**Define Real Observable 1**


Abstract DEFINITION OF REAL OBSERVABLE 1

postulate real observable 1

⇓

list-define math (from 1, sect.4)

⇓

z=zz algebraic definition of 1 is the small C limit of

z=zz+C, δC=0,C<0 (1) needed to define real observable 1

⇓ ⇓

| Plug left side z of eq.1 into right side zz | Plug z=1+δz into eq.1 and get: |
|---|---|
| repeatedly and use δC=0 and get | **δ(δz+δzδz)=0** |
| **Mandelbrot set** iterations from $z_o$=1 | Im=Clifford Alg, Real=SR→ |
| Cauchy seq subset generates real# 1 | *operator* formalism |
| Fiegenbaum pt. subset from Clifford alg | so **Dirac eq.**(flat space) |

⇓ ⇓

**new pde** psi $\gamma^\mu\sqrt{(\kappa_{\mu\mu})}\partial\psi/\partial x_\mu=(\omega/c)\psi$ (Curved space, Generally covariant, fractal) .

The ((dr+dt)/ds)ψ=1ψ=-iħdψdr+iħdψ/dct Hermitian *operator* on this ψ defines **observable**1

Note all we did here was to *define* real observable 1.

But by writing out this definition we also inadvertently derived *both* real# math and physics from the **postulate** of 1. (Backups at davidmaker.com)


**1)Introduction**

1 is the simplest idea imaginable. But 1 is not just a squiggle written on a piece of paper. For the **postulate** of 1 to be meaningful and tangible 1 must be real observable: an idea everyone can understand. So all I did then was to define **real observable 1**.

Note real (i.e., Cauchy seq.of rational #) and observable (i.e.,Hermitian operator on ψ) are rigorously defined and so the resulting new pde ψ is rigorously derived.

Summary: **Postulate** 1 (and get math and physics).

2) **Details of above derivation of the new pde that defines real observable**

So we just **postulate 1**, the simplest idea imaginable, and then use that list-define method , that uses this 1, to develop the algebra tools(sect.4) we need to define real observable. In that regard the simplest algebraic definition of 1,0 is z=zz which is the small C limit of

z=zz+C, δC=0, C<0 (1)

needed to define real **observable** 1.

(A) Substitute **z**=1+δz into eq.1 and get δ(δz+δzδz)=0 (2). (gets Dirac eq. "*observables*")

(B) Substitute the left side **z** of z =zz+C back into the right side zz of eq.1 repeatedly and use δC=0 and get the Mandelbrot set (fractal) iteration formula for some $C_M$.(containing subsets of Cauchy sequences for *real*#). Other substitutions into eq.1 than A&B do not lead to "real" to '*real*' '*observable*'. Other substitutions into eq.1 than A&B do not lead to '*real*' '*observable*'

## 2.1 Derivation of new pde

(A)So from eq.2 ($\delta z$-K)+$\delta z\delta z$=C (constant C and K) which is a quadratic eq. with in-general complex solution $\delta z$=dr+idt. Plug that back into eq.2 with K=$\delta z$ to initialize to flat space and get $\delta(dr^2+i(drdt+dtdr)-dt^2)=0$ since $dr^2-1^2dt^2=ds^2$ is special relativity (Minkowski metric given $1^2$=natural unit constant speed$^2\equiv c^2$) invariance. The imaginary extremum is the Clifford algebra $dr'dt'+dt'dr'=\gamma^r dr\gamma^t dt+\gamma^t dt\gamma^r dr=0$ since 2drdt≠0 here for NONvacuum. Factor the real component and get 5 equations (eg.,**e**; dr+dt=ds,dr-dt=ds (3),etc.,dr-dt in IV quadrant so ds>0. e=electron=only nonzero proper mass. (Complex *unknown* K for K≠$\delta z$+$\delta z'$ ($\delta z'$)perturbation adds 2 degrees of freedom.). **We just derived special relativity here!**

Square eq.3 to get $+ds^2=(dr+dt)^2=(dr^2+dt^2)$+drdt+dtdr implying $dr^2+dt^2=ds^2$ circle invariance at 45° since dr+dt and drdt+dtdr (cross term) are invariant. So $\delta z=dse^{i\theta}=dse^{i((\sin\theta dr+\cos\theta dt)/ds)}$. Take the r derivative, define dr/ds≡k, sinθ≡r, $\delta z\equiv\psi$ and multiply both sides by iħ and define momentum p≡ħk≡ξv to get the operator formalism $p_r\psi=-i\hbar\partial\psi/\partial r$ (so *observables* p). All three invariances imply the Dirac equation for **e**,*v*. **We just derived quantum mechanics here**! Clifford algebra small drdt area extremum is then the real# line drdt Mandelbulb Fiegenbaum pt. $C_M$. on the *real* axis.were the Mandelbrot iteration sequence has that Cauchy seq.subset. giving the real numbers. Postulate 1 (eq.1) then requires a new (boost) frame of reference to give small fractal baseline $\delta z'\equiv C_M/\gamma\equiv C_M/\xi\equiv r_H$=C. So K≠$\delta z$+$\delta z'$ perturbation of flat space eq.3: $(dr-\delta z')+(dt+\delta z')=ds\equiv dr'+dt'$ rotation (3) since ds invariant. Defining $\kappa_{rr}\equiv(dr/dr')^2=1/(1-r_H/r)$+., r≡dr, in the Minkowski metric $ds^2=dr'^2+dt'^2$+.,and using invariance drdt=$dr'dt'=\sqrt{\kappa_{rr}}dr\sqrt{\kappa_{tt}}dt$, we obtain $\kappa_{rr}=1/\kappa_{tt}$ and thereby **get 4D GR** math. So the Fiegenbaum point neighborhood perturbation rotations θ and Dirac equation give that **new pde** $\gamma^\mu\sqrt{(\kappa_{\mu\mu})}\partial\psi/\partial x_\mu=(\omega/c)\psi$ with that fractal $r_H$ (by$10^{40}$X scale change). Hermitian operators on these new pde ψs are the observables.

## 3) Applications Of The New pde

That *new pde* z=0 composite e,*v* implies the Z,$W^\pm$,γ , the 4 Bosons of the Standard electroweak Model SM (PartI) and so **Maxwell's equations** and **Proca** equation. *New pde z=0* $2P_{3/2}$ composite **3e** results in rapid e motion Fitzgerald contraction of E field lines giving the **strong force** and so (the much larger mass) **baryons**.(partII). The iteration of the new pde on the next higher fractal scale generates the Schwarzschild metric (i.e.**, gravity**) and so general covariance. So **we just derived general relativity (GR) from quantum mechanics in one line!**
Recall the *new pde* zitterbewegung oscillation on the next higher fractal scale. With us being in the expansion stage of the oscillation for $r<r_c$ this then **explains the expansion of the universe**. Many *new pde* experimentally testable predictions (eg., differential cross-section peak for 21Tev p-p collisions, totem results,..etc..,) are contained in partI, partII, partIII.

### 3.1) Note The Square Root In New pde $\gamma^\mu\sqrt{(\kappa_{\mu\mu})}\partial\psi/\partial x_\mu=(\omega/c)\psi$

For z=1 the 3rd order term in the Taylor expansion of the two square roots $\sqrt{\kappa_{\mu\mu}}$ in the *new pde* gets the Lamb shift (2) and anomalous gyromagnetic ratio respectively thus eliminating the need for renormalization and the resulting infinite charge, infinite mass, infinite vacuum density, etc.. Thus these square roots **cause theoretical physics to give right answers again** (Infinite everything is 0% right

## 4) **Real Analysis From Only The Postulate 1**

Recall one of our two goals was to define the real numbers from one simple postulate1. To do that we had to define real observable 1. Here we mention the details of developing the algebra (eg.,required for eq.1) such as the list-define method (in the above flow chart).
Given this (postulate) 1 we can use *list-define* (*list* the many instances of a relation e.g., start with **1**∪1≡ 2 , then *define* them all as relation a+b=c) math(appendix C PartI) to *replace* those famous order axioms, mathematical induction axioms (giving **N**) and the field and ring axioms to generate the numbers N and the algebra of eq.1. Also the (postulate of 1) restatement: z=zz+C,$\delta$C=0, C<0. (eq.1) is the same as min(**z-zz**)>0. So the well known (axiom of) completeness ∃**min**sup is provided by the **min** and the (axiom of) "choice" function is f(z)=**z-zz**. We thereby demonstrate that we get the (also required) Completeness and Choice(1) as well from the postulate of 1. Also, as we saw, by plugging in the left side z into the zz of the right side of eq.1(which also comes from the **postulate** of 1 via the *list-define* method) repeatedly and use that δC=0 we generate the Mandelbrot set iteration from $z_o$=1 and also a Cauchy sequence of rational numbers that generates the real number 1.
Here we thereby have that simplest imaginable idea of postulate 1 generating *only* the real number mathematics and observable physics (e.g.,we got 4D) *without* any other postulates! Otherwise we would also have those many axioms of mathematics to account for as well. 1 is *THE* single Occam's razor postulate meaning we have 'figured it out', Jackpot! (i.e., as in sect.3)

## **Conclusion**: Intuitive notion of the **Postulate** of ONE.

Given the fractalness astronomers are observing from the inside of what particle physicists are studying from the outside, the $r_H$ of that ONE *new pde 'object'* we first postulated. So we look at big and small scales and all we see is that **ONE** nonzero proper mass e (even baryons are 3**e**).

## References


(1) Royden, '**Real Analysis',** Pearson modern classics
(2) Bjorken and Drell, '**Relativistic Quantum Fields'**


**Table Of Contents**



1.1.1 Rewrite eq.1.1.1;1.1.2 as the more familiar operator formalism

**Sect.1** Postulate 1 as min(z-zz)>0 which can be rewritten as: z-zz=C (1.1.1), δC=0, C<0 (1.1.2)
Plug z=1+δz into eq.1.1.1 get (1+δz)-(1+δz)(1+δ)=C (1.1.3) and so δzδz+δz+C=0 (1.1.4)
Solving quadratic eq. 1.1.4 we get: δz=[-1±√(1-4C)]/2. For noise C>¼ δz=dr+idt (1.1.5)
(So we derived `space-time.`). Plug 1.1.4 into eq. 1.1.2 δC=δ((*δ*z-K)+δ(δzδz))=0 (1.1.6)

1.1.2 δz=K →flat

We can then always add a (given constant C) in general complex K in $\delta(\delta z\text{-}K+\delta z\delta z)=0$ to use $K=\delta z$ to initialize to local flat (making the $K\neq\delta z+\delta z'$ cases perturbations in this formulation) since $0+\delta(\delta z\delta z)=\delta[(dr+idt)(dr+idt)]=\delta(dr^2+i(drdt+dtdr)-dt^2)=0$ is Minkowski (C is real to have real $C=C_M$ in sect.1.2) since we postulated real 1). Also since K is complex for unknown $K\neq\delta z+\delta z'$ perturbation ir (K) merely adds 2 degrees of freedom as in 2⊕2 (Note then 4D keeps $C=ds^2$ invariant even if $K\neq\delta z$).

Given $\delta(\delta z\text{-}K)=0$ and eq.1.1.5 $\delta(\delta z\delta z)=\delta[(dr+idt)(dr+idt)]=\delta(dr^2+i(drdt+dtdr)-dt^2)=0$ (1.1.7)

Next factor the real component of 1.1.7.

$\delta(dr^2\text{-}dt^2)=\delta[(dr+dt)(dr\text{-}dt)]=\delta(ds^2)=[[\delta(dr+dt)](dr-dt))]+[(dr+dt)[\delta(dr-dt)]]=0$ (1.1.10)

Solve eq. 1.1.10 and get

(→±**e**) $dr+dt=\sqrt{2}ds$, $dr\text{-}dt=\sqrt{2}ds \equiv ds_1$ (1.1.11) I, IV +ds >0

(→light cone *v*) $dr+dt=\sqrt{2}ds$, $dr=-dt$, (1.1.12) II quadrant

" " $dr\text{-}dt=\sqrt{2}ds$, $dr=dt$, (1.1.13) III quadrant

(→vacuum) $dr=dt$, $dr=-dt$ (1.1.14) $dt=0=dr$

Equation 1.1.10 gives Special Relativity(SR) $ds^2=dr^2\text{-}(1)^2dt^2$ (note natural unit *constant* $1^2$ ($\equiv c^2$) in front of the $dt^2$). Thus $K=\delta z$ initializes to locally flat space if also C is real. Note our quadrants were chosen so that $ds>0$ giving us observability since the later operator formalism at 45° which also implies that if either dr or dt is zero then everything is zero and we have our "vacuum" solution 1.1.14 and so not observable.

Note also **Imaginary** component= $ds_3 \equiv$ ***drdt+dtdr*** (1.1.8)

Note our previous quadrant choice of dr,dt makes drdt+dtdr and so $ds_3$ positive or zero with zero being the extremum given eq.1.1.8 are finite extremums since $\delta\infty$ is undefined. But since dr, dt (in scalar 2drdt) is not 0 if not eq.1.1.14 vacuum then:

$$drdt+dtdr=0 \quad (1.1.9)$$

implies the imaginary extremum is a Clifford algebra (since we assume we are not in the eq.1.1.14 vacuum where drdt=0 is not the eq.1.1.14 vacuum as in )$dr'dt'+dt'dr'\equiv\gamma^1 dr\gamma^2 dt+\gamma^2 dt\gamma^1 dr=2drdt(\gamma^1\gamma^2+\gamma^2\gamma^1)=0$ so $\gamma^i\gamma^j+\gamma^j\gamma^i=0$, $(\gamma^k)^2=1$ ($(\gamma^k)^2=1$ from real component of eq.1.1.7).

# Third Invariant

In their respective quadrants all are +ds. Also recall the previous two invariants of $ds_1$,$ds_3$. We square $ds_1^2=(dr+dt)(dr+dt)=dr^2+drdt+dt^2+dtdr=[dr^2+dt^2]+(drdt+dtdr)\equiv ds^2+ds_3=ds_1^2$. Since $ds_3$ (from 1.1.9, is max or min) and $ds^2$ (from 1.1.10) are invariant then so is $ds^2=dr^2+dt^2=ds_1^2\text{-}ds_3$ as in figure 1 for all angles from the axis extremum. $ds^2$ is our 3rd invariant. (Note all three of these invariants $\partial ds/\partial z=0$ are satisfied at the Fiegenbaum point, *v* also at the limacon end, sect.1.2). Note in fig.1 min ds is at 45°. So ds is diagonal.

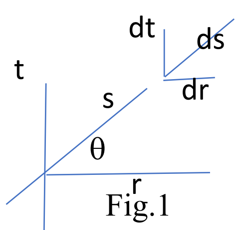
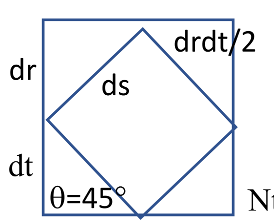



Fig.1




Nth fractal scale

Minimum $ds^2=dr^2+dt^2$ so at 45°: $\delta z=dse^{i\theta}=dse^{i(\Delta\theta+\theta o)}$, $\theta_o=45°$ (1.1.14)

Note in fig.1 45° is always measured from extremum axis'(also in fig.4). So for variation $\Delta\theta$
$\delta z = dse^{i\theta} = dse^{i(\Delta\theta+\theta o)} = dse^{i((\cos\theta dr+\sin\theta dt)/(ds)+\theta o)}$, $\theta_o=45°$. (1.1.15)
So $\theta=f(t)$. $\delta z=dse^{i(45°+\Delta\theta)}$. In eq.1.15 we define $k\equiv dr/ds$, $\omega\equiv dt/ds$, $\sin\theta\equiv r$, $\cos\theta\equiv t$. $dse^{i45°}=ds'=ds$.

Then eq.1.15 becomes $\delta z = dse^{i(\Delta\theta)} = dse^{i\left(\frac{\sin\theta dr}{ds}+\frac{\cos\theta dt}{ds}\right)}$ so $\frac{\partial\left(dse^{i\left(\frac{rdr}{ds}+\frac{tdt}{ds}\right)}\right)}{\partial r} = i\frac{dr}{ds}\delta z$ so

$$\frac{\partial\left(dse^{i(rk+\omega t)}\right)}{\partial r} = ik\delta z \quad (1.1.15a)$$

$k\delta z = -i\frac{\partial\delta z}{\partial r}$ Multiply both sides by ħ. ħk≡mv=p since k=dr/ds=v/c=2π/λ (1.1.15b)
from eq.1.15 for our unit mass $\xi_s\equiv m_e$. $\delta z\equiv\psi$,(eq.6.6.1) Note we also derived the `DeBroglie wavelength`λ=h/mv. (<F>*= ∫(Fψ)*ψdτ=∫ψ*Fψdτ =<F> Hermitian).
$p_r\psi = -i\hbar\frac{\partial\psi}{\partial r}$ which is the observables $p_r$ condition gotten from that eq.1.1.15 circle. (1.1.16)
**operator formalism** thereby converting eq.1.1.11, 1.1.12, 1.1.13 into Dirac eq. pdes.
Note these $p_r$ operators are Hermitian and so we have 'observables' with the associated eq.1.11-1.13 Hilbert space **eigenfunctions δz** (=ψ). δz (in z=1-δz) is the probability z is o (see appendix D).
We `derived QM` here.
Note rotation to 45° for min $ds_3$ in figure 1 on the eq.1.1.14 circle.
**1.1.3 Origin Of Math from Eigenvalue of δz**: Since ds∝dr+dt can make (dr+dt)/ds a integer:
**2δz**≡ (1∪1)δz≡(1.11+1.11)δz≡((dr+dt)+(dr-dt))/(k'ds)))δz≡-i2(ds/ds)∂(δz)/∂r≡-i2∂(δz)/∂r (1.1.16a)
=(integer)k)δz.
So from eq.1.16a we obtain the eigenvalues of: δz=0,-1 making our z=1+δz eq.1 **real numbers 1,0 =z (binary qubits) also observables. So we have come full circle and so use this result to develop the list-define algebra** required to use eq.1-1.2. eg.,"list" as in 1+1=2, 2+1=3; "define" a+b=c replacing the usual field axioms, order axioms and mathematical induction axiom (that merely gives **N**). See appendix C, Part I. Note this third invariant ds also *gives us the quantum mechanics* operator formalism (eq.1.1.16). See appendix D.

## 1.2 Mandelbrot Set.

Iterate to get Cauchy sequence. So real1
Just plug the left side z in z=zz+C back into each z on the right side of eq.1.1.1 and get z'=z'z'+C since z'≡(zz+C)=z. $z_1$=1 instead of 0 with the two $C_M$s chosen to give the upper and lower components of the Cauchy sequence. It is the Mandelbrot set displaced by -1. So you can repeat this step with this new z'=z'z'+C. We get the iteration $z_{N+1}=z_Nz_N+C_M$ with $\delta C=\delta(z_{N+1}-z_Nz_N)=0$ then implying this choice of $C_M$ defines the Mandelbrot set since δ(∞-∞) cannot be zero. Our z=zz postulate in eq.1.1.1 has solutions 1,0 and first term in the iteration is $z=z_1$. But $z=z_1=0$ will be used here (z=1 as $\xi_1$ is discussed below). One such sequence $z_N$ generated from this Mandelbrot set definition also provides a Cauchy sequence $z_N$ of rational numbers that shows that 1 is a *real* number(2). You can then use appendix B2 to define the real number *algebra* by rigorously defining min and zz-z. Note all three of these invariants ∂ds/∂z=0 are satisfied at the Fiegenbaum point.

**Clifford Algebra +Mandelbulbs Implies Fiegenbaum point Making K≠δz**

Scalar component of eq. 1.1.8 $\delta$(**2drdt**)=0 implies smallest area real C extremum Mandelbulb which is the Fiegenbaum point C= $C_M$ subset of the Mandelbrot set$\kappa$**A Moving Observer Frame of Reference Is Also Implied by Postulate 1**

But $C_M$ is big ($|C_M|$=1.4011..) so we need a new reference frame to get small C≈0 of postulate 1 (eq.1.1.1). Define $r'_H=\delta z=C_M/1$ so we (as a Fitzgerald contraction $1/\gamma$) boost $r'_H$=boost (as in the $p=\xi v=(1/\gamma)(dr/ds)$ definition 1.1.15b) $C_M/1\equiv C_M/\gamma\equiv C_M/\xi_1\equiv C$ to get small C≈0 (if $\xi_1$ is big) and so get the postulate of 1 in eq.1.1.1 (This is just the tangential instantaneous rotating frame of reference of the spin½ eq.1.2.7 new pde.). Also for the next smaller fractal baseline $\delta z>>\delta z\delta z$ in eq.1.1.4 so $\delta z\approx C$

z≈1 $C_M=\xi\delta z'$, $\delta z'$ in $z=1+\delta z'$ is small so $\xi_1$ is big.

z≈0 $C_M=\xi\delta z'$, $\delta z'$ in $z=1+\delta z'$ is big so $\xi_o$ is small.

z≈0 $\delta C_M=\delta(\xi C)=\delta(\xi\delta z)=\delta\xi_o\delta z+\xi_o\delta\delta z$ so $\delta\xi_o$ is small so small $\xi_o$ is stable ground state of the new pde.

z≈1 $\delta C_M=\delta(\xi C)=\delta(\xi\delta z)=\delta\xi\delta z+\xi\delta\delta z$ so $\xi\delta\delta z$ is small and $\delta\xi_1$ can be big so $\xi_1$ can be unstable

So $C=C_M/1$ making the stable 1 the stable $\xi_o$. $\delta\xi$ is then big so $\xi_1$ unstable and also $\xi=\xi_1$ is large and its $\Delta E=1/\sqrt{\kappa_{oo}}$ is also our ambient metric $\kappa_{oo}$ $(=1-(a/r)^2-r_H/r)$ term and so must split due to the rotational and vibrational metric quantization of object B in the Kerr metric $(a/r)^2$ term in the ambient metric. So we have three S=½ new pde objects (each with its own sect.1.1 neutrino and its own Reimann surface.) constituting $\xi_1=\xi_t+\xi_u+m_e$ in the new pde for r large with $\xi_t$, $\xi_u$ excited states of boosted $m_e$.

The $(\xi_1)/2=m_p$ reduced mass is the L=1 rotational $2P_{3/2}$, $r=r_H$ state (r small) is state with the m= ½+½ of the two positrons canceling the L=1 angular momentum.

So $\xi_1=\xi_3+\xi_2+\xi_o\equiv\tau+\mu+m_e\equiv1+\varepsilon+\Delta\varepsilon$ and so we also have $3C_M$ for $\xi_1$. So for z=1

$$r_H=\Sigma C_M/(\xi_3+\xi_2+\xi_o)\equiv\Sigma C_M/\xi_1 \qquad (1.2.0)$$

Thus we have added perturbation $\delta z'\approx\Sigma C_M/\xi\equiv r'_H$ on eq.1.1.13 constrained by the eq.1.1.6 circle has to be written at 45° as dr-δz'+dt+δz'=ds=dr'+dt' since ds is invariant and which is a rotation θ on the z=1 baseline next smaller fractal scale.

In a boost dt also changes so arctan(dr/dt)≡θ changes so θ gets larger and larger in $e^{i\theta}$ (sect.1.1.3) and passes by successive branch cuts and so $\xi_2$ and $\xi_3$ and their respective neutrinos (eq. 1.1.10-1.1.13) (in their assigned quadrants) each having it's own Reimann surface. These are the families of the 3 leptons with their associated Reimann surface neutrino. $\xi_o=\Delta\varepsilon=m_e$ is the stable ground state for all three states for large r and so independent Hamiltonian (and momentum) operators $H\psi=E\psi$.

For small $r=r_H$ (and same $\xi_1$) the rotational reduced mass $\xi_1/2=m_p$ is derived in part II from the B flux quantization and Meisner effect.

## Fiegenbaum Point

Go to http://www.youtube.com/watch?v=0jGaio87u3A to explore the Mandelbrot set near the Fiegenbaum point. 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 $C_M/\xi\equiv_H$ in electron rq.9 (eq.1.2.7 below). So for each larger electron there are **$10^{82}$ constituent electrons** (that result from the amazing equation). Also the scale difference between Mandelbrot sets as seen in the zoom is about **$10^{40}$, the scale change** between the classical electron radius and $10^{11}$ly giving us our fractal universe.

Given the solution 1.1.5 $\delta z = \frac{-1\pm\sqrt{1-4C}}{2}$. is real for noise C<¼

creating our noise on the N+1 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). $N=r^D$ . 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 .

which is the same as the 2D of eq.1.1.5 just below and the Mandelbrot set. The next smaller (subatomic) fractal scale $r_1=r_H=2e^2/m_ec^2$, N-1th, $r_2=r_H=2GM/c^2$ is defined as the Nth where $M=10^{82}m_e$ with $r_2=10^{40}Xr_1$

**z=0,z=1,** δK≠δz generally

### 1.2.2 K≠δz

Recall $(dt+dr)^2=dr^2+dt^2+drdt+dtdr=ds^2 = dr^2+dt^2+0$. Recall small δz, so small K, C≈ δz-K in eq.1.1.4 K≡x+iy in eq.1.1.4 also adds 2 more degrees of freedom since K can be complex and *non*locally is a free parameter. Recall that $\delta[(dr+idt-K_r-K_i)+dr^2-dt^2+i\delta(drdt+dtdr)]=0$. In section 1.1 $dr+idt-K_r-K_i=0$ for flat space initialization.

**4degrees of freedom** in 2 spatial dimensions in **rectangular** coordinates

Here δz≠K so given complex unknown K we have 2 additional degrees of freedom |K-δz'|≡dx'+dy' added to δz to have dx',dy',dz' behave the same for orthogonal $dr^2=dx^2+dy^2+dz^2$ so $(dr'+dt')^2=((dx'+dy'+dz')+dt')^2=dr^2+dt^2+0=ds^2$ since dr'dt'+dt'dr'=0.

We convert to dx,dy,dz, dt by $(dx'+dy'+dz'+dt')^2 = (\gamma^x dx+\gamma^y dy+\gamma^z dz+\gamma^t dt)^2 = dr^2+dt^2=ds^2$ (1.2.0) (new pde) to keep $ds^2$=C constant implying the Clifford algebra $\gamma^\mu\gamma^\nu+\gamma^\nu\gamma^\mu=0$, $\gamma^\mu\gamma^\mu=1$.

**4degrees of freedom** in 2 spatial dimensions in **polar** coordinates

Or we just add those 2 new parameters in a

**2D** rotation at 45° (dr-δz')+(dt+δz')≡ds (eg.,Δθ,Δr) (1.2.1)

(since ds is invariant).

In that regard in a moving frame of reference boost dt (recall $3\xi_o$ gets heavier right up to $\xi_1$) also changes so arctan(dr/dt)≡θ changes so θ gets larger and larger in $e^{i\theta}$ (sect.1.1.3) and passes by(successive branch cuts and so $\xi_2$ and $\xi_3$ and their respective neutrinos (eq. 1.1.10-1.1.13) (in their assigned quadrants) each having it's own Reimann surface. These are the families of the 3 leptons with their associated Reimann surface neutrino. $\xi_o=\Delta\varepsilon=m_e$ is the stable ground state for all three states for large r and so independent Hamiltonian (and momentum) operators Hψ=Eψ. From eq.1.1.19 $\Sigma C_M/\xi_1\equiv r'_H$ in $\kappa_{oo}=1-r'_H/r$ for z=1, $C_M/\xi_o\equiv r_H$. for z=0. So small δz implies a Δθ in $C_1$ Eq.1.1.14 $\delta z=ds e^{i(45°+\Delta\theta)}$ rotation occurs here implying that the eq.1.1.4 associated infinitesimal uncertainty $\pm C_M/\xi_1=\delta z$ cancel to rotate at θ≈45°:

$(dr-\delta z)+(dt+\delta z)=(dr-(C_M/\xi_1))+(dt+(C_M/\xi_1)) =\sqrt{2}ds= dr'+dt'$ (1.2.1)

= 2 rotations from ±45° to next extremum (appendix AI below). (1.2.1a)

This also keeps $ds_1$ invariant so keeping the eq.1.1.10 ds invariance. Note that by keeping dt not zero we have *already* put in background white noise (since then C>¼ in eq.6 & eq.1.1.4) into eq.1.1.11-1.1.13

Recall z≡1+δz so if z=0 then 0=1+δz so |δz| is big in $C_M=\xi(\delta z-K)$ so ξ is small

So for z=0 rotations ξ is small so big $C_M/\xi_o$ (also δξ=0 so stable, electron, sect1.2.4) from A1 $\theta=C_M/ds\xi_o$=45°+45°=90°. In contrast for z=1 $\xi_1$ big so θ=45°-45°≈0 since small $\delta z=C_M/\xi_1$.

Define $\kappa_{rr}\equiv(dr/dr')^2=(dr/(dr-(C_M/\xi_1)))^2 =1/(1-r_H/r)^2 =A_1/(1-r_H/r) +A_2/(1-r_H/r)^2$

The $A_I$ term can be split off from RN as in classic GR and so $\kappa_{rr}\approx 1/[1-((C_M/\xi_1)r))]$ (1.2.2)
From partial fractions where N+1th scale $A_1/(1-r_H/r)$ and Nth=$A_2/(1-r_H/r)^2$ with $A_2$ small here.
So we have a new frame of reference dr',dt'. So real eq.1.1.10 becomes 2D⊗2D:

$$ds^2= \kappa_{rr}dr'^2 +\kappa_{oo}dt'^2 +.. \qquad (1.2.3)$$

So a new frame of reference dr',dt'. Note from 1.1.8 $dr'dt'=\sqrt{\kappa_{rr}}dr\sqrt{\kappa_{oo}}dt=drdt$ so $\kappa_{rr}=1/\kappa_{oo}$(1.2.4)
We do a rotational dyadic coordinate transformation of $\kappa_{\mu\nu}$ to get the Kerr metric which is all we need for our GR applications. Note on the N+1th fractal scale $\kappa_{\mu\nu}$ is the ambient metric.
So we derived General Relativity (eqs.1.2.1,1.2.2,1.2.3) by the $C_M$ **rotation** *of special relativity* (eq. 1.1.10) which shows why we said **K≠δz** implies 4D curved space.

**Relation Between The Nth And N+1th Fractal Scale (Reduced Mass) Metrics $\kappa_{\mu\nu}$**
Recall (sect.6.30 he well known additional $(a/r)^2$ Kerr metric term as in $\kappa_{oo}=1-(a/r)^2-2GM/(c^2r)$ in the N+1 fractal scale. Also in the Nth scale reduced mass system $\xi_1/2=m_p$. Given the spin½ selfsimilarity the Kerr metric exists but is a mere observed perturbation due to inertial frame dragging observable only due to a nearby object B. So we have two equal masses on the N+1th fractal scale, hence we can use the reduced mass just as we do with the $m_p$. We can then do our scale transformation from one reduced mass system to another avoiding many complications. So multiply $\kappa_{oo}\approx[1-(C_M/(\xi_i r))]$ by 1-ε to then get $[1-\varepsilon-\Delta\varepsilon-C_M/(\xi_o r)]$ and then we are required to normalize (section 1.2) by 1-ε for 2D homogenous isotropic space-time which is then in the reduced mass $m_p$ system (partII). Given reduced mass systems for both the larger and smaller fractal scales **to jump to the next fractal scale electron we then merely multiply $C_M/\xi_o$ by $10^{40}$**. So $\kappa_{oo}=1-\Delta\varepsilon/(1-\varepsilon)-(10^{40}C_M/\xi_o)/r$ so that $-\Delta\varepsilon\rightarrow(a/r)^2$, $M=10^{80}m_e$, $10^{40}2e^2/m_ec^2=10^{40}C_M/\xi_o\rightarrow 2GM/c^2$. So $r_H\rightarrow r_H10^{40}$, $\kappa_{oo}= 1-C_M/\xi_o)/r \rightarrow 1-(a/r)^2-r_H/r= 1-\xi_1-(C_M/\xi_o)/r$, N+1th fractal scale, and $1/m\rightarrow m$ (since $r_H=2e^2/m_ec^2 \rightarrow 2GM/c^2$) defining G.

**1.2.3 4D and eq.1.2.2 in eq.1.1.11**

Note from the distributive law square 1.11: $(dr+dt+..)^2=dr^2+dt^2+drdt+dtdr+$.But Dirac's sum of squares=square of sum is missing the cross term drdt+dtdr requiring the $\gamma^\mu$ Clifford algebra. So this is the same as if those cross terms drdt+dtdr=0 as in eq.1.1.9. So equation 1.1.9 with 4D 1.1.11, automatically implies a Clifford algebra $\gamma^\mu\gamma^\nu+\gamma^\nu\gamma^\mu=0$, $(\gamma^\mu)^2=1$. From eq.1.2.7 there is also the covariant coefficient $\kappa_{\mu\mu}(\gamma^\mu)^2=\kappa_{\mu\mu}$. So after multiplying both sides by $\delta z\equiv\psi$ causes the **4D** operator equation 1.1.16 to cause eq.1.1.11→
$ds=(\gamma^1\sqrt{\kappa_{11}}dx_1+\gamma^2\sqrt{\kappa_{22}}dx_2+\gamma^3\sqrt{\kappa_{33}}dx_3+\gamma^4\sqrt{\kappa_{44}}dx_4)\delta z\rightarrow$

$$\gamma^\mu\sqrt{(\kappa_{\mu\mu})}\partial\psi/\partial x_\mu=(\omega/c)\psi \qquad \mathbf{(1.2.7)}$$

$\omega\equiv m_Lc^2/h$. Eq.1.2.7 is our new 4D pde which implies eigenfunctions δz (=ψ) and with $C_M>0$ gets leptons for z=1,0 and also 1.1.12 (ν pinned to the light cone so $C_M=\varepsilon/r_H=0$). For z=0 3e see PartII (in sect.1.2 we show that the Standard electroweak Model comes from the composite of e,ν at $r=r_H$ and in partII we show that the $2P_{3/2}$ particle physics at $r=r_H$.

**1.2.3** Add ground state energy Δε to $r_H/r$ for **r=large**

**Inverse Separability implying Nth scale operator formalism and frame of reference forces**
So there exists a eq.1.2.7 $(\gamma^\mu\sqrt{(\kappa_{\mu\mu})}\partial\psi/\partial x_\mu=(\omega/c)\psi)_N$ on every Nth fractal scale ($10^{40}$X larger than a given previous fractal zitterbewegung scale $r_H$) with an individual separate horizon $r_{HN}$ barrier to observability (sect.2.5) between every two such space-like scale intervals given. $\kappa_{oo}=1-r_{HN}/r$. Given these independent 1.2.7 equations, as in the usual differential equation separability, we can invoke a "inverse separability" $\psi_{point}=\psi_N*\psi_{N+1}*\ldots*\psi_\infty$. given the usual zitterbewegung $\psi=e^{i(mc^2/\hbar)t} \equiv e^{i\xi t}\equiv e^{i(\varepsilon+\Delta\varepsilon)}$ (sect.1.2) $\Delta\varepsilon=\xi_o$ with $e^{i(\varepsilon+\Delta\varepsilon)}{}_N$ the asymptotic ψ value (i.e.,r→∞). Also

note the $\sqrt{\kappa_{oo}}$ multiplier in equation 1.2.7: Thereafter after normalizing each $\psi^*\psi$ to 1 as usual we have: $\prod_N(\kappa_{oo}(\psi^*\psi)_N=\prod_N(\kappa_{oo}(\psi^*\psi)_N)=\prod_N(\kappa_{ooN})=e^{i(\varepsilon+\Delta\varepsilon)}{}_{N^*}e^{i(\varepsilon+\Delta\varepsilon)}{}_{N+1^{**}}$.(1.2.31).

The frame of reference provided by each $\psi$ gives our forces (eg., sect.7.3)

This inverse separability makes the rectangular method apply to all fractal at once.

**Object B And Kerr Contribution 6.4.16 $\kappa_{oo}=1-r_H/r \rightarrow 1-(a/r)^2-r_H/r=1/\kappa_{rr}$ from eq.1.2.4**

Note from Kerr metric contribution eq. 6.4.16 given space-like $r_H$ barrier separations the operators (sect.2.5) are on quantities only within a given fractal scale. Here $\Delta\varepsilon$ is N+1 th and $r_H$ Nth so as an operator equation: $\Delta\varepsilon(r_H\psi_N)=0$, $r_H(\Delta\varepsilon\psi_{N+1})=0$, etc. (partIII application ) in:

$$E=\frac{1}{\sqrt{1-\frac{\Delta\varepsilon}{1-\varepsilon}-\frac{r_H}{r}}}=1-\frac{\Delta\varepsilon}{2(1-\varepsilon)}-\frac{r_H}{2r}+\frac{3}{8}\left(\frac{r_H}{r}\right)^2+2\frac{\Delta\varepsilon}{1-\varepsilon}\left(\frac{r_H}{r}\right)+..=1-\frac{\Delta\varepsilon}{2(1-\varepsilon)}-\frac{r_H}{2r}+\frac{3}{8}\left(\frac{r_H}{r}\right)^2+0+..$$

(1.2.32)

And since $\Delta$ ($=r^2-2mr+a^2$) is also in the denominator of the Kerr metric $\kappa_{rr}$ we still have eq.1.2.4 $\kappa_{oo}\approx 1/\kappa_{rr}$

Add zero point energy state $\varepsilon$ to $r_H/r$ for **$r=r_H$** 1.2.33

We earlier derived for the new pde (above) $\Sigma C_M/\Sigma\xi_i=r_H$ for free space fundamental $\tau+\mu+m_e=\xi_1$ 3 free leptons for **r=large,** With same (required) $\xi_1$ and simple deflation to $r_H$ (**$r=r_H$**) and rotation to B flux quantized $\Phi=h/e$ we describe baryons, the **$r=r_H$** solution to the new pde. Given the Meisner effect two terms in $C_M/\xi_o-C_M/\xi_o+C_M/\xi_1$ are equal. The Meisner effect arises because of periodic virtual annihilation (PartII) inside $2P_{3/2}$ at $r=r_H$ and so a change in current in Faraday's law. So the new pde describes both free leptons ($r\rightarrow\infty$) and baryons ($r\approx r_H$). That Meisner effect cloud is the pions (partII). So add zero point energy state $\varepsilon$ to $r_H/r$ for $r=r_H$.

For 2P3/2 state. (for $2P_{1/2}$ the Es are separate and so Taylor expansion term $\varepsilon/2$ gets added).

Recall from section 1.2, (eq.1.2.0) that:

$$\begin{pmatrix}C_1\\C_2\end{pmatrix}=\xi_1\begin{pmatrix}\delta z_1\\\delta z_2\end{pmatrix}$$

Starting with $\tau+\mu+m_e=\xi_1$ we (more generally) rotate to the B flux quantization $\Phi=h/e$ plus deflation of $\begin{pmatrix}\delta z_1\\\delta z_2\end{pmatrix}$ to $r_H$ all the while conserving required $\xi_1$ mass energy

$$\text{Rotate}\delta z\text{+deflate}\delta z=\begin{bmatrix}\xi_{11}&\xi_{12}\\\xi_{21}&\xi_{22}\end{bmatrix}\begin{pmatrix}\delta z_1\\\delta z_2\end{pmatrix}+\begin{bmatrix}-\lambda&0\\0&-\lambda\end{bmatrix}\begin{pmatrix}\delta z_1\\\delta z_2\end{pmatrix}=\xi_1\begin{pmatrix}\delta z_1\\\delta z_2\end{pmatrix}$$

$$\begin{bmatrix}\xi_{11}+\lambda&\xi_{12}\\\xi_{21}&\xi_{22}+\lambda\end{bmatrix}=\xi^2-\xi Tr(M)+\det(M)=\xi_1$$

Partial fractions with 2 body $\varepsilon$ Meisner effect implies the first two fractions have the same magnitude and so fix the value of rotation $\xi_{ij}$, deflation $\lambda$ and so (determinant) M: $r_H=$ $\frac{C_M+C_M+C_M}{\xi_1}=\frac{C_M}{x^2+x(tr)+C}=\frac{C_M}{\xi_o}-\frac{C_M}{\xi_o}+\frac{C_M}{\xi_1}$ in $\kappa_{oo}$ and so the energy $1/\sqrt{\kappa_{oo}}$. (1.2.30)

So we have that baryon 3e composite. Note $\Sigma C_M/\xi_1\equiv C$ makes C small in eq.1.1.1 preserving the postulate of 1 also.

**Back to $r\rightarrow\infty$ Electron Hamiltonian From 6.6.15 Add $\Delta\varepsilon/(1+\varepsilon)$**

We can rewrite eq.1.2.8 and 1.2.32 for the electron assuming ambient (Kerr) metric (so $\kappa_{oo}=1/\kappa_{rr}$) as:

$$E_e = \frac{tauon + muon}{\sqrt{1 - \frac{\Delta\varepsilon}{1+\varepsilon} - \frac{r_{H\prime}}{r}}} - (tauon + muon + PE\tau + PE\mu.) \qquad \kappa_{oo} = 1 - \frac{\Delta\varepsilon}{1+\varepsilon} - \frac{r_{H\prime}}{r}$$

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 who are not in this orbit) $PEe=½e^2/r$. Note also all we did in 1.2.8 is to write the hydrogen energy and pull out the electron contribution. So from 1.2.9: $r_{H'}=(1+1+.5)2e^2/(m_\tau+m_\mu+m_e)/2=2.5e^2/(m_pc^2)$.

**Variation $\delta(E\psi^*\psi)=0$ At $r=n^2a_o$**

Next note the $\psi_{2,0,0}$ eigenfunction variation in energy is equal to zero at maximum $\psi^*\psi$ probability density where for the hydrogen atom is at $r=n^2a_o=4a_o$. Also $m_Lc^2 =(m_\tau+m_\mu+m_e)=2m_pc^2$ normalizes $½ke^2$:

$$E_e = \frac{tauon + muon + m_e}{\sqrt{1 - m_ec^2 - \frac{r_{H\prime}}{r}}} - (tauon + muon + PE\tau + PE\iota) =$$

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

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

So: $\Delta E_e=2\frac{3}{8}\left(\frac{2.5}{rm_Lc^2}\right)^2 m_Lc^2 =$

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

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

**Using Separability of eq.1.2.7 to get Gyromagnetic Ratio**

After separation of variables the "r" component of equation 1.2.7 can be rewritten as:

$$\left[\left(\frac{dt}{ds}\sqrt{g_{oo}}\,m_p\right) + m_p\right]F - \hbar c\left(\sqrt{g_{rr}}\frac{d}{dr} + \frac{j+3/2}{r}\right)f = 0 \qquad (1.2.10)$$

$$\left[\left(\frac{dt}{ds}\sqrt{g_{00}}\,m_p\right) - m_p\right]f + \hbar c\left(\sqrt{g_{rr}}\frac{d}{dr} - \frac{j-1/2}{r}\right)F = 0 \qquad (1.2.11)$$

Comparing the flat space-time Dirac equation to equations 1.2.10 and 1.2.11

$$(dt/ds)\sqrt{\kappa_{oo}}=(1/\kappa_{00})\sqrt{\kappa_{oo}}=(1/\sqrt{\kappa_{oo}})=\text{Energy}=E \qquad (1.2.12)$$

Using the above Dirac equation it is easiest to find the gyromagnetic ratios gy for the spin polarized F=0 case. Recall the usual calculation of rate of the change of spin S gives $dS/dt\propto m\propto gyJ$ from the Heisenberg equations of motion. We note that $1/\sqrt{g_{rr}}$ rescales dr in $\left(\sqrt{g_{rr}}\frac{d}{dr} + \frac{J+3/2}{r}\right)f$ in equation 1.2.10. 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 $1/\sqrt{g_{rr}}$ and set the numerator equal to 3/2+J(gy), where gy is now the gyromagnetic ratio. This makes our equation 1.2.10 compatible with the standard Dirac equation allowing us to substitute the gy into the standard $dS/dt\propto m\propto gyJ$ to find the correction to dS/dt. Thus again:

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

$[1/\sqrt{g_{rr}}](3/2+½)=3/2+½gy= 3/2+½(1+\Delta gy)$ (1.2.13)

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

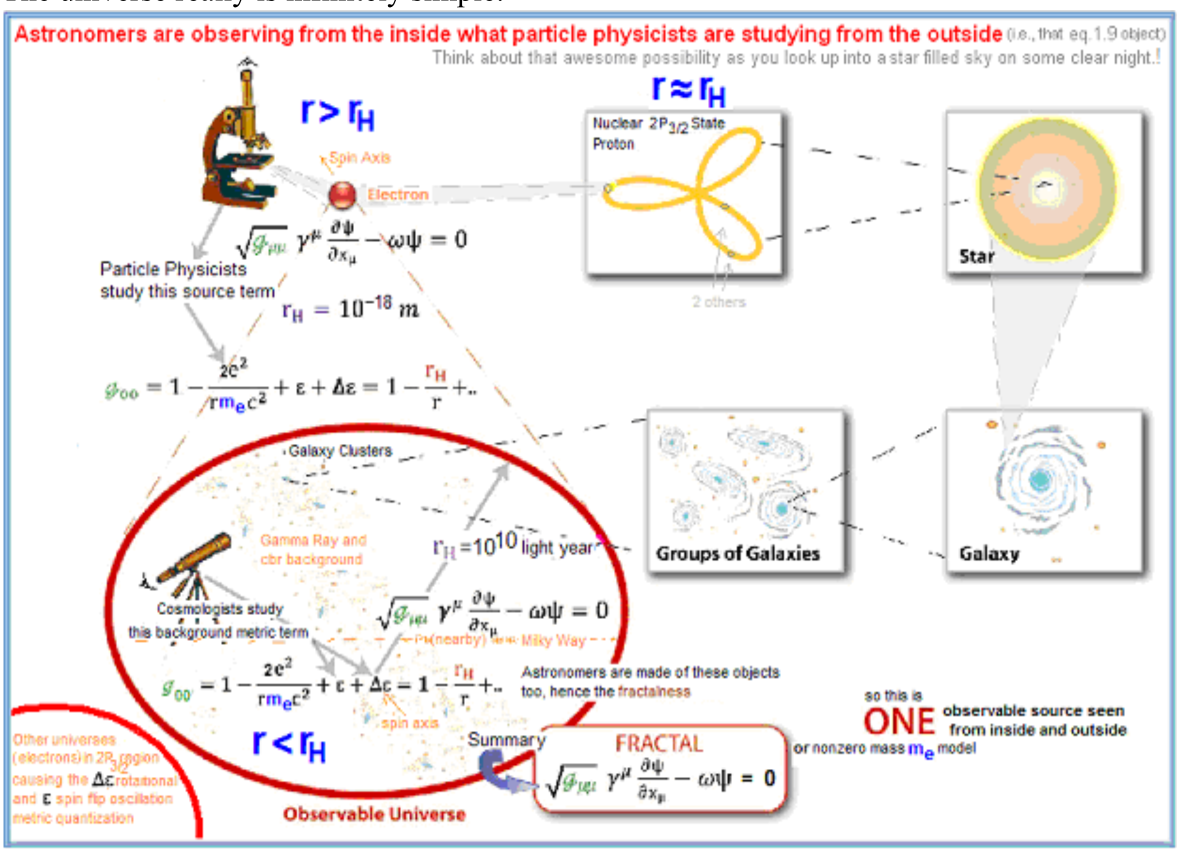
**S States**: Noting in equation 1.2.13 we get the gyromagnetic ratio of the electron with $g_{rr}=1/(1+\Delta\varepsilon/(1+\varepsilon))$ and $\varepsilon=0$ for electron. Thus solve equation 1.2.13 for $\sqrt{g_{rr}}=\sqrt{(1+\Delta\varepsilon/(1+\varepsilon))}= \sqrt{(1+\Delta\varepsilon/(1+0))}= \sqrt{(1+.0005799/1)}$. Thus from equation 1.2.13
$[1/\sqrt{(1+.0005799)}](3/2 + ½)= 3/2 + ½(1+\Delta gy)$. Solving for $\Delta gy$ gives anomalous gyromagnetic ratio correction of the electron $\Delta gy=.00116$.

If we set $\varepsilon\neq 0$ (so $\Delta\varepsilon/(1+\varepsilon)$) instead of $\Delta\varepsilon$) in the same $\kappa_{oo}$ (in equation 1.2.8a) in eq.1.2.7 we get the anomalous gyromagnetic ratio correction of the muon in the same way

**SUMMARY**

Given the fractalness astronomers are observing from the inside of what particle physicists are studying from the outside, that ONE new pde electron $r_H$ of eq.1.2.7. one thing.

The universe really is infinitely simple.




References


(1) Penrose in a utube video implied that the Mandelbrot set might contain physics. Here we merely showed how to find it. The fractal neighborhood of the Fiegenbaum point is a subset. In fact all we done here is to show how to obtain physics from the Mandelbrot set.

(2) 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 sequence $z_n$ same as Cauchy seq.$z_n$ so real1.

# Applications Of section 1

## Appendix A

**A1 z=1 Charge Associated With These Two Eigenfunctions** (since charge=$\varepsilon \equiv C_M$ not 0)
One result is that from eq.1.18 we have nonzero $\varepsilon$ in $(dr-\varepsilon)\equiv dr'$
So from 1.2.3: $ds^2=dr'^2+dt'^2=dr^2+dt^2+dr\varepsilon/2-dt\varepsilon/2-\varepsilon_1^2/4$ (A1)
From eq.1.1.12 the neutrino is defined as the particle for which $-dr'=dt$ (so can now be in 2nd quadrant dr', dt' fig.2 can be negative) so $dr\varepsilon/2-dt\varepsilon/2$ has to be zero and so $\varepsilon$ has to be zero therefore $\varepsilon^2/4$ is 0 and so is pinned as in eq.1.1.12 (*neutrino*). $\delta z\equiv\psi$. So on the light cone $C_M=\varepsilon=mdr=0$ *and so the neutrino is uncharged and also massless in this flat space.* Also see Ch.2 for nonflat results.
1.1.11: 2D Recall eq.1.11 electron is defined as the particle for which $dr\approx dt$ so $dr\varepsilon/2-dt\varepsilon/2$ cancels so $\varepsilon_1$ ($=C_M$) in eq.1.16 can be small but nonzero so that the $\delta(dr+dt)=0$. Thus dr,dt in eq. 1.1.11 are automatically both positive and so can be in the *first quadrant*. 1.11 is *not* pinned to the diagonal so $\varepsilon^2/4$ (and so $C_M$) in eq.1.2.2 is not necessarily 0. So *the electron is charged* since $C_M$ is not 0. This then explains the positioning of the +e,-e, v vectors in figure 2.

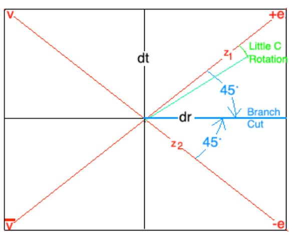


fig.2

Note for finite C in 1.2.7 we also **break** the **two** 2D **degeneracies (**in eq.1.1.11) giving us our **4D.**

**A2 z=0 Implies Large $\Delta\theta=C_M/\xi_o$ extremum to extremum Rotation In The Plane:**
Recall all observable z satisfy eq.1.1.15 so that $z\propto e^{i\theta}$. So Fiegenbaum point (2nd) source $r_H$ to be observed and so there is a second rotation. Eq.1.1.14 a 45° rotation $\delta z_p\delta z= e^{i\theta p}e^{i\theta}=\delta z'=e^{i(\theta p+\theta)}=-i\partial z/\partial r$. So a 45°+45° rotation gives: $\delta z_p\delta z'= e^{i\theta p}e^{i\theta'}=\delta z''=e^{i(\theta p+\theta)}=-i\partial^2 z/\partial r^2$. z=0 implies a rotation $C_M/\xi_o$ that we must rotate by $\theta=C_M$ that adds a spin½ (since it goes through a 45° lepton) and then $-C_M$ subtracts it using eq.1.1.4. For example start at 0° and rotate through $+45°=C_M$ through the 1st quadrant (electron) $dr+dt=\sqrt{2}ds$ in fig.1, fig.3 and get:
+45°, $[(dr+dt)/(ds\sqrt{2})]z=z_{1,r}+z_{1,t}$. Do $z_{1,r}$ and $z_{1,t}$ separately. $\delta z_p\delta z= e^{i\theta p}e^{i\theta}=\delta z'=e^{i(\theta p+\theta)}=-i\partial z/\partial r$ , $\delta z_p\delta z'= e^{i\theta p}e^{i\theta'}=\delta z''=e^{i(\theta p+\theta)}=-i\partial^2 z/\partial r^2$ So just for $z_{1,r}$: $z_{1,r}=-idz/dr$ (partial derivatives). Then do the $-C_M$ rotation:
-45°, $(dr/ds)z_{1,r}=z_{2,r}$. So $-idz_{1,r}/dr=z_{2,r}=-i[(d/dr)(-id/dr)z= (d^2/dr^2)z$. Do both and get for
45°+45° rotation $dr^2z+dt^2z\rightarrow (d^2/dr^2)z+(d^2/dt^2)z$ (A2)
So S=½+½=1 making z=0 real Bosons, not virtual. Note we also get the Laplacians characteristic of Bosons by those 45°+45° rotations so eq.1.1.4 implies Bosons accompany our leptons, so they exhibit "force". Note 2 small C rotations for z=1 can't reach 90° 2 particles. So it stays leptonic. With eq.1.1.16 and eq.1.2.7 we then have eigenfunctions z. This time however *all* variations $\delta C=0$ (even the 45° rotation to branch cut extremum) are realized and so have real (stable electron) particles instead of virtual(transitory).

**A3 2D Eq.1.2.7 $2P_{1/2}$ at $r=r_H$, for z=0 Composites of e,$\nu$**
z=0 allows a large **C** z rotation application from the 4 different axis' max extremum (of 1.1.15) branch cuts gives the 4 results: Z,+-W, photon bosons of the Standard Model fig.4. So we have

derived the Standard Model of particle physics in this very elegant way. You are physically at $r=r_H$ if you rotate through the electron quadrants (I, IV) and not at $r_H$ otherwise. So we have large $C_M$ dichotomic 90° rotation to the next Reimann surface of 1.1.15, eq.A2 $(dr^2+dt^2)z''$ from some initial extremum angle(s) θ. Eq.1.1.15 solutions imply complex 2D plane Stern Gerlach dichotomic rotations using noise $z''\propto C$ (1.2.1) using Pauli matrices $\sigma_i$ algebra, which maps one-to-one to the quaternionA algebra. From sect.1.2, eq.1.2.2 we start at some initial angle θ and rotate by 90° the noise rotations are: $C=z''=[e_L,\nu_L]^T \equiv z'(\uparrow)+z'(\downarrow) \equiv \psi(\uparrow)+\psi(\downarrow)$ has a eq.1.2.2 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 $n\to\infty$ 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.1.1.15 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.1.1.15 can then be replaced by eq.1.1.14, eq.1.2.3 $(dr^2+dt^2+..)z'' =(dr^2+dt^2+..)e^{\text{quaternionA}}$Bosons because of eq.A2. Then use eq. 1.2.2 to R rotate: z":

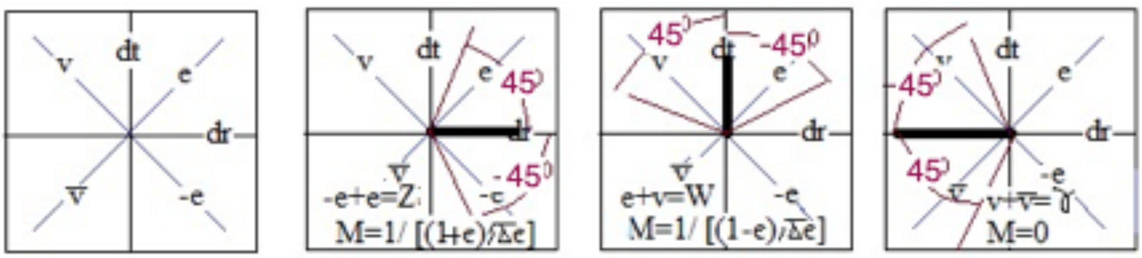



Figure 3. See eq.B4. The Appendix A derivation applies to the far right side figure.
Recall from eq.1.2.1a $2C_M$=45+45=90°, gets Bosons. 45-45= leptons.
v in quadrants II(eq.1.1.12) and III (eq.1.1.13). e in quadrants I (eq.1.1.11) and IV (eq.1.1.11).
Locally normalize out 1±ε . For the **composite e,*v*** on those required large z=0 eq.3 rotations for $C\to 0$, and for stability $r=r_H$ (eg.,for $2P_{1/2}$, I→II, III→IV,IV→I) unless $r_H=0$ (II→III) are:
II→III Dichotomic variables→Pauli matrix rotations→$z'=e^{\text{quaternion A}}$ →Maxwell γ
=Noise C blob. See Appendix A for the derivation of the eq.1.1.15 2nd derivatives of $e^{\text{quaternion A}}$.
I→II, III→IV,IV→I Δε→ε Meisner effect Dichotomic variables→Pauli matrix rotations→$z''=e^{\text{quaternion A}}$→KG Mesons.
I→II, III→IV,IV→I Δε Dichotomic variables→Pauli matrix rotations→$z''=e^{\text{quaternionA}}$, Proca Z,W
Composite 3e: $2P_{3/2}$ at $r=r_H \equiv C_M$ (also stable baryons, partII).

**Appendix B** Quad II→III eq.0.2 $(dr^2+dt^2+..)e^{\text{quaternion A}}$ =rotated through $C_M$ in eq.1.1.15. example

$C_M$ in eq.1.2.1 is a 90° CCW rotation from 45° through *v* and anti*v*
A is the 4 potential. From eq.1.2.4 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. 1.2.3 $dr^2\delta z =(\partial^2/\partial r^2)(\exp(iA_r+jA_o))=(\partial/\partial r[(i\partial A_r\partial r+\partial A_o/\partial r)(\exp(iA_r+jA_o)]$
$=\partial/\partial r[(\partial/\partial r)iA_r+(\partial/\partial r)jA_o)(\exp(iA_r+jA_o)+[i\partial A_r/\partial r+j\partial A_o/\partial r]\partial/\partial r(iA_r+jA_o)(\exp(iA_r+jA_o)+$
$(i\partial^2 Ar/\partial r^2 +j\partial^2 A_o/\partial r^2)(\exp(iA_r+jA_o)+[i\partial A_r/\partial r+j\partial A_o/\partial r][i\partial A_r/\partial r+j\partial/\partial r(A_o)] \exp(iA_r+jA_o)$ (A3)
Then do the time derivative second derivative $\partial^2/\partial t^2(\exp(iA_r+jA_o) =(\partial/\partial t[(i\partial A_r\partial t+\partial A_o/\partial t)$
$(\exp(iA_r+jA_o)]=\partial/\partial t[(\partial/\partial t)iA_r+(\partial/\partial t)jA_o)(\exp(iA_r+jA_o)+$

$[i\partial A_r/\partial r+j\partial A_o/\partial t]\partial/\partial r(iA_r+jA_o)(\exp(iA_r+jA_o) +(i\partial^2A_r/\partial t^2 +j\partial^2A_o/\partial t^2)(\exp(iA_r+jA_o)$
$+[i\partial A_r/\partial t+j\partial A_o/\partial t][i\partial A_r/\partial t+j\partial/\partial t(A_o)]\exp(iA_r+jA_o)$ (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.

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

**Still ONE Postulated Object**: By the way we note $A_\mu$ (composed of two ν identified as 1 γ in this 90°rotation) also *composes* the z=1 $\kappa_{oo}=1-r_H/r$ virtual particle potential energy ($r_H/r$) of the electron. So we are *still* only postulating that single eq.1.2.7 object by since we must include ν&γ in it. We derived the SM here because other derivations similar given their respective fig.4 sources.

Locally normalize out 1±ε . For the **composite e,*ν*** on those required large z=0 eq.3 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 the append B math and get a Proca equation
$E=1/\sqrt{(\kappa_{oo})} -1=[1/\sqrt{(1-\Delta\varepsilon/(1-\varepsilon)-r_H/r)}]-1=[1/\sqrt{(\Delta\varepsilon/(1-\varepsilon))}]-1$. $E_t=E+E=2/\sqrt{(\Delta\varepsilon/(1-\varepsilon))}$=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.
$E=1/\sqrt{(\kappa_{oo})} -1=[1/\sqrt{(1-\Delta\varepsilon/(1-\varepsilon)-r_H/r)}]-1=[1/\sqrt{(\Delta\varepsilon/(1-\varepsilon))}]-1$. $E_t=E+E=2/\sqrt{(\Delta\varepsilon/(1-\varepsilon))}$=W- mass.
$E_t$=E-E gives E&M that also interacts weakly with weak force.

**IVth → Ist quadrant rotation** is the $Z_o$. Do the math and get a Proca equation. $C_M$ charge cancelation.
$E=1/\sqrt{(\kappa_{oo})} -1=[1/\sqrt{(1-\Delta\varepsilon/(1+\varepsilon)-r_H/r)}]-1=[1/\sqrt{(\Delta\varepsilon/(1+\varepsilon))}]-1$. $E_t=E+E=2/\sqrt{(\Delta\varepsilon/(1+\varepsilon))}-1=Z_o$ mass.
$E_t$=E-E gives E&M that also interacts weakly with weak force. Seen in small left handed polarization rotation of light.

**IInd→IIIrd quadrant rotation** through those 2 neutrinos gives 2 objects. $r_H=0$
$E=1/\sqrt{\kappa_{oo}} -1=[1/\sqrt{(1-\Delta\varepsilon/(1+\varepsilon)}]-1=\Delta\varepsilon/(1+\varepsilon)$. Because of the +- square root E=E+-E so E rest mass is 0 or 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.A7) and get Maxwell's equations. Mass canceled and there was no charge $C_M$ on the two *ν* s.
Note we get the Standard electroweak Model particles out of composite e,*ν* using required eq.1.2.1 rotations for z=0.
For z=0 composite 3e (For new pde 2P3/2, rapidly moving two positrons, 1 slow electron.) is ortho s,c,b and para t particle physics.
For z=1 the new pde applies to QED with **large r**.

**B2 Derivation of the Standard Model But With No Free Parameters**

Since we have now derived $M_W$, $M_Z$, and their associated Proca equations, and $m_\mu,m_\tau,m_e$, etc., Dirac equation, $G_F$, $ke^2$, Bu, Maxwell's equations, etc. we can now write down the usual

Lagrangian density that implies these results. In this formulation $M_z=M_W/\cos\theta_W$, so you find the Weinberg angle $\theta_W$, $g\sin\theta_W=e$, $g'\cos\theta_W=e$; solve for g and g', etc., We will have thereby derived the standard model from first principles (i.e.,postulate1) and so it no longer contains free parameters!

**summary**

z=1 gives the $r\to\infty$ formulation $r_H=CM/m$. z=0 gives the $r=r_H$ rotational reduced mass formulation $r_H=C_M/m_e-C_M/m_e+C_M/m$ to be consistent with $C\to\infty$ with m=mt+mu+me in the new pde. For z=0 you calculate the $r=r_H$ rotational reduced mass $m_p=m/2$ (using flux quantization) which for z=1 is then $C_M/m=r_H$ in koo=1-rH/r. So $E_e=m/\sqrt{(\kappa_{oo})}-m_e=V$. Take the third order Taylor expansion term to get $\Delta V$

**B3 z=0 eq. 6.6.17**

**z=0 Metric $\kappa_{\mu\nu}$:** For only a single **electron $\Delta\varepsilon$ at $r=r_H$ in eq.1.1.14 $2P_{1/2}$ state** (N neutron) we must then normalize out the $1+\varepsilon$ so $\kappa_{00}=1+\Delta\varepsilon/(1+2\varepsilon)-r_H/r$. But more distant object C (Our large 3 object cosmological object is a proton) for a weakly bound state (eg., $2P_{1/2}$ at $r\approx r_H$) implies another smaller $r= C_M/\xi_2= r_H$, so $\kappa_{00}=\Delta\varepsilon/(1+2\varepsilon)\approx\Delta\varepsilon(1-2\varepsilon)$ or in general: Equipartition of Meisner effect $\varepsilon$ energy between the $2P_{1/2}$ and central $2P_{3/2}$ electrons (since they are "identical particles") so $\varepsilon/2$ is with the $2P_{1/2}$ electron at $r=r_H$, thus the W. Thus for $2P_{1/2}$ Meisner+mass=
$E=\varepsilon/2+1/\sqrt{\kappa_{00}}= 1/\sqrt{(\Delta\varepsilon(1\pm2\varepsilon))}+\varepsilon/2 =1/[(1\pm\varepsilon))\sqrt{(\Delta\varepsilon)}]+\varepsilon/2 =\xi_W$ (A7)
Eq. A7 gives the W,Z rest masses E. In fact **eq.A7 is the basis for 3 of the 4 rotations of the SM**. So W (right fig.4) is a single electron $\Delta\varepsilon+\nu$ perturbation at $r=r_H=\lambda$ (Since two body $m_e$.): So $H=H_o+m_ec^2$ inside $V_w$. $E_w=2hf=2hc/\lambda$, $(4\pi/3)\lambda^3=V_w$. For the two leptons $\frac{1}{V^{1/2}}=\psi_e=\psi_3, \frac{1}{V^{1/2}}=\psi_\nu=\psi_4$. Fermi 4pt= $2G\iiint_0^{r_w}\psi_1\psi_2\psi_3\psi_4\,dV=2G\iiint_0^{r_w}\psi_1\psi_2\frac{1}{V^{1/2}}\frac{1}{V^{1/2}}V = 2\iiint_0^{r_w}\psi_1\psi_2 G\equiv\iiint_0^{V_w}\psi_1\psi_2(2m_ec^2)dV_w=\iiint_0^{V_w}\psi_1(2m_ec^2)\psi_2 dV_w$. (B2)
What is Fermi G? $2m_ec^2(V_W)=.9X10^{-4}$Mev-$F^3=G_F$ **the strength of the weak interaction**.

**Note z=0 is also a solution to z=zz**

So for added $z\approx0$, $z\sqrt{2}=(z+\Delta)\sqrt{2}$ which we incorporate into $\xi\equiv\xi_1\equiv\xi+\xi_o$ where $\xi_o\equiv m_e$ is small. If $\xi=\xi_o$ then $C_M/\xi$ is big and so those big rotations in sect 1.2.
In the more fundamental set theory formulation $\{\varnothing\}\subset\{\text{all sets}\}\Leftrightarrow\{0\}\subset\{1\}=\xi C=z_1$ . So $\xi_o$ acts as 0 in eq.1.1.1 since $\varnothing=\varnothing\cup\varnothing\Leftrightarrow0+0=0$, $\{\{1\}\cup\varnothing\}=\{1\}\Leftrightarrow1+0=1$. Thus $z_1=\xi_1=m_L$ contains $z_o\approx0$ in $\xi_1=\xi+\xi_o$ is the same algebra **as the core idea** of set theory and so of both mathematics and physics (as we saw above).

**Appendix C Quantum Mechanics**

In $z=1-\delta z$ $\delta z$ is (defined as) the probability of z being 0. Recall z=0 is the $\xi_o=m_e$ solution to the new pde so $\delta z$ is the probability we have just an electron. 1 then is the probability we have the entire $\xi_1$=KMQ complex (sect.1.2.1), that includes the electron (Observed EM&QM, sect.6.12). Note z=zz also thereby conveniently provides us with an automatic normalization of $\delta z$. Note also that $(\delta z^*\delta z)/dr$ is also then a one dimensional probability 'density'. So Bohr's probability density postulate for $\psi^*\psi$ ($\equiv(\delta z^*\delta z)$) is derived here. It is not a postulate anymore. Note the electron observer Eq.1.1.11 (eq.1.2.7) has *two* parts that solve eq.1.1.11 together we could label

*observer* and *object* with associated 1.1.11 wavefunctions δz. So if there is no observer eq.1.1.11 then eq.1.1.10 doesn't hold and so there is no object wavefunction. Thus the wave function "collapses" to the wavefunction 'observed' (or eq.1.1.11 does not hold). Hence we derived the Copenhagen interpretation of Quantum Mechanics(QM).
On the diagonals (45°) we have eq.1.11 holding: particles. Eq.1.1.15 as an operator equation (use 1.1.16) gives waves. A wide slit has high uncertainty, large C so we are at 45°(eg., particles, photoelectric effect). For a *small slit* we have smaller C so we are not large enough for 45° so only the *wave equation* 1.2.8 holds (small slit diffraction). Thus we proved wave particle duality. $dt/k'ds \equiv \omega$ in sect.1.2 implies in eq.1.1.16 that $E=p_t = \hbar\omega$ for all energy components, universally. $mv/k=\hbar$ defines $\hbar$ in terms of mass units (1.1.15b). But equation 1.2.7 is still the core idea since it creates the eigenfunction δz, directly. So along with 1.2.7 and appendix C and eq. 1.1.15, 1.1.21a *we have derived Quantum Mechanics.*

**At a glance, what is this all about?**

It is about the **postulate** of 1.
But it must be one 'thing' to be meaningful. (which merely means this 1 is real and observable).
**So all this paper does is define these *real, observable* terms.**
(eg., *Real* numbers have a rational Cauchy sequence. *Observables* are Hermitian operators on the new pde $\psi$.)

(If you want to skip this "1, *THE* Occam's razor postulate" stuff then jump right to the (slide 3) exciting new fractal pde "applications" below.
So just start with the new pde and do the QM math.).

# Flow Chart

Postulate 1

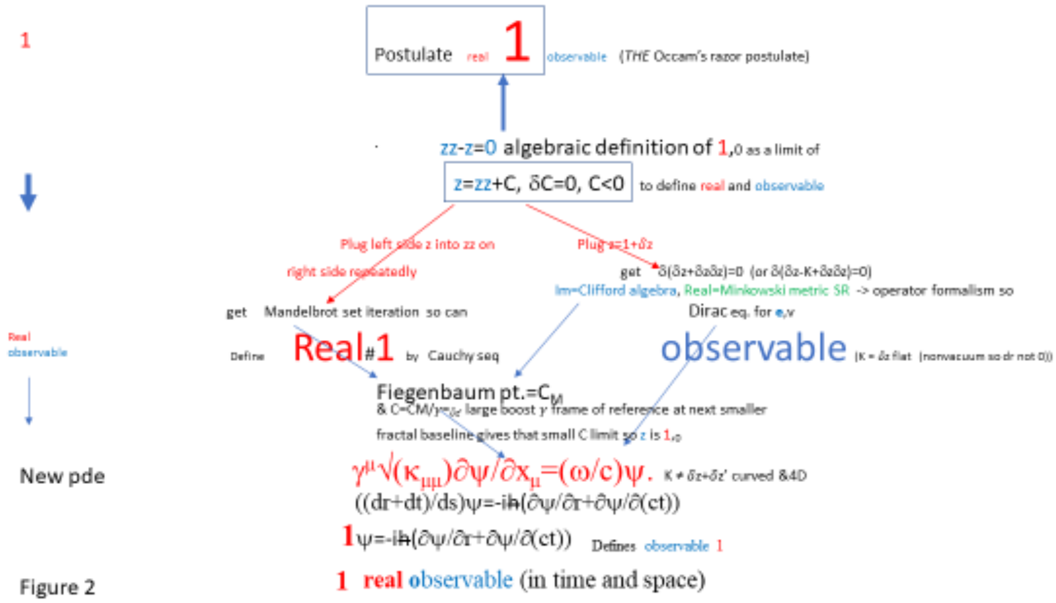



Figure 2

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**r large** in $\gamma^{\mu}\sqrt{(\kappa_{\mu\mu})}\partial\psi/\partial x_{\mu}=(\omega/c)\psi$

**$\kappa_{oo}$ and $\kappa_{rr}$**

**Recall $C_M=\xi\delta z'$**

$z\approx1$ $C_M=\xi\delta z'$, $\delta z'$ in $z=1+\delta z'$ is small so $\xi_1$ is big.
$z\approx0$ $C_M=\xi\delta z'$, $\delta z'$ in $z=1+\delta z'$ is big so $\xi_o$ is small.
$z\approx1$ $\delta C_M=\delta(\xi C)=\delta(\xi\delta z)=\delta\xi\delta z+\xi\delta\delta z$ so $\xi\delta\delta z$ is small and $\delta\xi_1$ can be big so $\xi_1$ can be unstable
$z\approx0$ $\delta C_M=\delta(\xi C)=\delta(\xi\delta z)=\delta\xi_o\delta z+\xi_o\delta\delta z$ so $\delta\xi_o$ is small so small $\xi_o$ is stable ground state of the new pde. $C=C_M/1$ making the stable 1 the stable $\xi_o$. So $\xi_1=\xi+\xi_o$. is our boosted $\xi_o$ by $\gamma$.
But $\xi_1$ and $\xi_o$ are both spin½ so our boost (and object B-A motion allowed metric quantization states (sect.6.3)) involves two added $\xi$ spin ½s masses whose spins must cancel in ½=(½-½)+½ so that $\xi_1=\xi_3+\xi_2+\xi_o\equiv\tau+\mu+m_e\equiv1+\varepsilon+\Delta\varepsilon$ and so we also have $3C_M$ for $\xi_1$. So for z=1
$r_H=\Sigma C_M/(\xi_3+\xi_2+\xi_o)\equiv\Sigma C_M/\xi_1$

Thus we have added perturbation $\delta z'\approx\Sigma C_M/\xi\equiv r'_H$ constrained by the circle operator formalism so keeping the dr+dt=ds invariance solution of $\delta(\delta z+\delta z\delta z)=0$ that has to be written at 45° as $dr-\delta z'+dt+\delta z'=ds=dr'+dt'$ since ds is invariant and which is a rotation $\theta$ on the z=1 baseline fractal scale.

---

# r large

### $\kappa_{oo}$ and $\kappa_{rr}$

So $(dr-\delta z)+(dt+\delta z)=(dr-(C_M/\xi_1))+(dt+(C_M/\xi_1)) =\sqrt{2}ds= dr'+dt'$

Define $\kappa_{rr}\equiv(dr/dr')^2=(dr/(dr-(C_M/\xi_1)))^2 =1/(1-r_H/r)^2 =A_1/(1-r_H/r) +A_2/(1-r_H/r)^2$

The $A_I$ term can be split off from RN as in classic GR and so

$$\kappa_{rr}\approx 1/[1-\Sigma C_M/(\xi_1 r)]$$

From partial fractions where N+1th scale $A_1/(1-r_H/r)$ and Nth$=A_2/(1-r_H/r)^2$ with $A_2$ small here. So we have a new frame of reference dr',dt'. So real eq.1.1.10 becomes: $ds^2= \kappa_{rr}dr'^2 +\kappa_{oo}dt'^2 +..$

So a new frame of reference dr',dt'. Note from 1.1.8 $dr'dt'=\sqrt{\kappa_{rr}}dr\sqrt{\kappa_{oo}}dt=drdt$ so $\kappa_{rr}=1/\kappa_{oo}$

So: $\kappa_{oo}\approx 1-\Sigma C_M/(r\xi_1)$

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

$$\gamma^\mu\sqrt{(\kappa_{\mu\mu})}\partial\psi/\partial x_\mu=(\omega/c)\psi$$

$\omega\equiv m_L c^2/h$. This is our new 4D pde

# r large

### $\kappa_{oo}$ and $\kappa_{rr}$

**Ambient Metric Effects On $k_{rr}$ ignoring fractal $r_H$ operator formulation**

This is a fractal theory so the pde gives rotations on all fractal scales. So from Kerr (rotation) metric on the next higher fractal scale (ignoring $r_H$ as a space like horizon) and the equations for that ambient metric (sect. 6.3) with normalized out large quantities $\kappa_{rr}$ goes to:

$$\kappa_{rr}=1/(1+\Delta\varepsilon/(1+\varepsilon)) \text{ and } \varepsilon=0 \text{ for electron}$$

**r small** **$r=r_H$** in $\gamma^\mu\sqrt{(\kappa_{\mu\mu})}\partial\psi/\partial x_\mu=(\omega/c)\psi$

**$\kappa_{oo}$ and $\kappa_{rr}$**

With same (required) $\xi_1$ and simple deflation to $r_H$ (**$r=r_H$**)and rotation to B flux quantized $\Phi$=h/e we describe baryons, the **$r=r_H$** solution to the new pde. Given the Meisner effect first two terms in $C_M/\xi_o$-$C_M/\xi_o$+$C_M/\xi_1$ are equal. The Meisner effect arises because of periodic virtual annihilation (PartII) inside $2P_{3/2}$ at $r=r_H$ and so change in current in Faraday's law. So the new pde describes both free leptons and baryons. That Meisner effect cloud is the pions (partII). Recall from section 1.2 that:

$$\begin{pmatrix} C_1 \\ C_2 \end{pmatrix} = \xi_1 \begin{pmatrix} \delta z_1 \\ \delta z_2 \end{pmatrix}$$

Starting with $\tau+\mu+m_e=\xi_1$ we (more generally) rotate to the B flux quantization $\Phi$=h/e (speed) plus deflation of $\begin{pmatrix} \delta z_1 \\ \delta z_2 \end{pmatrix}$ to $r_H$ all the while conserving required $\xi_1$ mass energy

Rotate$\delta$z+deflate$\delta$z= $\begin{bmatrix} \xi_{11} & \xi_{12} \\ \xi_{21} & \xi_{22} \end{bmatrix} \begin{pmatrix} \delta z_1 \\ \delta z_2 \end{pmatrix} + \begin{bmatrix} -\lambda & 0 \\ 0 & -\lambda \end{bmatrix} \begin{pmatrix} \delta z_1 \\ \delta z_2 \end{pmatrix} = \xi_1 \begin{pmatrix} \delta z_1 \\ \delta z_2 \end{pmatrix}$

$$\begin{bmatrix} \xi_{11}-\lambda & \xi_{12} \\ \xi_{21} & \xi_{22}-\lambda \end{bmatrix} = \xi^2 - \xi Tr(M) + \det(M) = \xi_1$$

Partial fractions with 2 body $\varepsilon$ Meisner effect implies the first two fractions have the same magnitude and so fix the value of rotation $\xi_{ij}$, deflation $\lambda$ and so (determinant) M:

$\frac{C_M+C_M+C_M}{\xi_1} = \frac{C_M}{x^2+x(tr)+C} = \frac{C_M}{\xi_o} - \frac{C_M}{\xi_o} + \frac{C_M}{\xi_1}$ in $\kappa_{oo}$ and so the energy $1/\sqrt{\kappa_{oo}}$. So we have that baryon 3e composite.

Note $\Sigma C_M/\xi_1 \equiv C$ makes C small in eq.1.1.1 preserving the postulate of 1 also.