Delta\varepsilon)}e^{i\pi/2}=\sin(\varepsilon+\Delta\varepsilon)+i\cos(\varepsilon+\Delta\varepsilon)$. (D13)

This is Ricci tensor exterior source to the interior ($r<r_H$) comoving metric.

Recall Recall N>0≡observer. The Laplace Beltrami method (D4)gives what the N>1 observer sees *we see* (huge N=1 cosmological motion) so we see it. Laplace Beltrami for N>1, with inside $\mu\rightarrow i\mu$ tells us what we see of the much larger cosmos from the *inside*. Outsied is sinu and we are in the duzzy edge, So we use the bottom left curve of figure 10 is assumed to be a simple exponential so we use as a source here sinhν for Laplace Beltrami.

Real part R_{22} *commoving inside* r_H for small $i\mu=\varepsilon$ (so sin→−sinh) over large region so neglect tiny $\Delta\varepsilon$: $R_{22}=e^{-\nu}[1+½ r(\mu'-\nu')]-1=-\sinh\nu=(-(e^{\nu}-e^{-\nu})/2)$, $\nu'=-\mu'$ 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 $e^{-\nu}[-r(\mu')]=1-\cosh\mu$. Thus $e^{-\mu}r(d\mu/dr)]=1-\cosh\mu$. This can be rewritten as: $e^{\mu}d\mu/(1-\cosh\mu)=dr/r$. The integration is from $\xi_1=\mu=\varepsilon=1$ to the present day mass of the muon= .06 (X tauon mass) (D14).

We then get: $\ln(r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-\ln[e^{\mu}-1]]2$ (D15)

then $r_{bb}\approx$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 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)

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

$x_i=rz_i$ $2\le i\le n$ 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 $_{HN=-1}$ $\Delta x \Delta(m_{N=-1}c)$=~~ħ~~/2. $m_{N=-1}=10^{-40}m_e$. So $\Delta x=10^5$LY 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* $1S_{1/2}$ state of ground state Δε, so not same state as Δε)

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

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 $\rightarrow L_1$ 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 ε, δ

Diameter of U is defined as

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

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

analogous to the elementary $V=U^s$ where of s=3, U=L then V is the volume of a cube 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 $0\leq s<\dim E$, $H^s(E)=0$ if $\dim E<s<\infty$

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 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 $z_{N+1}=z_N z_N$-C. δC=0 requires us to reject the Cs for which

-δC=δ(z_{N+1}-$z_N z_N$)= 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'}

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. 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 $\delta C=0$ 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 So this is not quite the same math as in statistical mechanics.)