It's Broken, fix it

David Maker

Key words, Mandelbrot set, Dirac equation, Metric

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

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

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

References

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

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

$\kappa_{xx}=\kappa_{yy}=\kappa_{zz}=\kappa_{tt}=1$ is flat space, Minkowski, as in his Dirac equation(1).

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

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

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

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

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

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

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

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

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

We fixed it.

So where does that Newpde come from that fixed it? All mathematicians know that the real numbers (ie .rationals & irrationals) can be constructed from Cauchy completeness i.e. real# sets as rational Cauchy sequence limits. So all we did here is show we postulated real#0 by using it to derive a associated rational Cauchy sequence. We did this because that same postulate (of real#0) math *also* implies fundamental theoretical physics. See below "Results" & "Summary".

Recall 1≡1+0 and (the *list*) **0**≡0X0,1≡1X1 *defined* as **z=zz**:
the simplest algebraic definition of **0** and 1. So we hypothesize:

Postulate *real* #**0** (so real1) *if* **z'=0** and **z'=1** is substituted (plugged) into z'=z'z'+C **eq1** results in *some* C=0 constant(ie δC=0). Thus

•Plug in **z=0**=z_o=z' in **eq1.** To find ***all* C** substitute z' on left (**eq1**) into right z'z' repeatedly and get iteration $z_{N+1}=z_N z_N$-C. Constraint **δC=0** requires we reject the Cs for which -δC=δ(z_{N+1}-$z_N z_N$) =δ(∞-∞)≠0. The Cs that are left over define the **Mandelbrot set** C_M=C with a subset C=0, fractal scales δz'=10^{40N}δz, N=integer. These fractal scales having their own δz then perturb that **z=1** on its own fractal scale so put z=1+δz in **eq.1** to get δz+δzδz=C (3)
Define N≤0 as 'observable' fractal scales. Thus define the 'observer' fractal scales as N≥1 implying C and δz are big in eq.3 so |δz|>>1. Then solve equation 3 as a quadratic equation so

δz=(-1±$\sqrt{1+4C}$)/2=dr+idt if C≤ -¼ (complex) (4)

Mandelbrot set iteration (i.e., $z_{N+1}=z_N z_N$-C) for this δC=0 *extremum* C=-¼ is a rational number Cauchy sequence -¼, -3/16, -55/256, ...,**0** thereby proving the hypothesis of our above postulated *real#0* math and **real1** *since* real#1=1+0≡1∪real0.

•Plug in **z=1** in z'=1+δz in **eq1**, So **δC=0**= (eq1 implies eq3)=δ(δz+δzδz)= δδz(1)+ δδz(δz)+(δz)δδz= (observer |δz|>>1) ≈δ(δzδz)=0=(plug in eq.4) =δ[(dr+idt)(dr+idt)] =

δ[(dr^2-dt^2)+i(drdt+dtdr)]=0 (5)

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

Factor real eq.5 δ(dr^2-dt^2)=δ[(dr+dt)(dr-dt)] =0=[[δ(dr+dt)](dr-dt)]+[(dr+dt)[δ(dr-dt)]] =0 (6)
so -dr+dt=ds,-dr-dt=ds≡ds_1(→±**e**) Squaring&eq.5 gives circle.in e,v (dr,dt) 2nd,3rd quadrants (7)
& dr+dt=ds, dr-dt=ds, dr±dt=0, light cone (→ν,$\bar{\nu}$) in same (dr,dt) plane 1st,4th quadrants (8)
& dr+dt=0,dr-dt=0 so dr=dt=0 defines vacuum (while eq.4 derives space-time) (9)
Those quadrants give *positive* scalar drdt in eq.7 (if *not* vacuum) so imply the eq.5 *non* infinite extremum imaginary≡drdt+dtdr=0≡$\gamma^i dr\gamma^j dt+\gamma^j dt\gamma^i dr=(\gamma^i\gamma^j+\gamma^j\gamma^i)drdt$ so $(\gamma^i\gamma^j+\gamma^j\gamma^i)=0$, i≠j (from real eq5 $\gamma^i\gamma^i=1$) (7a) Thus from eqs5,7a: $ds^2= dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$ Note how eq5 and C_M just fall (pop) out of eq.1, amazing! (These quadrants in e,*v* plane are used to *illustrate* the 4 Boson SM 4 rotation extreme math ofperturbed eq.7 which is eq.12)

•**Both z=0,z=1** together (in eq1. Use orthogonality to get (2D+2Dcurved space)). Thus (z=1)+(z=0)=(dx_1+idx_2)+(dx_3+idx_4)≡dr+idt given $dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$ *if* $dr^2\equiv dx^2+dy^2+dz^2$ (3D orthogonality) so that $\gamma^r dr\equiv\gamma^x dx+\gamma^y dy+\gamma^z dz$, $\gamma^i\gamma^i+\gamma^j\gamma^i=0$, i≠j,$(\gamma^i)^2=1$, rewritten ($\kappa_{ii}$ from N=0 C_M perturbation of N=1, eqs 7,13-15) as $(\gamma^x\sqrt{\kappa_{xx}}dx+\gamma^y\sqrt{\kappa_{yy}}dy+\gamma^z\sqrt{\kappa_{zz}}dz+\gamma^t\sqrt{\kappa_{tt}}idt)^2$= $\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$. Multiply both sides by $1/ds^2$ and $\delta z^2\equiv\psi^2$ use eq.11 circle result -i∂δz/∂r=(dr/ds)δz inside brackets( ) get 4D QM $\gamma^\mu(\sqrt{\kappa_{\mu\mu}})\partial\psi/\partial x_\mu=(\omega/c)\psi$≡Newpde for e,*v*, κ_{oo}=1-r_H/r =1/κ_{rr}, $r_H=e^2X10^{40N}/m$ (**N**=. -1,0,1.,). So $\kappa_{\mu\nu}$ carries the general covariance (eq.13-15) and **Postulate** 1→**Newpde**

Results: of (merely plugging z'=0,z'=1 into eq.1) **postulate1**: (1) backups: davidmaker.com
Newpde: **N**=0,stable r=r_H composite(part II) 3e $2P_{3/2}$ is baryons(QCD not required), SM is the extreme of 4 e,v quadrant rotations. **N**=-1 is GR. Expansion stage of **N**=1 cosmological scale δz'=δze^{iwt} Dirac eq zitterbewegung oscillation is the cosmological expansion, for **N**=0 the 3rd order Taylor expansion component(1) of $\sqrt{\kappa_{rr}}$ gets the anomalous gyromagnetic ratio so don't need the renormalization infinities. So we get the physics here.

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

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

•So the *simplest idea imaginable* 1 implies all *fundamental math-physics.* no more, no less (eg., We simply have 4D and not a myriad of other dimensions)

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

Reminder: *Real#0* math postulaties literally nothing(0) (except **real1** *since* 1=1+0≡1∪real#0.) The algebraic *definition of 1* (*and* 0) is z=zz (note z= **0,1**) *if* C=0 in the below definition:

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

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

So can plug (δC=0 &) **z=0** into **eq1** iteration(to get ***all*** C) get 2D(complex) **Mandelbrot** set C_M=C (fractal scale N)
(this iteration also results in a Cauchy sequence confirming 1 is a real# comes from our above '1' definition.)
plug (δC=0 &) **z=1** into **eq1** get 2D **Dirac** equation ((N=1)≡'observer') perturbing N=0 (z=1) "observables"
combine **both** 2D+2D=4D **Newpde** using $(dx_1+idx_2)_{z=0}+(dx3+idx_4)_{z=1}$=dr+idt & dr 3D orthogonalization
therefore

postulate 1→ Newpde (So we get all of physics and 1+C→1∪ algebra and Real#math (1 such C_M iteration is Cauchy) **everything** that is physical, no more, no less. See backups at davidmaker.com eg.,in introduction
Ultimate Occam's razor postulate 1 so ultimate physics theory, So understand universe completely

Part I **FOREWORD** (Referencing Newpde and composite 3e at $r=r_H$)

Maker's New Pde Implies The Strong Interaction Without A Host of Assumptions
I am writing in support of David Maker's new generalization of the Dirac equation.(New pde)
For example at his $r=r_H$ Maker's new pde $2P_{3/2}$ state fills first, creating a 3 lobed shape for ψ*ψ. At $r=r_H$ the time component of his metric is zero, so clocks slow down, *explaining the stability of the proton*. The 3 lobed structure means the electron (solution to that new pde) spends 1/3 of its time in each lobe, *explaining the multiples of 1/3e fractional charge*. The lobes are locked into the center of mass, can't leave, *giving assymptotic freedom*. Also there are 6 2P states *explaining the 6 quark flavors.* P wave scattering *gives the jets.* Plus the S matrix of this new pde gives the W and Z as resonances (*weak interaction*) and the Lamb shift but this time without requiring renormalization and higher order diagrams. Solve this new pde with the Frobenius solution at $r=r_H$ and get the hyperon masses. Note we mathematically *solved* the new pde in each of these cases, *we did not add any more assumptions*. In contrast there are many assumptions of QCD (i.e., masses SU(3), couplings, charges, etc.,) versus the one simple postulate of Maker's idea and resulting pde.
Many assumptions are in reality a mere list of properties. One assumption means you actually understand the phenomena.

Dr. Jack Archer
PhD Physicist

Concerns the e,v composite Standard electroweak Model and 3e composite

Physics Theories Interconnected In Maker Theory

A cosmologist has probably asked: What is dark energy? What is the source of the dipole moment in CMBR? Why is gravity only attractive? A particle physicist has probably wondered: Why is the core of the SM a left handed Dirac doublet? What is the source of the nuclear force? Is gauge invariance needed? David Maker has derived a generalized Dirac equation that answers all of these questions. Furthermore, his theory shows that all of these questions are intimately connected.

Dr. Jorge O"Farril PhD
In Particle Physics Theory

Physics Implications of the Maker Theory (**Referencing Newpde**)

"People work with a Hamiltonian which, used in a direct way, would give the wrong results, and then they supplement it with these rules of subtracting infinities. I feel that, under those conditions, you do not really have a correct mathematical theory at all. You have a set of working rules. So the quantum mechanics that most physicists are using nowadays is just a set of working rules, and not a complete dynamical theory at all. In spite of that, people have developed it in great detail. "

This sharp criticism of modern quantum field theory is quoted from a talk by Paul Dirac that was published in 1987, three years after his death: see Chapter 15 of the Memorial Volume "Paul Adrian Maurice Dirac: Reminiscences about a Great Physicist", edited by Behram N. Kursunoglu and Eugene Paul Wigner (paperback edition 1990). Richard Feynman too felt very uncomfortable with "these rules of subtracting infinities" (renormalization) and called it "shell game" and "hocus pocus" (wikipedia.org "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".
[The third term in the Taylor expansion of the square root in equation 9 $\gamma^r\sqrt{(\kappa_{rr})}\partial\psi/\partial r=(\omega/c)\psi$ gives the equation 6.12.10 and so the Lamb shift and equation 8.4 gives anomalous gyromagnetic ratio so we do obtain the QED precision but without the higher order diagrams and infinite charges and masses]
In his highly critical talk Dirac went on to say:
"I want to emphasize that many of these modern quantum field theories are not reliable at all, even though many people are working on them and their work sometimes gets detailed results." He stressed the fundamental requirement to find a Hamiltonian that satisfies the Heisenberg equation of motion for the dynamic variables of the considered system in order to obtain the correct quantum theory. After all, it was this kind of approach, not invoking the correspondence principle to classical mechanics, that led him to discover the relativistic spinor wave equation of the electron that carries his name! The underlying question here is, of course, how to modify the Hamiltonian of that original Dirac equation to incorporate a dynamical system with electromagnetic fields. As wikipedia.org, under the entry "Dirac Equation", put it (Oct 2009): "Dirac's theory is flawed by its neglect of the possibility of creating and destroying particles, one of the basic consequences of relativity. This difficulty is resolved by reformulating it as a

quantum field theory. Adding a quantized electromagnetic field to this theory leads to the theory of quantum electrodynamics (QED)." But it is just this simple additive modification of the Hamiltonian based on the correspondence principle that violates the Heisenberg equation of motion and, therefore, had been rejected by Dirac.

Dirac concluded his talk with these words:
"I did think of a different kind of Hamiltonian which is in conformity with the Heisenberg equations, but … it has not led to anything of practical importance up to the present. Still, I like to mention it as an example of the lines on which one should seek to make advance. … I shall continue to work on it, and other people, I hope, will follow along such lines. "

Unfortunately, nobody seemed to have listened, instead everybody continued to believe that renormalizing away those awkward infinities is the only available answer and blindly followed in the steps of QED in formulating other quantum field theories, such as those for the weak and the strong forces. This has led to a hodgepodge of complex mathematical acrobatics including the proliferation of string theories for quantum gravity and the attempts to construct a comprehensive matrix string theory (M-theory, supposedly a "theory of everything"), theories that require an unreasonable number of dimensions. Dirac would despair!

But eventually, an outsider has been looking back and took Dirac seriously. Joel David Maker, over the past two decades, has been formulating a new theory totally based on the fundamental principles laid out by Dirac. He was able to derive a new Hamiltonian for the Dirac equation to incorporate the electromagnetic (EM) field. In order to achieve this task, he basically had to create a new general relativity (GR) for the EM force by postulating that there is only one truly fundamental elementary particle, the electron - all other particles are derived from it. Maker expresses this postulate mathematically by a basic EM point source that is an observable quantum mechanical object. He then argues that the equivalence principle for an EM force from such a point source does, in fact, hold, since one has to deal with only one value of charge, namely, the electron charge. Hence, he is able to apply Einstein's GR formalism to this simple EM point source. A new ambient metric results in which the Dirac equation needs to be imbedded, leading to a modification of the Hamiltonian that is by no means additive but is GR covariant and satisfies the requirement of the Heisenberg's equation of motion.
Note: [the 3rd term in the Taylor expansion of the square root (see 6.12.1(Lamb shift), eq.8.4 (anomalous gyromagnetic ratio) in eq.2 pde $\gamma^r\sqrt{(\kappa_{rr})}\partial\psi/\partial r=(\omega/c)$ (1.11) contains the high precision QED results otherwise only obtainable by gauges, higher order diagrams and renormalization.]

An important ingredient of this new ambient metric is the existence of an EM Schwarzschild radius for the postulated single point source generating an electron event horizon that is directly related to the classical electron radius. It also leads to the revolutionary concept of fractal event horizons that envelope each other with deep implications for the self-similarity of the physics at different scales. Our observable physics is, however, limited to the region between the electron (more generally, Dirac particle) horizon and the next larger scale horizon, the cosmological horizon. Perturbations from higher-order scales can, however influence observations in our observable region.

Maker's fundamentally new approach, by including the concept of observability, naturally unifies general relativity with quantum mechanics and makes GR complete (i.e. ungauged), a result, Einstein had been striving for, but was unable to achieve. In addition it provides the precision answers of QED (such as a accurate value of the Lamb shift) and other quantum field theories in a direct way without higher-order Feynman diagrams and/or renormalization.
Solutions of the new GR covariant Dirac equation for the region outside the electron event horizon produce the needed physics for EM forces, QED corrections, and weak forces. Solutions for a composite Dirac particle evaluated near its event horizon (which, in a composite system, needs to be a "fuzzy" horizon and, hence, some inside observation becomes possible) provide an understanding of leptons and hadrons (baryons and mesons) as electronic S, $2P_{3/2}$ states of the multi-body Dirac particle: For example, S-states are interpreted as leptons, hybrid SP2 states as baryons. Quarks are not separate particles but are related to the three-fold lobe structure of 2P3/2 at r=rH states in this model, providing an explanation of the strong forces. Gravity is derived, as a first-higher-order effect, from the modification of the ambient EM metric by the self-similar radial expansion dynamics at the cosmological scale. This first-higher-order effect, also provides an understanding of the lepton mass differences; by including the perturbation from the next self-similar larger-scale dynamics (those of a "super cosmos") the finiteness of neutrino masses are explained as tiny contributions from such a second-higher-order effect. Amazingly, Maker was able to deduce all these results from a basic simple postulate, namely, the existence of a single observable EM point source, which - within the formalism of Einstein's general relativity - defines a new ambient metric.
Thus, with his radically new thinking, Maker has proven the correctness of Dirac's lines of approach to the Hamiltonian problem. Dirac believed in the power of mathematical beauty in the search for a correct description of our observable physical world: "God used beautiful mathematics in creating the world" (thinkexist.com, Oct 2009). Beautiful mathematics it is indeed!

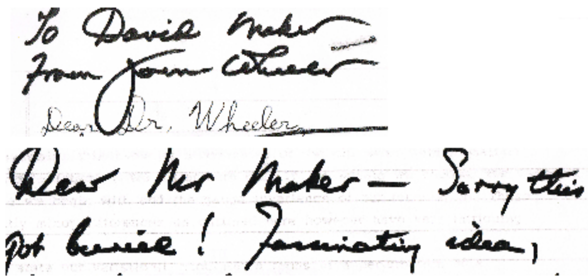
Reinhart Engelmann, Oct 2009

Maker, *Quantum Physics and Fractal Space Time*, volume 19, Number 1, Jan 1999, *CSF*,

concerns the fractal cosmological implications

The above reference is a publication in a refereed journal of an article on the universe as a particle in a fractal space time. Here these (fractal) objects are the result of circle mappings onto Z plane Reimann surfaces, separated by nontrivial branch cuts (see preface below). The dr+dt extrema diagonals on this Z plane translate to pde's for leptons in the ds extrema case and for bosons in the ds^2 ($=dr^2+dt^2$) extrema case each with its own "wave function"ψ.

I attended the U.Texas for a while and as a teaching assistant I shared the mailbox rack with people like Weinberg and Archibald Wheeler. So one day on looking over at Wheeler's a few mailboxes over on an impulse I plopped in a physics paper on this subject. Wheeler responded later in a hand written note that what I had done was a 'fascinating idea'.


To David Maker
From John Wheeler
Dear Dr. Wheeler
Dear Mr Maker — Sorry this
got buried! Fascinating idea,

Fascinating idea

He apparently took this fractal idea seriously because 8 years later he organized a seminar at Tufts U. (1990) on a closely related concept: “the wave function of the universe” (the universe in his case as a Wheeler De Witt equation boson wavefunction). Allen Guth and Stephan Hawking also attended.

Derivation of the New Pde From the Postulate Of 1

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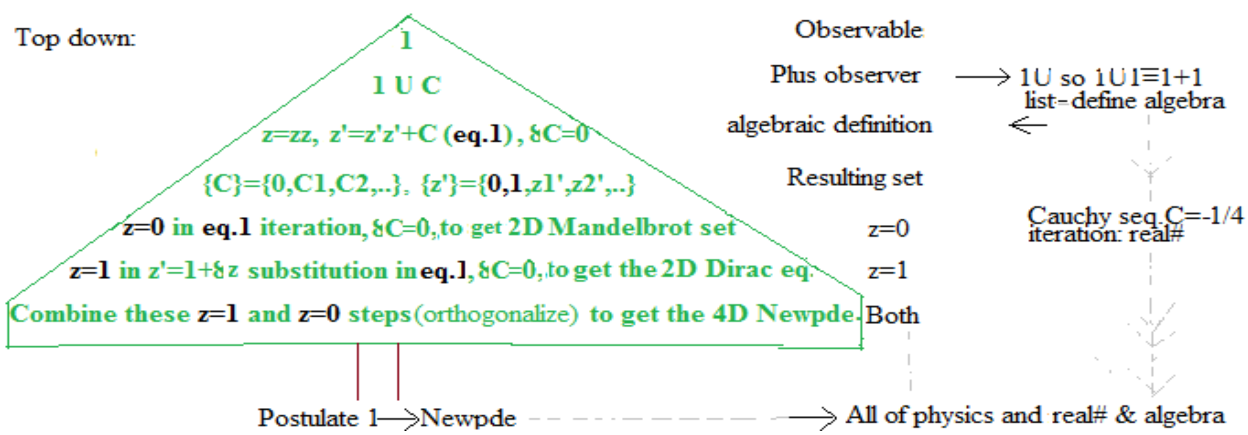


I Math Details of 1

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

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

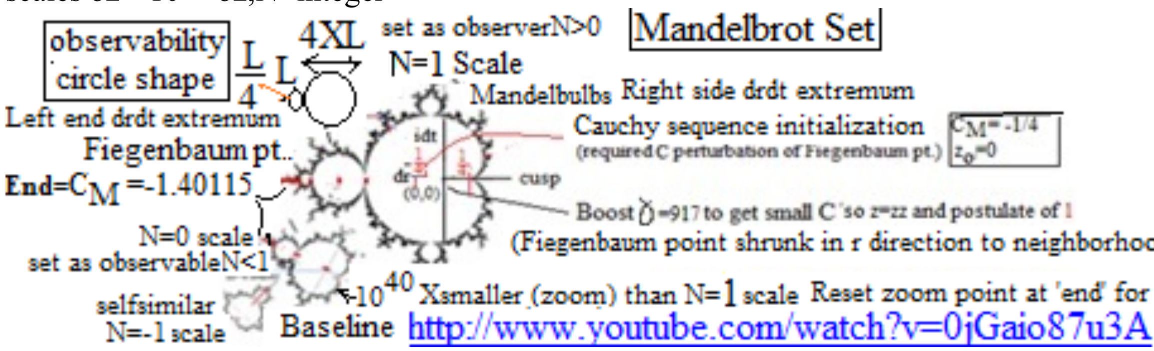


Fig.1

These fractal scales having their own δz then perturb that **$z=1$** so put z=1+δz in **eq.1** to get

$$\delta z+\delta z\delta z=C \quad (3)$$

Then solve equation 3 so $\delta z=(-1\pm\sqrt{1+4C})/2=dr+idt$ if $C< -\frac{1}{4}$ (complex) (4)

Mandelbrot set iteration for this δC=0 *extremum* (thus is postulated) C=-¼ is a rational# Cauchy seq. -¼, -3/16, -55/256, .,0 *confirming the real#0 Cauchy completeness*. Thus also **1** in above 1≡1∪0 is a real# verifying **postulate** 1.

Define N≤0 as 'observable'fractal scales. Thus define the'observer'fractal scales as N≥1 implying $|\delta z|>>1$.

•Plug in **$z=1$** in z'=1+δz in **eq1**, So **δC=0**= (eq1 implies eq3)$=\delta(\delta z+\delta z\delta z)=\delta\delta z(1)+\delta\delta z(\delta z)+(\delta z)\delta\delta z=$ (use $|\delta z|>>1$) $\approx\delta(\delta z\delta z)=0=$(plug in eq.4) $=\delta[(dr+idt)(dr+idt)]=$

$$\delta[(dr^2-dt^2)+i(drdt+dtdr)]=0 \quad (5)$$

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

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

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

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

& $dr+dt=0,dr-dt=0$ so $dr=dt=0$ defines vacuum (while eq.4 derives space-time) (9)

Those quadrants give *positive* scalar drdt in eq.7 (if *not* vacuum) so imply the eq.5 *non* infinite extremum imaginary≡drdt+dtdr=0≡$\gamma^i dr\gamma^j dt+\gamma^j dt\gamma^i dr=(\gamma^i\gamma^j+\gamma^j\gamma^i)drdt$ so $(\gamma^i\gamma^j+\gamma^j\gamma^i)=0$, i≠j (from real eq5 $\gamma^i\gamma^i=1$) (7a) Thus from eqs5,7a: $ds^2=dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$ Note how eq5 and C_M just fall (pop) out of eq.1, amazing!

(These quadrants in e,v plane are needed to illustrate the 4 Boson SM 4 rotation extreme

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

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

Mandelbrot set iteration is at –¼ extemum is also a Cauchy sequence giving the real#0
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=- ¼ 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.
δC=0 Extremum on *Circle* 4X sequence shapes (fig1) In Mandelbrot set pulls it out of zoom clutter because of the above 4X *circle* observability sequence in fig1
δC=0 as usual applies to a differential extemum δC=Σ(∂C/∂_{xi})dx_i) and we must in its final application apply it to N≤0 observables C≈δz (otherwise why bother?). So $\delta C = \left(\frac{\partial C}{\partial r}\right)_t dr + \left(\frac{\partial C}{\partial t}\right)_r idt = 0$. So for that fig.1 4X sequence of *circles* drdt= darea_M≠0 (so eq.11 observables) the real δC=0 extremum given the decreasing circle radius sequence $\lim_{m\to\infty}\frac{\partial C}{\partial area_m}dr_m$=KX0 =0 (since dr_∞≈0) at Fiegenbaum point =f^α=(-1.40115.,i0)= C_M≡end and is the *ultimate realization of δC=0.* So random circles in the zoom don't do δC=0. Note if a circle (or many circles) is rotated (U), translated (D), shrunk (S) equally in both dimensions (i.e., $(\partial x^j/\partial x'^k)f^j = f^k \equiv \begin{bmatrix} f_{1N} \\ f_{2N}\end{bmatrix} = S_N\begin{bmatrix} U_{11} & U_{12} \\ U_{21} & U_{22}\end{bmatrix}\begin{bmatrix} f \\ 0\end{bmatrix} + \begin{bmatrix} D_{1N} \\ D_{2N}\end{bmatrix}$) it is still a circle, eq.11 still holds, so *it's still an observable* as seen in the N fractal scale zoom. Thus you can pick out from that zoom these fig.1 Mandelbrot set extremum 4Xdiameter circles as the only o**bservables** *and* δC=0 extremum geometry in all that clutter. Reset the zoom, restart at such $S_N C_M$= $10^{40N}C_M$ in eq.13.
metric and so Lorentz transformation boosts γ on scale N
Note z=0=1+δz=1-1 applies to thr electon or neutrino (eqs. 7-9,11b) making it's z real. We could then have a Lorentz transformation γ that then gave a δz=0 in z=1+δz thus implies the rea#1=z as in our original real# 1 definition,that also being the ultimate meaning of our required "*someC=0'*

For N=0 observable Postulate1 *also* implies a small C in eq.1 which implies a eq.5 Lorentz contraction (9) 1/γ boosted frame of reference (fig.6) in N=0 eq.3 small C=C_M/γ≡ C_M/ξ_1=δz' z=1+δz and δC_M=(δξ)δz+ξδδz=0. So must add N=0 curved space perturbation δz' in eqs.11,12

for z=1 δz is small so $\delta\xi$ and ξ can be large (**unstable large mass $\tau+\mu$,** sectD4). (11a)
for **z=0** $|\delta z|$ is large so $\delta\xi$ and ξ can be small (**stable small mass: electron** ground state δz(11b)
For N=1 δz=dr gets small relative to 1 at high energy Lorentz boost δz but still keeps $dr^2-dt^2=ds^2$ constant so merely results in slightly modified eq.7: $(dr-\delta z')+(dt+\delta z')\equiv dr'+dt'=ds$ (12)
since ds must remain a constant implying angle perturbation from $\theta_o=45°$on the above **ds Circle**
For N_{ob}=0 (observer at N=1) and eq. 7 dr+dt=ds the r,t axis' are the max extremum for ds^2, and the ds^2 at 45° is the min extremum ds^2 so each $\Delta\theta=\pm 45°$ is pinned to an axis' so extreme $\Delta\theta\approx\pm 45°=\delta z'$. So in eq.12 the 4 rotations 45°+45°=90° define 4 Bosons (see **appendix A).** But **for N=-1** 45°-45° $N_{ob}<0$ then contributes so you also have other (smaller and infinitesimal N=-1) fractal scale extreme $\delta z'$(eg.,tiny Fiegenbaum pts so N=1 dr=r, for N_{ob}=-1) 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 applications(9). Recall also from eqs5,7a that $dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$

Both z=0,z=1 together using orthogonality get (2D+2Dcurved space) . So (z=1)+(z=0)= $(dx_1+idx_2)+(dx_3+idx_4)\equiv dr+idt$ given $dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$ *if* $dr^2\equiv dx^2+dy^2+dz^2$ (orthogonality) so thatn$\gamma^r dr\equiv\gamma^x dx+\gamma^y dy+\gamma^z dz$, $\gamma^j\gamma^i+\gamma^j\gamma^i=0$, $i\neq j$,$(\gamma^i)^2=1$, rewritten (with curved space $\kappa_{\mu\nu}$ eq.13-15) $(\gamma^x\sqrt{\kappa_{xx}}dx+\gamma^y\sqrt{\kappa_{yy}}dy+\gamma^z\sqrt{\kappa_{zz}}dz+\gamma^t\sqrt{\kappa_{tt}}idt)^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$. Multiply both sides by $1/ds^2$ and $\delta z^2\equiv\psi^2$ use use operator equation 11 inside brackets( ) get curved space 4D

$$\gamma^\mu(\sqrt{\kappa_{\mu\mu}})\partial\psi/\partial x_\mu=(\omega/c)\psi \quad (16)$$

$\equiv$Newpde for e,ν,$\kappa_{oo}=1-r_H/r=1/\kappa_{rr}$, $r_H=e^2X10^{40N}/m$ (**N**=. -1,0,1.,). Also $C_M/\xi=r_H=$ *smallC so big $\xi=\gamma$ boost so z=zz so **postulate 1**. So we really did just postulate 1. So

Postulate 1→Newpde

* C_M/ξ_1 is ξ small C boost for z=zz so postulate1 from Newpde $r=r_H$ $2P_{3/2}$ stable state. See fig6. The 4 eq.12 Newpde e,ν rotations at $r=r_H$ are the 4 W^+,γ,W^-,Z_o SM Bosons (appendixA).
So Penrose's intuition(6) was right on! There *is* physics in the Mandelbrot set, all of it.

2.1 Oscillation of $\delta z(\equiv\psi)$ on a given fractal scale

From Newpde (eg., eq.1.13 Bjorken and Drell) $i\hbar\frac{\partial\psi}{\partial t}=\frac{\hbar c}{i}\left(\alpha_1\frac{\partial\psi}{\partial x^1}+\alpha_2\frac{\partial\psi}{\partial x^2}+\alpha_3\frac{\partial\psi}{\partial x^3}\right)+\beta mc^2\psi=H\psi$. For electron at rest: $i\hbar\frac{\partial\psi}{\partial t}=\beta mc^2\psi$ so: $\delta z=\psi_r=w^r(0)e^{-i\varepsilon_r\frac{mc^2}{\hbar}t}$ ε_r=+1, r=1,2; ε_r=-1, r=3,4.): This implies an oscillation frequency of $\omega=mc^2/\hbar$. which is fractal here. So the eq.12 the 45° line has this ω oscillation as a (that eq.7-9 δz variation) rotation. On our own fractal cosmological scale we are in the expansion stage of one such oscillation. Thus the fractalness of the Newpde explains cosmology. The next higher cosmological scale is independent (but still connected by superposition of speeds implying a separation of variables result: $i\hbar\frac{\partial\psi}{\partial t}=\beta\sum_N(10^{40N}(\omega t)_{\varepsilon+\Delta\varepsilon})\psi \ =\beta\sum_N(10^{40N}m_{\varepsilon+\Delta\varepsilon}c^2/\hbar)\psi$). By the way fractal scale N=1 the 45° small Mandelbulb chord ε (Fig6) is now, given this ω, getting larger with time so 1-t α ε. But the tauon 68.74° is stationary so its mass can be set to 1. So at this time (relative to the tauon) the muon =ε=.06, electron Δε=.0005899. So cosmologically for stationary N=2 δz=√κ$_{oo}$dt=$e^{-i\varepsilon_r \frac{mc^2}{\hbar}t} \rightarrow e^{i(\varepsilon+\Delta\varepsilon)}$(17)

But seen from inside at N=1 (D18) E=1/√κ$_{oo}$=1/√(1-r$_H$/r) then r<r$_H$ & E becomes imaginary in $e^{iEt/h}$ =δz=√κ$_{oo}$dt= $e^{-i\varepsilon_r \frac{mc^2}{\hbar}t} \rightarrow e^{(\varepsilon+\Delta\varepsilon)}$ (17a)

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

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

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

Stability of composite 3e: (Newpse stable 2P$_{3/2}$ at r=r$_H$ state)

We can actually calculate m$_p$ from the quantization of the magnetic flux h/2e=Φ$_0$=BA (partII) using the Newpde ground state z=0 three electron (S$_1$,S$_2$,S$_3$), e=e+e-e states of the Newpde with LS coupling minimal energy (**J**=L+S=1-½-½+½ =**½**) with two orbiting relativistic positrons γm$_e$ for 2P$_{3/2}$ at r=r$_H$, so 3e=(γm$_e$+γm$_e$)=m$_p$ S*tability* is implied by (dt'^{2}=(1-r$_H$/r)dt^2) since clocks stop (dt'=0) at r=r$_H$. That 3rd mass also reverses the pair annihilation with virtual pair creation inside the r$_H$ 2D area given σ=πr$_H^2$≈(1/20)barns which is the reason why only composite 3e or its multiples gives stability.

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

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

For N=0 observable

z=0, **r=r$_H$ 11b**, the high energy r=r$_H$ 2D spherical shell then is a domain of these same 2D Mandelbulbs μ, τ giving on the 2D shell: μ+τ=3e+3e=(γm$_e$.+γm$_e$)$_τ$+(γm$_e$.+γm$_e$)$_μ$=3e+3e=m$_p$+m$_p$. two body motion equipartition of energy of the intereacting positrons in each of two **baryons** each with **J=S'= ½.** Eq 11b so for each positron δz'= r$_H$=C$_M$/ξ$_o$= C$_M$/m$_e$ in eq.12.

z=1, **11a**, **r'$_H$<<r$_H$** (so not that shell) because for z=1 ξ_1>>ξ_o λ=h/mc=Compton wavelength, $2\pi r'_H=\lambda$,. m=ξ_1. Again 3e for each of 2D free space domain high energy quasi stable μ,τ,: $\tau+\mu$=3e+3e= 2 free space **leptons** each with **J=S'=½. 11a** so $\delta z=r'_H=C_M/\xi_1= C_M/(\tau+\mu)$ (18) in eq12

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

Postulate 1 implied finally

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

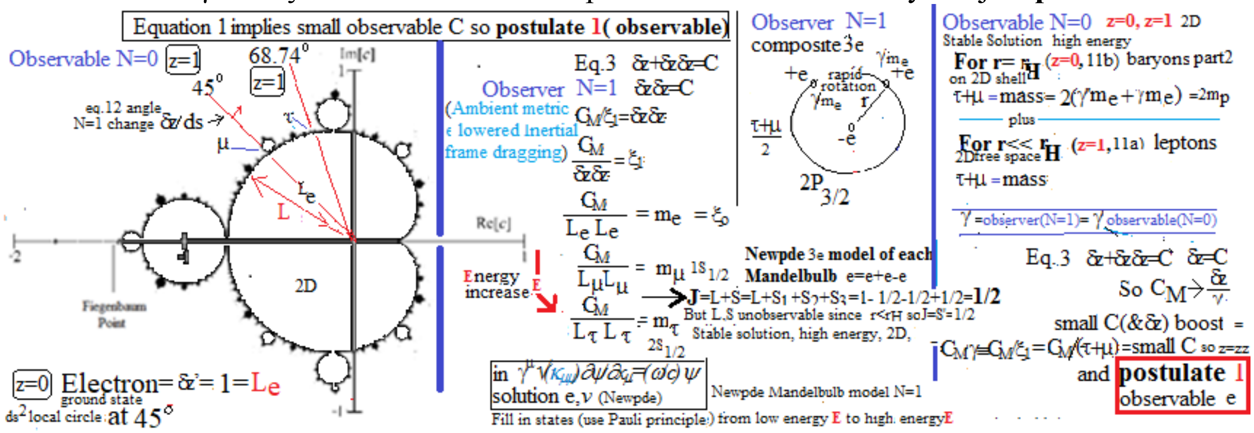


Fig.6 **Conclusion**

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

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

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

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

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

The Fiegenbaum point (11a) is the only part of the Mandlebrot set we use. At the Fiegenbaum point (imaginary) time X10^{-40}=Δ 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≈$\delta z'$ (from eq.3) =real distance =real$\delta z/\gamma$ =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 X$10^{-40}\gamma$ 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 $\delta z+\delta z\delta z=C$ with quadratic equation result:
$\delta z=\frac{-1\pm\sqrt{1-4C}}{2}$. is real for noise C<¼ creating our noise on the N=0 th fractal scale. So ¼=$(3/2)kT/(m_pc^2)$. So T is 20MK. So here we have *derived the average temperature of the universe* (stellar average). That $z'=1+\delta z$ substitution also introduces Lorentz transformation rotational and translation noise that does not effect the number of splits, analogous to how a homeomorphism does not change the number of holes (which is a Topological invariant).
So the excess C noise (due to that small C' boost) causes the 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 $r_1=r_H=2e^2/m_ec^2$, N=0th, $r_2=r_H=2GM/c^2$ is defined as the N=1 th where $M=10^{82}m_e$ with $r_2=10^{40}r_1$ So the Fiegenbaum pt. gave us a lot of physics:
eg. **#of electrons in the universe, the universe size, temp.**
Iteration Math
Mandelbrot set iteration sequence z_n $C_M=-¼$, $z_0=0$ same as Cauchy seq. since it begins with rational number -¼, allowing the (C' uncertainty) dr neighborhood of 0 to have a nonzero probability of being a real number and thereby giving real eigenvalues to the equation 11 operator formalism after the small C' boost to get observability around dr=0. dr=0.
So $\delta z\approx$zero (N=0 fractal scale) is a real number which makes the z=1 in $z=1+\delta z\approx 1+0$ a real number thereby confirming our original postulate real #1. The postulate 1 also gives the *list-define* math (B2) *list* cases $1\cup 1\equiv 1+1\equiv 2$, *define* a=b+c (So no other math axioms but 1.)
That means the **mathematics *and* the physics** come from (**postulate 1→Newpde**): *everything*.
Recall from eq.7 that dr+dt=ds. So combining in quadrature eqs 7&11 SNRδz=(dr/ds+dt/ds)δz =((dr+dt)/ds)δz=(1)δz (11c,append) and so having come *full circle* back to sect.1 postulate 1 as a real eigenvalue (1≡Newpde electron). So, having come *full circle* then: (**postulate 1⇔ Newpde**), back to our section 1. So we rewrite our title:
"The Ultimate Occam's razor theory (ie 1) is *the same as* the ultimate math-physics theory (ie Newpde)". One defines the other.as in an ankh circle.

Mathematical Notion (of postulate 1⇔Newpde)

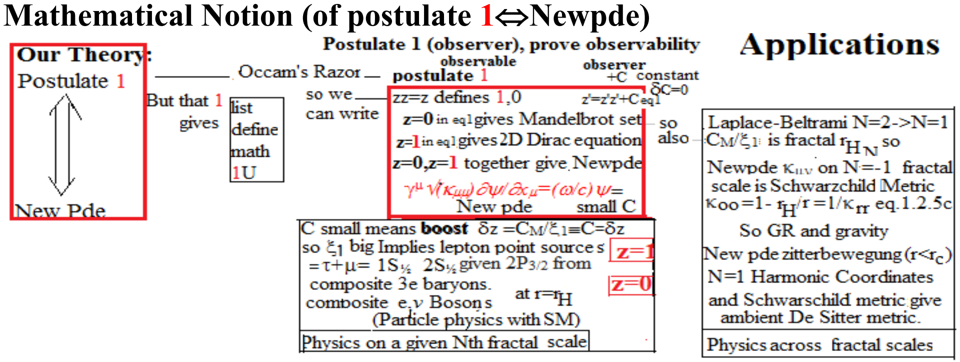


fig.5

2.4 Results: Recall from ultimate Occam's razor **Postulate** 1 we got the Newpde. We note in reference 5 on the first page that we also get the *actual* physics with the Newpde. Thus the usual postulating of hundreds of Lagrange densities(fig.11), free parameters, dimensions, etc., is senseless. For example (appendixC) *Newpde* composite 3e $2P_{3/2}$ at $r=r_H$ is the proton: That B flux quantization(C3) implies a big proton mass implying 2 high speed $\gamma=917$ positrons and so the Fitzgerald **contracted E field lines *are* the strong force**: we finally understand the strong force! (bye,bye QCD). So these *two* positrons then have big mass *two body* motion(partII) so also **ortho(s,c,b) and para(t) Paschen Back excited (hadron multiplet) states** understood (partII) N=0 extreme perturbation rotations of N=1 eq.12 implies Composite e,ν at $r=r_H$ giving **the electroweak SM** (appendixA) **Special relativity** is that eq.5 Minkowski result. **With the Eqs.16 Newpde ψ (**appendix C) **we finally understand Quantum Mechanics** for the first time and eq.4 **gave us a first principles derivation of r,t space-time** for the first time. That Newpde $\kappa_{\mu\nu}$ metric (In eq.14), on the N=-1 next smaller fractal scale(1) so $r_H=10^{-40}2e^2/m_ec^2\equiv 2Gm_e/c^2$, is the Schwarzschild metric since $\kappa_{oo}=1-r_H/r=1/\kappa_{rr}$ (15): we **just derived General Relativity(gravity) *from* quantum mechanics in one line**. The Newpde zitterbewegung expansion component ($r<r_C$) on the next larger fractal scale (N=1) is the universe expansion sect.2.1: **we just derived the expansion of the universe in one line.** The third order terms in the Taylor expansion of the Newpde $\sqrt{\kappa_{\mu\nu}}$ give those precision QED values (eg.,Lamb shift sect.D) allowing us to **abolish the renormalization and infinities.**

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

Intuitive Notion (of postulate 1⇔Newpde)

The Mandelbrot set introduces that $r_H = C_M/\xi_1$ horizon in $\kappa_{oo}=1-r_H/r$ in the Newpde, where C_M is fractal by 10^{40}Xscale change(fig.2) So we have found (davidmaker.com) that: Given that fractal selfsimilarity astronomers are observing from the inside of what particle physicists are studying from the outside, that ONE *New pde* e electron r_H, one thing (fig.1). *Everything* we observe big (cosmological) and small (subatomic) is then that (*New pde*) r_H, even baryons are composite 3e. So we understand, *everything*. This is the only Occam's razor optimized 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! Think about that as you gaze up into a star filled sky some evening! We really then understand how there could ONE object (that we postulated).

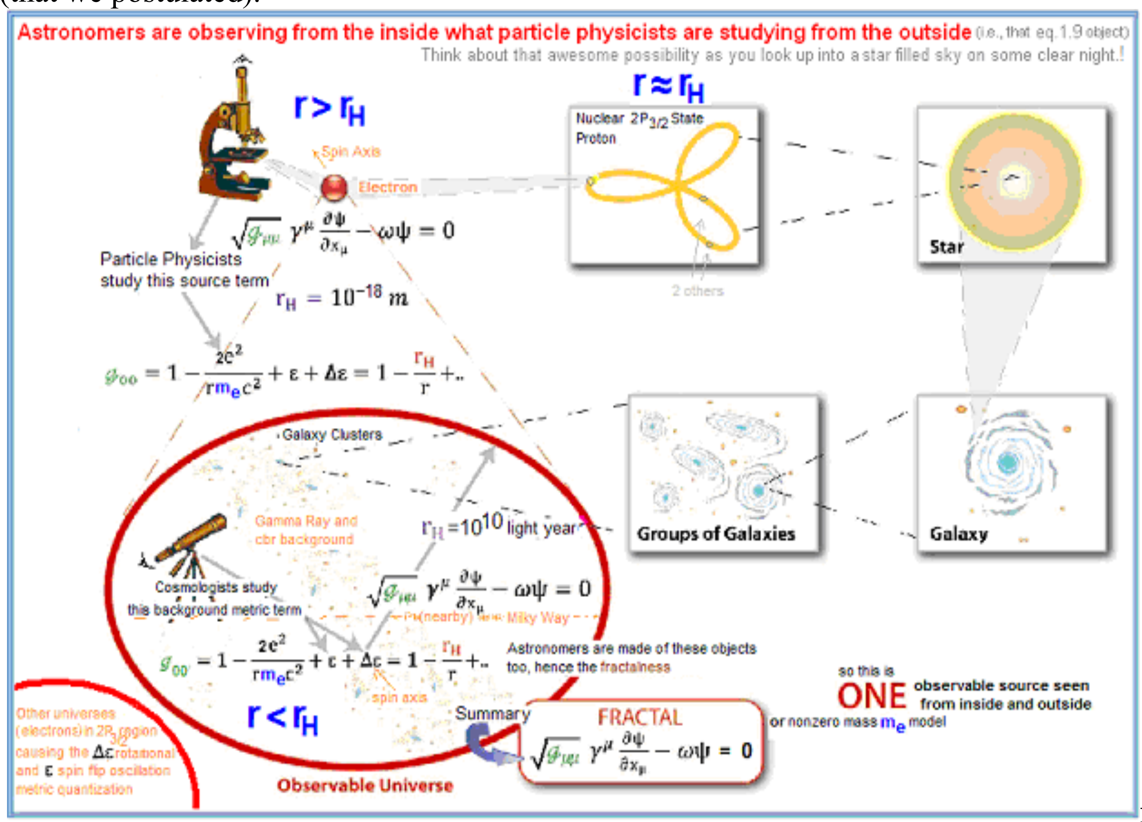


fig2

(↑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 $C_M=-\frac{1}{4}$, $z_0=0$ same as Cauchy

seq. since it begins with rational number -¼, allowing the (C' uncertainty) dr neighborhood of 0 to have a nonzero probability of being a real number and thereby giving real eigenvalues to the equation 11 operator formalism after the small C' boost to get observability around dr=0. dr=0. So δz≈zero (N=0 fractal scale) is a real number which makes the z=1 in z=1+δz ≈1+0 a real number therby confirming our original postulate real #1

(8)Tensor Analysis, Sokolnikoff, John Wiley
(9)The Principle of Relativity, A Einstein, Dover
(10)Quantum Mechanics, Merzbacher, John Wiley
(11) lemniscate circle sequence (Wolfram, Weisstein, Eric)

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

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

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

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

I→II, II→III,III→IV,IV→I 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. one such rotation around an around a axis (SM) and the other around a diagonal (SC). Note in fig.3 dr,dt is also a rotation. and so has an eq.11 rotation operator observable θ. Thus from equation 11 for (θ) angle rotations θδz≡(dr/ds)δz= $-i\partial(\delta z)/\partial r$ 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 $\theta\theta\delta z' = e^{i\theta p}e^{i\theta'}\delta z = e^{i(\theta p+\theta)}\delta z = (dr/ds)((dr/ds)dr') = -i\partial(-i\partial(dr'))/\partial r)\partial r = -\partial^2(dr')/\partial r^2$ large angle rotation in figure 3. In contrast for z=1, δz' small so 45°-45° small angle rotation in figure 3 (so then N=-1). Do the same with the time t and get for z=0 rotation of 45°+45° (fig.4) then $\theta\theta\delta z' = (d^2/dr^2)z' + (d^2/dt^2)\delta z'$ (A1)

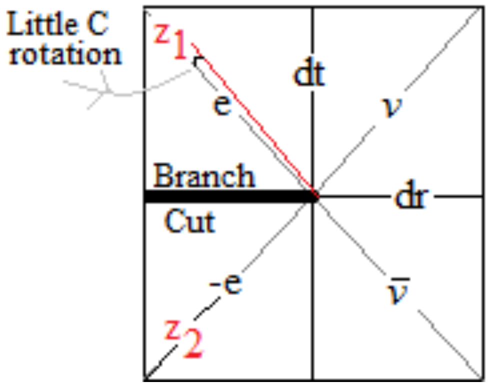
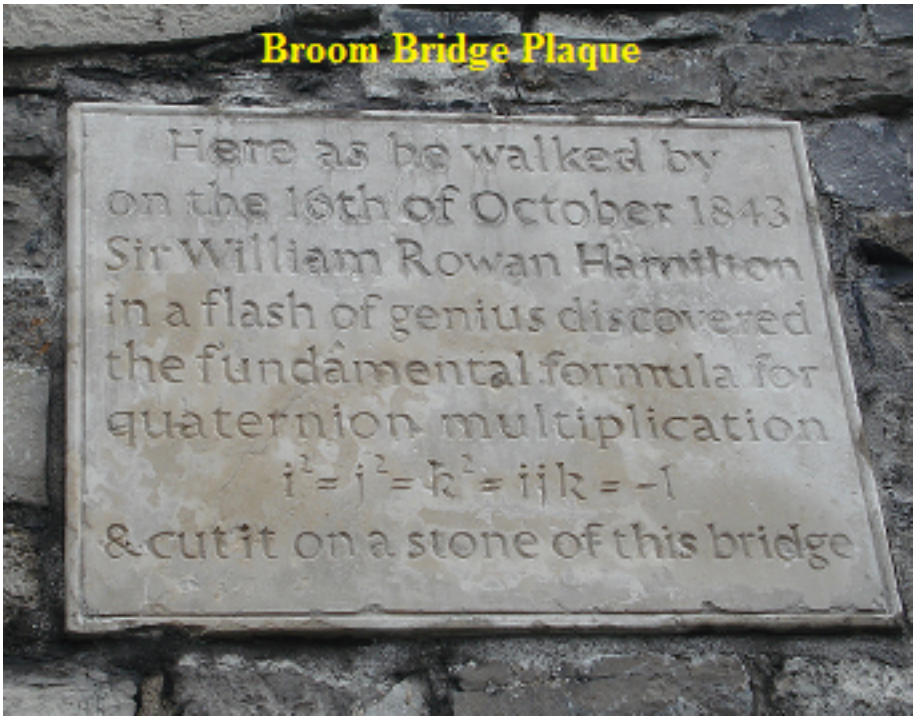


fig.3 for **45°-45°**

Note also the para two body spin states $\Delta S=\frac{1}{2}-\frac{1}{2}=0$ (sect.4.5, pairing interaction).
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 $\delta z'$), **so these leptons exhibit "force".**

Newpde $r=r_H$, z=0, 45°+45 rotation of composites e,*ν* implied by Equation 12

So z=0 allows a large C z rotation application from the 4 different axis' max extremum (of eq.16) branch cuts gives the 4 results: Z,+-W, photon bosons of the Standard Model. So we have derived the Standard Model of particle physics in this very elegant way (from the four axis'). You are physically at $r=r_H$ if you rotate through the electron quadrants (I, IV).of eq.7-9. So we have large C_M dichotomic 90° rotation to the next Reimann surface of eq.12, eq.A1 $(dr^2+dt^2)z''$ from some initial extremum angle(s) θ. Eq.12 solutions imply complex 2D plane Stern Gerlach dichotomic rotations using eq.A1 thereby using Pauli matrices σ_i algebra, which maps one-to-one to the quaternionA algebra. Using eq.12 we start at some initial angle θ and rotate by 90° the noise rotations are: $C=\delta z''=[e_L,\cancel{\nu}_L]^T\equiv\delta z'(\uparrow)+\delta z'(\downarrow)\equiv\psi(\uparrow)+\psi(\downarrow)$ has a eq.12 infinitesimal unitary generator $\delta z''\equiv U=1-(i/2)\varepsilon n*\sigma)$, $n\equiv\theta/\varepsilon$ in $ds^2=U^tU$. But in the limit $n\rightarrow\infty$ we find, using elementary calculus, the result $\exp(-(i/2)\theta*\sigma)=\delta z''$. We can use any axis as a branch cut since all 4 are eq.16 large extremum so for the 2nd rotation we move the branch cut 90° and measure the angle off the next diagonal since Pauli matrix dichotomic rotations are actually axis rotations, leaving our e and v directions the same. In any case $(dr+dt)z''$in eq.16 can then be replaced by eq.A1 $(dr^2+dt^2+..)\delta z''=(dr^2+dt^2+..)e^{\text{quaternionA}}$Bosons because of eq.A1.
A2 Then use eq. 12 and quaternions to rotate $\delta z''$ since the quaternion formulation is isomorphic to the Pauli matrices. $dr'=\delta z_r=\kappa_{rr}dr$ for **Quaternion** A $\kappa_{ii}=e^{iAi}$.



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

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

For baryons with a 3 particle r_H/r may change sign without third particle ε changing sign so that at $r=r_H$. Can normalize out the background ε in the denominator of $E=(\tau+\varepsilon)/\sqrt{(1+\varepsilon+\Delta\varepsilon-r_H/r)}$ for small conserved (constant) energies $1/\sqrt{(1+\varepsilon)}$ and (so $E=(1/\sqrt{(1+x)})=1-x/2+$) large r (so large λ so not on r_H)implies the normalization is:

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

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

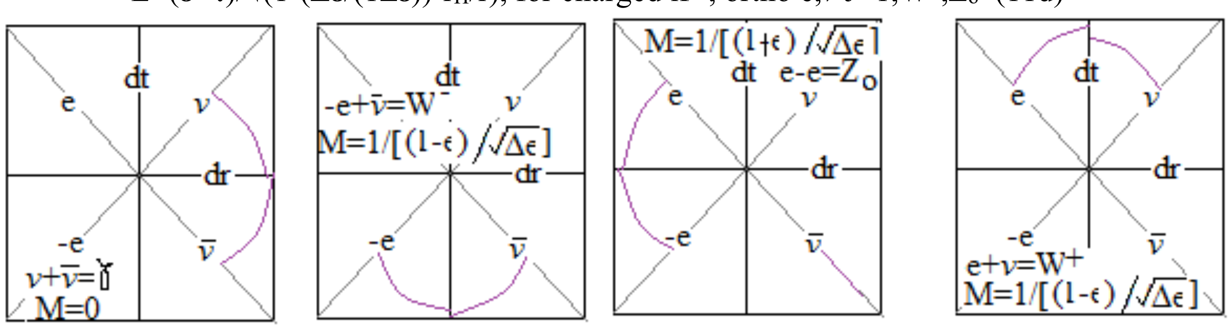


fig4

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

A2 These quadrants were defined in eq.7-9 and used in eq.12. The Appendix A4 derivation applies to the far right side figure. Recall from eq.12 z=0 result C_M=45°+45°=90°, gets Bosons. 45°-45°= leptons. The *ν* in quadrants II(eq.5) and III (eq.9). e in quadrants I (eq.7) and IV (eq.7). Locally normalize out 1+ε (appendix D). For the **composite e,*ν*** on those required large z=0 eq.9 rotations for C→0, and for stability r=r_H (eg.,for $2P_{½}$, I→II, III→IV,IV→I) unless r_H=0 (II→III) Example:

A4 Quadrants IV→I rotation eq.A2 $(dr^2+dt^2+..)e^{\text{quaternion } A}$ =rotated through C_M in eq.16.

example C_M in eq.A1 is a 90° CCW rotation from 45° through *ν* and anti*ν*

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

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

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

Adding eq. A2 to eq. A4 to obtain the total D'Alambertian A3+A4=
$[i\partial^2 A_r/\partial r^2+i\partial^2 A_r/\partial t^2]+[j\partial^2 A_o/\partial r^2+j\partial^2 A_o/\partial t^2]+ii(\partial Ar/\partial r)^2+ij(\partial A_r/\partial r)(\partial A_o/\partial r)$
$+ji(\partial A_o/\partial r)(\partial A_r/\partial r)+jj(\partial A_o/\partial r)^2++ii(\partial Ar/\partial t)^2+ij(\partial A_r/\partial t)(\partial A_o/\partial t)+ji(\partial A_o/\partial t)(\partial A_r/\partial t)+jj(\partial A_o/\partial t)^2$.

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

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

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

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

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

The Lorentz gauge is the only gauge hence it is no gauge at all and we have avoided the Maxwell overdeterminism problem (8eq, ,6 unknowns E_i,B_i.).Must use Newpde 4D orthogonalization here Amplitudes of physical processes in QED in the noncovariant Coulomb gauge coincide with those in the covariant Lorenz gauge. The Aharonov–Bohm effect depends on a line integral of **A** around a closed loop, and this integral is not changed by A→A+∇ψ which doesn't change B=∇XA either. So formulation in the Lorentz gauge mathematics works so it is no longer a gauge, we are gaugeless.

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

For the **composite e,*ν*** on those required large z=0 eq.12 rotations for C≈0, and for stability r=r_H for $2P_{½}$ (I→II, III→IV,II→III) unless r_H=0 (IV→I) are:

Ist→IInd quadrant rotation is the W+ at **r=r_H**. Do similar math to A2-A7 math and get instead a Proca equation The limit ε→1=τ (D13) in ξ_1 at r=r_H.since Hund's rule implies μ=ε=$1S_{½}$ ≤$2S_{½}$= τ=1. So the ε is negative in Δε/(1-ε) as in case 1 charged as in appendix C1 case 2.

$E=1/\sqrt{}(\kappa_{oo})-1=[1/\sqrt{}(1-\Delta\varepsilon/(1-\varepsilon)-r_H/r)]-1=[1/\sqrt{}(\Delta\varepsilon/(1-\varepsilon))]-1$. $E_t=E+E=2/\sqrt{}(\Delta\varepsilon/(1-\varepsilon))$=W+ mass.
E_t=E-E gives E&M that also interacts weakly with weak force.

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

$E=1/\sqrt{(\kappa_{oo})}-1=[1/\sqrt{(1-\Delta\varepsilon/(1-\varepsilon)-r_H/r)}]-1=[1/\sqrt{(\Delta\varepsilon/(1-\varepsilon))}]-1$. $E_t=E+E=2/\sqrt{(\Delta\varepsilon/(1-\varepsilon))}$=W- mass. E_t=E-E gives E&M that also interacts weakly with weak force.

II → III quadrant rotation is the Z_o. Do the math and get a Proca equation. C_M charge cancelation. D14 gives $1/(1+\varepsilon)$ gives 0 charge since $\varepsilon\to1$ to case 1 in appendix C2.

$E=1/\sqrt{(\kappa_{oo})}-1=[1/\sqrt{(1-\Delta\varepsilon/(1+\varepsilon)-r_H/r)}]-1=[1/\sqrt{(\Delta\varepsilon/(1+\varepsilon))}]-1$. $E_t=E+E=2/\sqrt{(\Delta\varepsilon/(1+\varepsilon))}-1=Z_o$ mass. E_t=E-E gives E&M that also interacts weakly with weak force. Seen in small left handed polarization rotation of light.

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

From A0 $E=1/\sqrt{\kappa_{oo}}-1=[1/\sqrt{(1-\Delta\varepsilon/(1+\varepsilon)}]-1=\Delta\varepsilon/(1+\varepsilon)$. Because of the +- square root E=E+-E so E rest mass is 0 or $\Delta\varepsilon=(2\Delta\varepsilon)/2$ reduced mass.

Et=E+E=2E=2$\Delta\varepsilon$ is the pairing interaction of SC. The E_t=E-E=0 is the 0 rest mass photon Boson. Do the math (eq.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 $\iiint_0^{r_{rH}}\psi_1\psi_2\psi_3\psi_4dV=2G\iiint_0^{r_H}\psi_1\psi_2\frac{1}{V^{1/2}}\frac{1}{V^{1/2}}V$

$\equiv\iiint_0^{r_H}\psi_1\psi_2G\equiv\iiint_0^{r_H}\psi_1\psi_2(2m_ec^2)dV_{rH}=\iiint_0^{V_{rH}}\psi_1(2m_ec^2)\psi_2dV_{r_H}$ (A8)

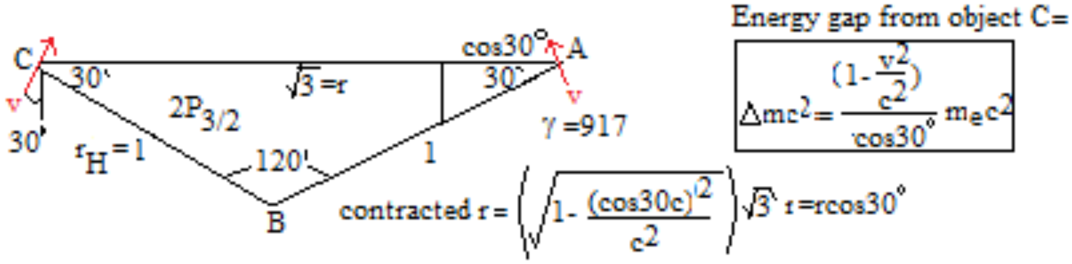
Object C adds it own spin (eg., as in 2nd derivative eq.A1) to the electron spin (1,IV quadrants) and the W associated with the $2P_{3/2}$ state at r=rH thereby adds a derivative in a neutrino quadrant (fig.4) thereby including neutrinos in thec Fermi 4pt. So 2nd derivative

$$\Sigma((\gamma^\mu\sqrt{\kappa_{\mu\mu}}dx_\mu)-i\kappa)(\gamma^\nu\sqrt{\kappa_{\nu\nu}}dx_\nu+i\kappa)\chi=\Sigma((\gamma^\mu\sqrt{\kappa_{\mu\mu}}dx_\mu)-i\kappa)\psi \text{ so } \tfrac12(1\pm\gamma^5)\psi=\chi. \quad \text{(A9)}$$

In that regard the expectation value of γ^5 is speed and varies with $e^{i3\phi/2}$ in the trifolium. The spin½ decay proton $S_{1/2}\propto e^{i\phi/2}\equiv\psi_1$, the original ortho $2P_{1/2}$ particle is chiral $\chi=\psi_2\equiv\frac12(1-\gamma^5)\psi=\frac12(1-\gamma^5e^{i3\phi/2})\psi$. Initial $2P_{1/2}$ electron ψ is constant. Start with initial ortho state χ. These γ^5 terms then modify equation A8 to read $=\iiint_0^{V_{rH}}\psi_1\psi_2(2m_ec^2)dV_{rH}=\iint\psi_{S1/2}{}^*(2m_ec^2V_{rH}))\chi dV_\phi=$
$K\int\langle e^{i\frac{i\phi}{2}}\left[\Delta\varepsilon V_{r_H}\right]\left(1-\gamma^5e^{i\phi\frac{3}{2}}\right)\psi\rangle\,d\phi=KG_F\int\langle e^{i\phi/2}-\gamma^5ie^{i(4/2)\phi}\rangle d\phi=KG_F\left(\frac{2e^{i\phi}}{i}\Big|_0^{2\pi+C}-\frac{2\gamma^5e^{i4\phi}}{i4}\Big|_0^{2\pi+C}\right)$ = $k1(1/4+i\gamma^5)$= $k(.225+i\gamma^50.974)$ =$k(\cos13°+i\gamma^5\sin13°)$ **deriving the 13° Cabbibo angle**. With previously mentioned CP result(direct evidence of fractal universe) get CKM matrix

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

Review of $2P_{3/2}$ Next higher fractal scale (X10[40]), cosmological scale. Recall from D9 $m_ec^2=\Delta\varepsilon$ is the energy gap for object B vibrational stable iegenstates of composite 3e (vibrational perturbation r is the only variable in Frobenius solution, partII Ch.8,9,10) proton. Observor in objectA. $\Delta m_e c^2$ gap=object C scissors eigenstates. is what we see at object A but $\Delta m_e c^2$ gets boosted by γ by rotation into the object B direction.(to compare with the object B $m_e c^2$ gap).



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

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

$r_{CA}=1\sqrt{1-\frac{\cos^2 30°c^2}{c^2}}\sqrt{3}$ =.866=cos30°=CA and Fitzgerald contracted AB= r_{BA} =x/γ=1/γ so for Fitzgerald contracted x=1 for AB (fig7). We can start at t=0 with the usual Lorentz transformation for the time component.

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

since time components are Lorentz contracted proportionally also to mc^2, both with the γ multiplication.

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

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

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

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

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

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

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

allowing us to finally compare the energy gap caused by object C ($\Delta m_e c^2$) to the energy gap caused by object B ($m_e c^2$. A8). So to summarize ΔE= $(m_e c^2/((\cos 30°)917^2)$ $=m_e c^2/728000$. So the energy gap caused by object C is ΔE=$(m_e c^2/((\cos 30°)917^2)$ $=m_e c^2/728000$. The weak interaction thereby provides the ΔE perturbation ($\int\psi^*\Delta E\psi dV$) inside of r_H creating those

Frobenius series (partII) $r\neq 0$ states, for example in the unstable equilibrium $2P_{1/2}$ electrons m_e. so in the context of those e,ν rotations giving W and Z_o.. The G can be written for E&M decay as $(2mc^2)XVr_H$= $2mc^2$ $[(4/3)\pi r_H^3]$. But because this added object C rotational motion is eq.A9 Fermi 4 point it is entirely different than a mere 'weak' E&M. So for weak decay from equation A8 it is G_F= $(2m_ec^2/728{,}000)Vr_H$=$\mathbf{G_F}$ =1.4X10^{-62} J-m^3 =.9X10^{-4} MeV-F^3 **the strength of the Fermi 4pt weak interaction constant** which is the coupling constant for the Fermi 4 point weak interaction integral. Note $2m_ec^2/729{,}000$=1.19X10^{-19}J. So ΔE=1.19X10^{-19}/1.6X10^{-19}=.7eV which is our ΔE gap for the weak interaction inside the Fermi 4pt. integral for G_F. This ΔE generates that r perturbation (instability) states in the Frobenius solution (partII) and so weak decay.
interaction integral. Note $2m_ec^2/729{,}000$=1.19X10^{-19}J. So ΔE=1.19X10^{-19}/1.6X10^{-19}=.7eV which is our ΔE gap for the weak interaction inside the Fermi 4pt. integral for G_F.

The pertruubation r in the Frobenius solution is caused by this ΔE in ($\int\psi^*\Delta E\psi dV$) with available phase space for $\psi^*=\psi_p\psi_e\psi_\nu$. and $\psi=\psi_N$.

Multiple Applications Of The eq.B6
Ultrarelativistic Object B Also Source Of The Mexican Hat Potential

Recall equation B6. Equation B6

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

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

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

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

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

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

The left handed doublet was given by the fractal theory (section 4.4)

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

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

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

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

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

$\psi(t)=e^{iHt}\psi(t_o)=e^{i(1+\varepsilon+\Delta\varepsilon)^\wedge 2}\psi(t_o)$. See partIII

A8 Derivation of the Standard Model from Newpde but with No Free parameters

Since we have now derived M_W, M_Z and their associated Proca equations, and Dirac equations for m_τ,m_μ,m_e etc., and G,G_F,ke^2 Maxwell's equations, etc. we can now write down the usual Lagrangian densities that implies these results. In the formulation $M_Z=M_W/\cos\theta_W$ you can find the Weinberg angle θ_W, $g\sin\theta_W=e$, $g'\cos\theta_W=e$; solve for g and g', etc., We will have thereby derived the standard model from first principles (i.e.,postulate1). **It no longer contains free parameters.**

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

Appendix B

B1 List-Define Mathematics from postulate 1 (Part2 for details) Ultimate Occam's razor (observable)

Note an ultimate Occam's razor[*observable*(1) requires an *observer*(C)] i.e.,just $1\cup C\equiv$**1**+C. So union $\cup$ came out of the observable component of the postulate. 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., $1\cup 1\equiv 1+1$ (B2,Ch.2).

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

So we have derived set theory, not postulated it. But in postulate 1 z=zz why did 0 come along for the ride? There is a deeper reason in set theory**.** Note $\varnothing$ and 0 aren't really new postulated 'observables' since they are literally postulating "nothing".

The null set $\varnothing$ is the subset of every set. In the more fundamental set theory formulation $\{\varnothing\}\subset\{\text{all sets}\}\Leftrightarrow\{0\}\subset\{1\}$ since $\varnothing=\varnothing\cup\varnothing\Leftrightarrow 0+0=0$, $\{\{1\}\cup\varnothing\}=\{1\}\Leftrightarrow 1+0=1$.

So l**ist** $1\cup 1\equiv 1+1\equiv 2$, $2\cup 1\equiv 1+2\equiv 3$,..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, $\delta C=0$ for example.

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:$C\approx\delta z$ and $C\to C/\gamma=C_M/\gamma\equiv C_M/\xi$. So from eq.3 for N=0 in eq.12 $C_M/\xi=\delta z$ (eq.17)

($C_M/\xi=\delta z\delta z$ for N=1) . So $\delta C_M=0=\delta\delta z\xi+\delta\xi\delta z=0$ (N=0). If **z=0** then $\delta z'=-1$ (in $z'=1+\delta z$) is big for N=0. In $\delta C_M=0=\delta\delta z\xi+\delta\xi\delta z=0$ for ξ small then $\delta\xi$ has to be small and so ξ is stable, electron $\xi_o=\Delta\varepsilon$. For **z=1** then δz is small on the N=0 fractal scale thus $\delta\xi$ and ξ are both big so unstable and large mass. Everything, including that small mass stable $\xi_o=\Delta\varepsilon$ electron, must have that large ξ in its $r_H=C_M/\xi$ or not postulate 1 even though its $\kappa_{oo}=e^{ii\Delta\varepsilon}$ If it is not consistent with postulate 1 it does not exist.

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.

Appendix C Stability of small C limit

N=0 Magnetic Flux Quantization For Current Around Loop

Our Newpde II→III quadrant eq.12 rotations (appendix A4) gave us Maxwell's equations and E&M so we can apply B fields here. We also derived quantum mechanics from that Circle equation (giving eq.11). Thus we can have quantization of the B field flux$\oint \vec{B}\bullet\overrightarrow{dA}$ =Φ_0N

Magnetic Flux Quantization For Current Around Loop

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From the vantage point of the end of the coil the coil is Fitzgerald contracted to a point at the center. So we use only the B (=$\mu_o i/(2r_H)$) at the center of the coil since r_H is shrunk by 1/γ and t in the i=e/t is shrunk by γ so the γ cancels out and we have the same B. Given B is perpendicular to dA at the center and the r_H cancels out this Φ=ΣΔΦ=Φ=BA= $B\pi r_H^2$. Thus we must write for the 2 electrons ΣΔΦ=Φ=BA= $B\pi r_H^2$ with the B at the center of the coil for z=0 (appendix). So

$$BA = (\frac{\mu_0 i}{2r_H})(\pi r_H^2) = \Phi_0(\#2positronMotion). \qquad (1)$$

Also $r_H=e^2/m_ec^2$, q/t=i. q=e=1.6X10^{-19} C, Φ_0= NIST: 2.067833848X10^{-15}Wb, 1/γ dilation of r_H in the current i but it and r_H get canceled out here. The time t dilation γ is in the current 'i' moving frame of reference. Recall that for circular motion: c=D/t=2πr_H/t so:
$t = 2\pi r_H 3/\gamma c$, so i=$\frac{e}{3\left(\frac{2\pi r_H}{\gamma c}\right)}$ each electron is γ/3 in mass.

$$BA = \frac{\mu_0 i}{2r_H 3}(\pi r_H^2) = \frac{\mu_0}{2r_H}\left(\frac{e}{3\left(\frac{2\pi r_H}{\gamma c}\right)}\right)\pi r_H^2 = \Phi_0 \mathrm{N} = \frac{h}{2e}(2PositronMotion) \quad (2)$$

B=μ_0i/2r_H is the minimum B inside the loop, and given r_H cancels out in eq.2, can be taken as a variational principle optimization of the energy B^2.
Each of the 2 positron flux contributions around the circle(N1=2). But each positron moves through all 3γs. So doing the cancelations in eq.2:
γ(μo/4*3)ec=(h/2e)(2positrons). (3)
So
γ(μ_o/4)ec=(h/2e)6, But there already is a populated state (Hund's rule) 1$S_{½}$ (μ) =.1125=μ/P so we add it in (For example recall in the hydrogen atom that the 1S states fill before the 2P states.).
So:
γ=$\frac{h}{2e}6(1+\mu)\frac{1}{\frac{\mu_0}{4}ec}$ (Note that 4 cancels the 4 in μ_o=4πX10^{-7} Wb-m/Amps.)

$$\gamma = \frac{2.0678X10^{-15}(6)(1+\mu)}{\pi X10^{-7}1.6X10^{-19}3X10^{8}} = \frac{1.2407X10^{-14}X(1.11255)}{1.5086X10^{-17}} = \frac{1.38034X10^{-14}}{1.5086X10^{-17}}=915 \qquad (4)$$

We must add in the 3X.511=1.533 for the 3 electrons
915+1.533=916.533
2$P_{3/2}$ at r=r_H implies also twice our 2 positron γ result will be the proton mass.
2(916.533))m_ec^2=1.50087X10^{-10}J=937Mev

Finally we must add that 1Mev binding energy between that μ and the (Fitzgerald contracted) net +e positrons and electron (Fitzgerald contracted to a point Coulomb source) from axial frame of reference (sect.10.5) and get 938.23Mev.
Actual proton mass= 938.272Mev=m_p.
An exact answer!
938.272Mev=m_p **Therefore we have derived the mass of the proton from first principles.**
Small C (Part II) of this book starts out with this result.

Appendix D digital analogy of this theory
Review This is an Occam's razor *optimized* (i.e.,(δC=0, ||C||=noise)
POSTULATE OF 1 So
z=zz (1) is the algebraic definition of 1,o,**add real constant C (i.e., z'=z'z',δC=0) (2)**,z∈{z'}
Recall from eq.7 that dr+dt=ds. So combining in quadrature eqs 7&11 SNRδz=(dr/ds+dt/ds)δz =((dr+dt)/ds)δz=(1)δz (11c,append) and so having come *full circle* back to postulate 1 as a real eigenvalue (1≡Newpde electron). So we really do have a binary physics signal. So, having come *full circle* then: (**postulate 1⇔ Newpde**)

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

Review This is an Occam's razor *optimized* (i.e.,(δC=0, ||C||=noise)
POSTULATE OF 1 So
z=zz (2) is the algebraic definition of 1,o **and add real constant C (i.e., z'=z'z',δC=0) (1)**)

Digital communication anology: Binary (z=zz) 1,0 signal (Boolean algebra) with white noise δC=0 in z'+C=z'z'. Recall the algebraic definition of 1 is z=zz which has solutions 1,0.(eq.11a,11c) Also you could say white noise C has a variation of zero (δC=0) making it easy to
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Ch.2 Details of List define Mathematics and Fractalness

2.1 List- Define Mathematics (continuation of section 1 appendix B)

Postulate 1 (observable) So observer 1∪C≡1+C. z=zz has both 1,0 as solutions so defining negation ~with 0=1-1 Thus we can define intersection with ~((A∪B)~B~A)≡A∩B. So we have intersection ∩ ao we have derived set theory.

Because of our postulate of 1 we can then *list* all cases such as 1∪1≡1+1≡2 and define a+b=c. Note along the way we have defined union and so define set theory as well.

The Progessive "List" Origin Of Mathematics

Microcosm Math 3 Numbers (allowed by finite precision) | **Cosmic Math 10^{82} Numbers**

1 U 1≡1+1≡2   1+1≡1*2
1 U 2≡1+2≡3   2+2≡2*2
Defines A+B≡C   Defines A*B≡C That being eq.2
Finite precision ≡ noise > 0
Eq.2 can now define 0 with 0*0=0
Use 0 to define subtraction with
1-1≡0
2-2≡0
3-3≡0
Defines δC=0 That being Eq.1 in this particular microcosm.
Note there are no axioms for defining relations A+B=C or A*B=C, just the list above those relations.

Fig.7 in that particular microcosm. There are no postulated rings or fields here either.

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

Subtraction a-b=c:
List
1-1=0 (is defined as the null (0)set here).
1+1=2 from earlier.
2-1=1 etc., etc   Define a-b=c
So you can define subtraction with a list-define procedure as well.

Definitions Of Cantor's Cauchy Sequence And The Mandelbrot Set

Set Theory Review

Null Set ∅ Review

We postulated 1 observable. But an observable 1 requires an observer C so we have 1UC and thus we have *derived set theory* from the postulate of 1 (observable).

In the context of set theory the null set ∅ is the subset of every set. Note ∅ and 0 are not new postulates because in that case they would be postulating "nothing".
So here you postulate {One real set} which automatically has the null set as a subset.
Note we earlier developed the whole numbers from $1\cup1\equiv1+1$, in the context of set theory. But $\varnothing\cup\varnothing=\varnothing$ is the only property of the null set ∅ we use and of course it is isomorphic to $0\cup0\equiv0+0=0$ the *only* property of 0 we need in the development of the whole numbers.
Note also the null set is the lack of anything and so is 0.
Note the $z_1=z_\infty$ at $C\to0$ gives $z=zz+C$ which does correspond with the 1 set (1=1X1) and null set dichotomy of set theory given also that 0=0X0. Also the Mandelbrot set sequence gives the Cauchy sequence of the real set.
So this {one real set} starting point maps (uniquely) directly to the **Mandelbrot set.**

Why min(z-zz)>0? **Completeness and Choice** (since that implies z is a real number)
The Fiegenbaum point sits on the negative r axis so equation 1 can be rewritten as $z=zz+C$, $\delta C=0$, $C<0$ which is the same as min(z-zz)>0. Yes, ONE indeed is the simplest idea imaginable. But unfortunately we have to complicate matters by algebraically defining it as universal min(**z-zz**)>0 and so as the two most profound axioms in real# mathematics: "completeness" (∃**min**sup) and "choice" (Here the choice function is f(z)=**z-zz**). But here they are mere definitions (of "min" and "z-zz") since z=zz, so no 1z=z field axiom for multiple z, implies our one z (See z≈1 result below.). We did this also because that list-define math (appendix C PartI) *replaces the rest* (i.e., the order axioms, mathematical induction axiom (giving **N**) and the rest of the field axioms); Thus we have algebraically defined the real numbers thereby implying the usual Cauchy sequence of rational numbers definition of the real# z.

By the way that 'incompleteness theorem' of Godel is thereby negated by our *single* pick of (axiom of choice) choice function f(z)=zz-z (in association with our list-define mathematics definition defining the rest.) and incompleteness of the real numbers is negated by the "completeness" (minsup) of real number mathematics above which here are not axioms but a restatement of what we mean by min(zz-z)>0 which itself is taken to be a restatement of the postulate of real 1. So in conclusion the postulate of real 1 negates Godel's incompleteness theorem, makes it wrong.
Also given our z=zz and the list define math defiitions we no longer need the rest of the field axioms, order axioms and mathematical induction axiom (giving N)
But 1,0 can define the binary system and so the rest of the real numbers through the union of eq.1.11. (See appendix D). eq.1.16a defines the finite +integer *list*(i.e.,$1\cup1\equiv1+1\equiv2$)--*define*(i.e.,A+B=C) math *required for* the algebraic rules underpinning eq.**1** ***without* any added postulates** (axioms). Also
list 2*1=2, 1*1=1 *defines* A*B=C. Division and **rational numbers** defined from B=C/A.
We repeat with the list 3*1=3, etc., with the Clifford algebra terms satisfaction keeping this going all the way up to 10^{82} and start over given the above fractal result given the r_H horizons of eq.1.18. This list-define method replacing the usual ring and field algebraic formalism
Note the noise C guarantees limited precision so we can multiply any number in our list with the above trifurcation number integer 10^{82} to obtain the integers in which iteration of the new pde into the Klein Gordon equation gives us quantization of the Boson fields.

Cantor also used that binary number diagonal to prove the uncountability of the real numbers (with the r_H horizon from the the fractalness the observability counting limit is 10^{82}). further illustrating the importance of the binary numbers in the development of the real numbers. With 1,0 (of our z=zz) you can even prove Cantor's binary diagonalization proof that the real # are uncountable.

Uniqueness Of These Operator Solutions: Note the invariant operator $\sqrt{2}$=ds here. So the eq.1.1.15 operator invariant ds^2 and eq. 7, eq.8 $\sqrt{2}ds \equiv \delta z_M = dr \pm dt$ is the **operator** (eq.16) solution δz_M (so *not* others such as ds^3 ,ds^4, etc.,which would then imply higher derivatives, hence a functionally different operator.

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

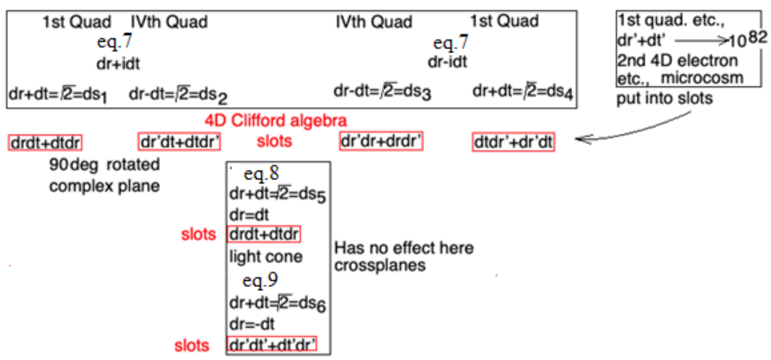


Fig.6 These added cross term eq.11a objects (1.11) extend eigenvalue equation 11 from merely saying 1+1=2 all the way to the number10^{82}.

From section 1 we generate 6 cross terms directly from one application of eq,1a that may or may not be the ones required for our 4D Clifford algebra. To get precisely the 6 cross terms of a 4D Clifford algebra we had to repeatedly plug into eq.2 the associated dr,dt of the required cross term drdt+dtdr. Note **by doing this we include the two ν fields in the definition of the electron!** electrons and so a sequence of electrons. We thereby generate the universe! Thus we have derived the below progressive generation of list- define microcosms in eq.1.11a. We then plug that into eq.1.24 as sequence of electrons. This allows us to use eq.11a to go beyond 1U1, beyond 2 to 3 let's say. So we can then define $1\cup 1$ from equation eq.11 δz_M just like postulate 1 was defined from z=zz.. So consistent with eq.11a and eq.1 we can then develop +integer mathematics from 1U1 beyond 2 because of these repeated substitutions into eq.11a using a list-define method so as not to require other postulates. So by deriving the 6 crossterms of one 4D electron we get all 10^{82} of them! So just multiply any number (given our limited precision) by 10^{82} and it becomes an integer implying all integers here. Given the ψs of equation 16 for $r<r_c$ (So a allowed zitterbewegung oscillation thus SHM analogy) we can then redefine this integer N-1 also as an eigenvalue of a coherent state Fock space $|\alpha\rangle$ for which $a|\alpha\rangle=(N-1)|\alpha\rangle$. Also recall eigenvalue $1\cup 1$ is defined from equation 11a. Note 10^{82} limit from above. Any larger and it's back to one again. But in this process we thereby create other eq.11a terms for other electrons and so build other 4D.

Recall section 1. We use 3 number math to progressively develop the 4 number math etc., eg.,2+2≡4., so yet another list. Go on to define division from A*B≡C then A≡B/C. So the method is List-define, list-define, list-define, etc., as we proceed into larger and larger microcosms. There are no new postulates (axioms) in doing that. It follows from our generation of those 6 Clifford algebra cross terms one after the other and that sequence of 4D electrons, the objects we are counting. We require integers and so no new axoms. Note C implies finite precision and we can always multiply a finite precision number by a large enough integer to make a finite precision number an integer in any case. So we also have our required integers here. So we don't need any more axioms such as Peano's mathematical induction or ring and field axioms. We generate each microcosm number and algebra with this list define method until we reach 10^{82} (sect.2).

Our Limit Definition (eg., in the Cauchy Sequence)

In section 1 you notice (attachment) our **numbers** are also eigenvalues (observables) in eq.11a and also **are the # of electrons**. But there is no observation possible through the fractal r_H horizons in eq.2 (and sect.2.5) and 10^{82} is the maximum such number inside r_H (C_M). Also all small limits are then only to the next smaller fractal baseline (C_{M-1}) horizon and no farther. *This is stated several places in the paper* (eg., definition paragraph first page).

So since our numbers here are observables and so **all limits**, big and small, are limited by these fractal scales (eg., instead of limit $x\to 0$ we have limit $x\to\Delta$ where Δ is the next smaller fractal scale.). This makes it so there is only one thing we are postulating, 1, the electron given by eq.2 (see the inside-outside comment in the summary below).

So these limits (eg., for the Cauchy sequences) are all required by the postulate of 1.

You could call them "fractal based limits" if you like. Recall that: given a number $\varepsilon>0$ there exists a number $\delta>0$ such that for all x in S satisfying

$$|x-x_o| <\delta$$

we have

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

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

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

Hausdorf (Fractal) s dimensional measure using ε, δ

Diameter of U is defined as

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

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

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.

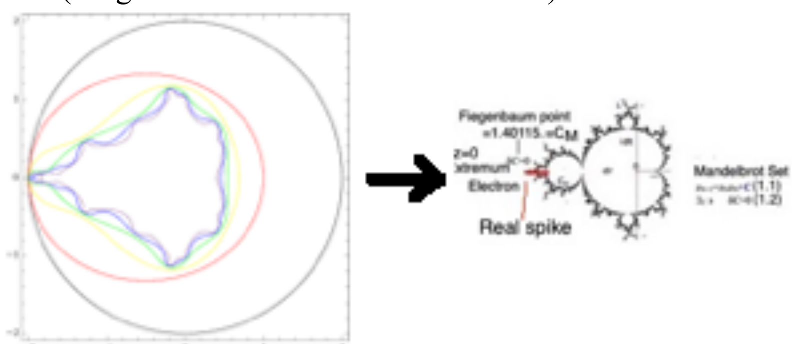
To get the Hausdorf outer measure of E we let $\delta\to 0$ $H^s(E) = \lim_{\delta\to 0} H^s_\delta(E)$

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 $0\le s<\dim E$, $H^s(E)=0$ 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 $\delta C=0$ 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, $\delta C=0$

2.2 The isolated lemniscate Mandelbrot Set implied by the circle (eq.11) observability
In section 1 we got the Circle $dr^2+dt^2=ds^2$ and so *observability* of eq.11. So including observability *only* we could have instead postulated $1^2=1^21^2$ or $C_{N+1}=C_NC_N+C$. $C=C_1=dr^2+dt^2$, $C_0=0$ instead of the more general z=zz (1=1X1) implying $z_{N+1}=z_Nz_N+C$. This gets the lemniscate sequence and so just the bare bones Mandelbrot set without all the flourishes of the smaller scale versions of $z_{N+1}=z_Nz_N+C$.
Note then *observability* thereby implies *only* the basic Mandelbrot set structure and so not all the other parts, the flourishes, of that zoom. Thus for observability the **||CM|| extremum really is at the Fiegenbaum point** (and – ¼) for all fractal scales. So a given **Mandelbrot set is an observable**!! (irregardless of the clutter it resides in)



point C_M. fig.7
From the sect.1 Circles resulting in the 'observability' of eq.11 these z=0 lemniscates constructed from these circles give $\delta z=r_H=CM10^{40N}/\xi_1=\Delta$ perturbations to C and so Δ perturbations to z=0 from eq.3. So $z=0\rightarrow z=0+\Delta$. (2.2.1)
Fig.7 Lemniscate sequence (Wolfram, Weisstein, Eric) $C_{N+1}=C_NC_N+C$. $C=C_1=dr^2+dt^2$, $C_0=0$.
After an infinite number of successive approximations $C''=C'C'+C=C_M{}^2$
Mandelbrot calls C_M the ER, Escape Radius (see Muency).
These lemniscate circles (eq.11) underly the connection of the core Mandelbrot set structure to observability through our postulate (Ultimate Occam's Razor (observable)). But on any specific scale only the 4X Mandelbulb circles are actualy observable because of the horizons r_H so we only pick these out of the zoom. Note an:

2.3 section 2 addendum C_M Fractal Consequences

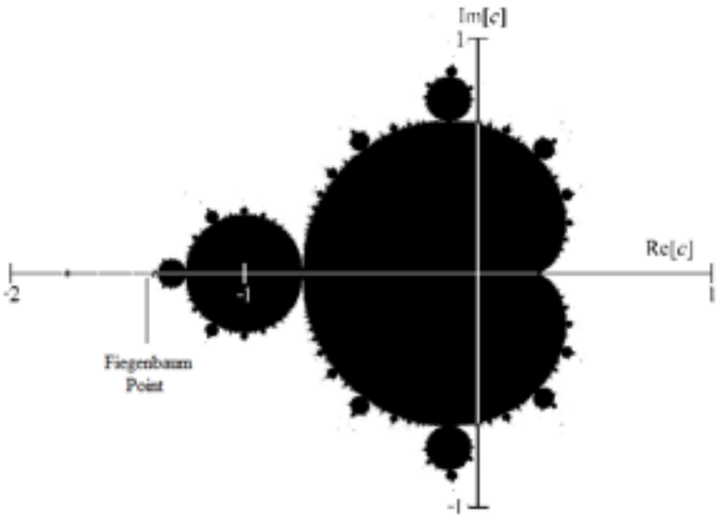


fig. 9

Note that the center of mass(COM, fig.9) is at the (negative inverse of the) golden mean -.618033.. (=-1/φ) and is also a solution of our equation 2 written as z=zz-1. So C=-1. -1 is right in the middle of the biggest circle above. Given this goofy (-1/φ) is also at the average of the Mandelbrot set the golden mean seems to be connected to the Mandelbrot set. But this result doesn't mean anything because we need the δC=0 extremum at the Fiegenbaum point= -1.40115.., (and C=- ¼) not the average position of the Mandelbrot set.

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

Recall section 1 and the derivation of the fractal space time. So there is more to these 2D complex number solutions to eq.3 than just irrational and rational numbers, there is also this underlying space-time fractal structure {neighborhood{C_M}∩{-r axis}} that contains even fewer elements than the rational numbers and which only "exists" when the "fog" is not thick, i.e. when C goes to 0. It permeates all of space and yet has zero density. It is a very mysterious subset of the complex plane indeed.

Note to be a part of what is postulated (eq.3) C→0 we must be in the neighborhood of the tip of the horizontal Mandelbrot set dr axis with extremum given by the circle lemniscate fig.7. But from the perspective (scale) of this N+1 th scale observer one of the 10^{40}X smaller (Nth fractal scale) 45° rotated Mandelbrot sets (fig.8) is still near his own dr axis putting it within the ε, δ limit neighborhoods of C→0 of eq.2. Thus in this narrow context we are allowed the 45° rotations to the extremum directions of the solutions of equation 2. Thus we also have the Riemann surfaces of fig.4 if we continue our rotations beyond 360°. Our C increases (eg., C→0) discussed later sections are also all in this Nth fractal scale context. For example eq. 7 is then reachable on the Nth fractal scale ($r>r_H$) as a noise object (C>0). So 8 at 135° must then also result from noise (C>0) introduction and so from that first fractal jump rotation in the 2D plane. Later we even note a limit on C (sect.4.3.1).

2.4 Fourier Series Interpretation Of C_M Solution

Recall from equation 7 that on the diagonals we have particles (and waves) and on the dr axis where C=0 only waves, see A1 Recall 2AC solution dr=dt, dr=-dt gives 0 as a solution and so C=0. But in equation 2 for C→0 δz=0,-1. So eq.3implies the two points δz=0,-1. So for waves to give points implies a Fourier superposition of an infinite number of sine waves and so wave lengths. In terms of eq.7 these are solutions to the Dirac equation and so represent fractalness, smaller wave lengths inside smaller wavelengths. So it is fractal.

S states

Need boosted C small in z=zz+C or the postulate of 1 does not hold. So need boost so $C_M/\xi_1=C$ is small so with ξ_1 big with ξ_o stable core (electron) mentioned above..
For z=1 ξ_1 is big so τ,μ,e can be free S states (since $\xi_1=\tau+\mu+e$ is still in denominator of the C= C_M/ξ_1 for each of τ, μ and m_e so C is still small for each. This same effect also makes leptons (nearly) point sources whereas baryons are not (with their much larger r_H radius

2.5 Observer-object alternative way (to iterating eq.2) to understand fractalness

Recall also that eq.7 has two solution and associated two points one of which we define as the observer. In the new pde: $\sqrt{\kappa_{\mu\mu}}\gamma^\mu\partial\psi/\partial x_\mu=(\omega/c)\psi$ 16, (given that it requires these two points), we *allow the observer to be anywhere*. So just put the observer at $r<r_H$ and you have derived your fractal universe in one step without iterating eq.2 as we did at the outset. To show this note from equations 14 we have the Schwarzschild metric event horizon of radius $R\equiv2Gm/c^2$ in the M+1 fractal scale where m is the mass of a point source. Also define the null geodesic tangent vector K^m to be the vector tangent to geodesic curves for light rays. Let R be the Schwarzschild radius or event horizon for $r_H=2e^2/m_ec^2$. Thus (Hawking, pp.200) in the case that equation applies we have: $R_{mn}K^mK^n>0$ for $r<R$ in the Raychaudhuri (K_n=null geodesic tangent vector) (4.5.1) equation. Then if there is small vorticity and shear there is a closed trapped surface (at horizon distance "R" from x) for null geodesics. No observation can be made through such a closed trapped surface. Also from S.Hawking, *Large Scale Structure of Space Time*, pp.309...instead he will see O's watch apparently slow down and asymptotically (during collapse) approach 1 o'clock...". So $g_{rr}=1/(1-r_H/r)$ in practical terms never quite becomes singular and so we cannot observe through r_H either from the inside or the outside (space like interval, not time like) as long as the bigger horizon r_H is isolated (for nearby object B there is some metric perturbation). Note we live in between fractal scale horizon $r_H=r_{M+1}$ (cosmological) and $r_H=r_M$ (electron). Thus we can list only two observable (Dirac) vacuum Hamiltonian sources (also see section 1).
H_{M-1} and H_M
But we are still entitled to say that we are made of only ONE "observable" source i.e.,r_H of equation 13 (which we can also observe from the inside (cosmology) and study from the outside (particle physics). Thus this is a Ockam's razor optimized unified field theory using:
ONE "observable" source
of nonzero proper mass which is equivalent to our fundamental postulate of equation 1. Metric coefficient $\kappa_{rr}=1/(1-r_H/r)$ near $r=r_H$ (given $dr'^2=\kappa_{rr}dr^2$) makes these tiny dr observers just as big as us viewed from their frame of reference dr'. Then as observers they must have their own r_Hs, etc. . You might also say that the fundamental Riemann surface, and Fourier superposition are therefore the *source* of the "observer".
Recall we get min(zz-z)>0 from that and 1 as a explicit real observable which goes back to the implicit real observable 1 we started with.

2.6 N=1 Observer (humanity) Implications

Dr.Murayama (P5 head) says that "particle physics is really at the heart of what we are, why we are. We would like to understand why we exist, where we came from,.": so this junkpile is who we are? (Given the mainstream results) Sadly yes. But from our above Occam's razor point of view, absolutely not.
Eq.4 just above gives you space time(r,t), required by physical reality (creation) and eq. 4 is clearly dependent on that $C=C_M$ Mandelbrot set.

But the Mandelbrot set C_M depends on that interesting connection with ∞-∞ in above equation 3. Normally in physics an infinite quantity is really just a very large quantity, but not here: we actually connected to infinity! Thus Creation itself is caused by *this* (eq.3) extremely sublime *relation with Δinfinity*! So we understand creation at the deepest possible level.. Understanding creation itself makes life worth living, makes humanity *unique* among all physical things.

Also since Newpde equation 16 is essentially all there is there is then also the above (sect.2.5) anthropomorphic (i.e., observer) based derivation of that fractalness using equation 7 that requires both the observer and object to solve eq.5. (Postulate 1 and so equation 5 is not solved unless ***both parts*** of equation 7 hold). There is then a powerful ethics lesson that comes out of this result (eg.,negation of solipsism (of sociopathology) partV): ethical equality of observer and observed (i.e.,golden rule). So we just found that "life is wotth living" and "reason to act ethically" (but cautiously toward solipsists (sociopaths) who consider themselves the only observers), so be kind: These are unexpected but wonderful results coming out of the **postulate1→Newpde.**

The Neoplatonist view of the beautiful Hypatia of Alexandria (circa 412AD) that mathematics was yet another path to the 'one' (the Platonic ideal) was the closest philosophical school to this 'postulate of 1' idea. Also the postulate of 1 reminds us of Paul Tillich's 'One' ultimate truth, ground of being.

Ch.3 Quantum Mechanics *Is* The Newpde $\psi \equiv \delta z$ (for each N fractal scale)

Ultimate Occam's razor (observable) But the postulate of 1 gives other properties of $\psi=\delta z$ besides those that come out of the math of the Newpde which shows that the Newpde is not the only consequence of the postulate of 1. For example 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,*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)

Summary: 1+C

$\boxed{1+C}$ Thus

Postulate 1 z=zz+0=algebraic definition 1. So z=1,0. Add (at least local) constant C (δC=0) giving z'=z'z'+C (1). Note infinite number of z' (z'$_i$) and C (C_i) in equation 1. Given z= **1,0** are postulated then the C and z' in equation 1 are:

$$\{C\}=\{0,C_1,C_2,C_3,\ldots\},\{z'\}=\{1,0,z'_1,z'_2,z'_3,\ldots\}$$

Thus we can plug **1,0** for z' into z'=z'z'+C eq.1 to find obviously 0=C and z'=1,0 are solutions. But **z=0**, δC=0 requires that you also iterate z'=z'z'+C to get ALL solutions C resulting in that 2D $\{C\}=\{C_M\}$ Mandelbrot set. Next plug in **z'=1**+δz into eq.1 and get the 2D Dirac equation. These **z=1, z=0** steps both together get the 2D+2D=4D **Newpde**

Implications for QM

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

The postulste of 1 is the source of other properties of δz=ψ in addition to those provided by just the Newpde.

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

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

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

Also recall from appendix A dr^2+dt^2 is a second derivative *operator* wave equation (A1,eq.11) that holds all the way around the circle (even for the eq.10 vacuum solutions), gives waves. In eq.12, error magnitude C (sect.2.3) is also a $\delta z'$ angle measure on the dr,idt plane. One extremum ds (z=0) is at 45° so the largest C is on the diagonals (45°) where we have eq.5 extremum holding: particles. So a wide slit has high uncertainty, so large C (rotation angle) so we are at 45° (eg., particles, eq.16 photoelectric effect). For a *small slit* we have less uncertainty so smaller C, not large enough for 45°, so only the *wave equation* A1 holds (small slit diffraction). Thus we derived wave particle duality here. So complenarity is derived here, not postulated. Recall wave equation eq.A1 iteration of the New pde with eq.11 operator formalism. So dr/ds=k in the sect.1 $\delta z=dse^{i\theta}$ θ exponent then becomes $k=2\pi/\lambda$. Multiplying both sides by $\hbar$ 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.

Note adding 2D eq.12 δz perturbation gives 4D $(dx_1+idx_2)+(dx_3+idx_4)\equiv dr+idt$ given (eqs5,7b) $dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$ if $dr^2\equiv dx^2+dy^2+dz^2$ so that $\gamma^r dr\equiv\gamma^x dx+\gamma^y dy+\gamma^z dz$, $\gamma^i\gamma^i+\gamma^j\gamma^i=0$, $i\neq j$, $(\gamma^i)^2=1$ (B2), rewritten (with eq14) $(\gamma^x\sqrt{\kappa_{xx}}dx+\gamma^y\sqrt{\kappa_{yy}}dy+\gamma^z\sqrt{\kappa_{zz}}dz+\gamma^t\sqrt{\kappa_{tt}}idt)^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$. Multiply both sides by $1/ds^2$& $(\delta z/\sqrt{dV})^2\equiv\psi^2$ and using operator eq 11 inside the brackets( ) get **Newpde** $\gamma^\mu(\sqrt{\kappa_{\mu\mu}})\partial\psi/\partial x_\mu=(\omega/c)\psi$ for e,ν, $\kappa_{oo}=1-r_H/r=1/\kappa_{rr}$ $r_H=e^2X10^{40\mathbf{N}}/m$ (**N**=. -1,0,1.,) (16)

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 $\delta z'$ 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.

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3.2Fractal 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. Next plug this result into the uncertainty principle $\Delta x\Delta(mc)\geq\hbar$. There is a δz for the N=0 fractal scale so why not a δz for the N=1 fractal scale and an associated uncertainty principle $10^{40}\Delta x)(10^{80}m_ec)=h10^{120.}$?

N=1 Uncertainty Principle Fractal universe implies $(10^{40}\Delta x)(10^{80}m_e c)=h10^{120}$ $\propto$(energy density) (1/f) accounting for that 10^{120}X descrepancy in the qed cosmological constant Λ (energy) with GR's (See also sect.7.6.). So for huge fractal scale N=1 then is the $\Delta x=10^{11}$LY electron, .5Mev $(X10^{82})=\Delta\varepsilon$ in the uncertainty principle so at N=1, in $dt'^2=\kappa_{oo}dt^2$. But $\sqrt{\kappa_{00}}$=boost on dt zitterbewegung oscillation $\kappa_{oo}=\mathrm{Rel}e^{i\Delta\varepsilon}$; for this electron N=1object from the Newpde. $\Delta\varepsilon$=electron mass relative to tauon τ. $\varepsilon=\mu$ is at its maximally symmetric value of 0 in the halo, local free space approximation, in $R_{22}=\sinh\mu$ (see D15 for nonlocal). Also for Δx of object C (A7) there is the uncertainty principle (the next smaller) perturbation ΔE=.7eV so $\Delta r=10^5$ LY=(.7eV/.5Mev)10^{11}, the size of a galaxy. Note also that $mv^2/r=kGM/r$ comes from a field with local narrowing plate symmetry so that r cancels out so only |v| independent of distance r allowing us to set $g_{oo}=\kappa_{oo}$ (with that $\kappa_{oo}=e^{i\Delta\varepsilon}$, partIII) that shape results in orbital stability so $\delta(1/\sqrt{\kappa oo})=\delta E=0$. So $\delta|v|=0$ there. So a mixed state pancake shaped $1S_{1/2}$ state uncertainty cloud in the plane of the galaxy provides gravitational stability for planar structures of this size since it implies the nearly flat mαr plate circular 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 mαr $1S_{1/2}$ 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). Also note the implied sharp cut off of a given v at some r (eg.,Centaurus A pancake, Andromeda halo }v} jump down Rubin data). If the galaxy pulls in so much mass that its Δr gets too large (>>$(10^5$LY)N)the above $\Delta r=10^5$LY is no longer realized and so the $1S_{1/2}$ state and its 2P harmonics is gone and so the pancake cylindrical symmetry (shape) goes away and so $g_{oo}\neq\kappa_{oo}$ and so the pancake shape (metric quantization) *stability goes away* and so this flat spiral shape disappears and we only have a high entropy elliptical (galaxy) shape left with high $g_{oo}=\kappa_{oo}$ v around *any* plane. Recall 10^{2N} meric quantization **generated from** this 10^6 galaxy bubble $\boldsymbol{\kappa_{oo}=e^{i\Delta\varepsilon}}$ term in partIII.with each of these regions also a stsble uncertainty principle Δr region given the associated Δm masses in that exponent of κ_{00}. Thus we also got metric quantization (structure stability) for protostar nebula=10X1,LY, globular cluster-dwarf galsxy=$10X10^2$ LY, **galaxy =$\mathbf{10X10^4}$LY**, Local group $10X10^6$LY, giant bubbles $10X10^8$LY

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.*

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!

Thermodynamics

Note that a "single state δz per particle" comes out of 1 particle per δz state per solution in 11 and eq.16. So the number of ways W of filling g_i single states with n_i particles is $g_i!/(n_k!(g_i-n_i)!$ thereby giving us klnW≡S and so thermodynamics.

3.3 The Most General (noise) Uncertainty C In Eq.1 Is Composed Of Markov Chains

This final variation wiggling around inside dr= error region near the Fiegenbaum point also implies a dz that is the sum of the total number of all possible individual dz as in a *Markov chain* (In that regard recall that the Schrodinger equation free particle Green's function propagator mathematically resembles Brownian motion, Bjorken and Drell) where we in general let dt and dr be either positive or negative allowing several δz to even coexist at the same time (as in Everett's theory and all possible paths integration path integral theories below). Recall dt can get

both a $\sqrt{(1-v^2/c^2)}$ Lorentz boost (with the nonrelativistic limit being $1-v^2/2c^2+\ldots$) and a $1-r_H/r=\kappa_{oo}$ contraction time dilation effects here. In section 2.2.6 we note that for a flat space Dirac equation Hamiltonian the potentials are infinite implying below an unconstrained Markov chain and so unconstrained phase in the action So $dt\rightarrow dt\sqrt{(1-v^2/c^2)}\sqrt{\kappa_{oo}}$. $r_H=2e^2/(m_ec^2)$. We also note the alternative (doing all the physics at the point ds at 45°) of allowing $C>C_1$ to wiggle around instead between ds limits mentioned above results in a Markov chain.
$dZ=\psi\equiv\int dz=\int e^{id\theta}dc=\int e^{idt/so}dc=\int e^{idt/\sqrt{(1-v^2/c^2)}\sqrt{\kappa oo/so}}ds'ds$.. In the nonrelativistic limit this result thereby equals $\int e^k e^{ikdt(v^2-k/r)}= \int e^{i\int k\int(T-V)dt}ds'ds\ldots=\int e^{iS}ds'ds\equiv dz_1+dz_2+..\equiv\psi_1+\psi_2+$. many more ψs (note S is the classical action) and so integration over all possible paths ds not only **deriving the Feynman path integral but also Everett's *alternative*** (to Copenhagen) many worlds (i.e., those above many Markov chain $\delta z_i=\psi s$ in $\int dz=\psi s\equiv\psi_1+\psi_2+$.) interpretation of quantum mechanics where the possibility of –dt allows a pileup of δzs at a given time just as in Everett's many worlds hypothesis. But note equation 9 curved space Dirac equation does not require infinite energies and so unconstrained Markov chains making the need for the path integral and Everett's many worlds mute.: We don't need them anymore. Thus we have derived both the Many Worlds (Everett 1957) and Copenhagen interpretations (Just below) of quantum mechanics (why they both work) and also have derived the Feynman path integral.
In regard to the Copenhagen interpretation if we stop our J.S.Bell analysis of the EPR correlations at the quantum mechanical -cosθ polarization result we will not get the nonlocality (But if instead we continue on and (ad hoc and wrong) try to incorporate hidden variable theory (eg.,Bohm's) we get the nonlocality, have transitioned to classical physics two different ways. We then have built a straw man for nothing. Just stick with the h→0, Poisson bracket way. So just leave hidden variables alone. The Copenhagen interpretation thereby does not contain these EPR problems. And any lingering problems come from that fact that the Schrodinger equation is parabolic and so with these noncausal instantaneous boundary conditions. But the Dirac equation is hyperbolic and so has a retarded causal Green's function. Since the Schrodinger equation is a special nonrelativistic case of the Dirac equation we can then ignore these nonlocality problems all together. You take a Log of both sides and use Stirling's approximation and you get the Fermi Dirac distribution for example.

3.1 NONhomogeneous and NONisotropic Space-Time

N=0 observer from equation 3 solution eq.4 we note that this theory is fundamentally 2D. So what consequences does a 2D theory have? We break the 2D degeneracy of eq. 7 at the end by rotating by C_M (fig.6) and get a 4D Clifford algebra. Recall 7 and 8 are dichotomic variables with the noise rotation C going from eq.7 at 45° to eq.8 at 135°.

Recall eq.7 implies simultaneous eq.7+eq.7 are 2D⊕2D=4D. But single eq.7 plus single eq.8 are *not* simultaneous so are still 2D. So this theory is still 2D complex Z then. Recall the $\kappa_{\mu\nu}$, $=g_{\mu\nu}$ metrics (and so R_{ij} and R) were generated in section 1.
In that regard for 2D for a homogenous and isotropic g_{ij} we have identically $R_{\mu\mu}-\frac{1}{2}g_{\mu\mu}R=0$ (3.1.1 ≡source $=G_{oo}$ since in 2D $R_{\mu\mu}=\frac{1}{2}g_{\mu\mu}R$ identically (Weinberg, pp.394) with μ=0, 1... Note the 0 (=E_{total} the energy density source) and we have thereby proven the existence of a net zero energy density vacuum. Thus our 2D theory implies the vacuum is really a vacuum! It is then the result of the fractal and 2D nature of space time!

A ultrarelativistic electron is essentially a transverse wave 2D object (eg., the $2P_{1/2}$ electron in the neutron). In a isotropic homogenous space time Goo=0. Also from sect.2 eqs. 7 and 8 occupy the same complex 2D plane. So eqs. 7+8 is $G_{oo}=E_e+\sigma\bullet p_r=0$ so $E_e=-\sigma\bullet p_r$
So given the negative sign in the above relation the neutrino chirality is left handed.
But if the space time is not isotropic and homogenous then G_{oo} is not zero and the neutrino gains mass.
Note thereby the neutrino bares some similarities to the muon in that its mass changes with time (as the universe expands) just as the muon's does and both are spin½. The electron is also similar at least with respect to spin½. Thus we can have degeneracies in some observables.
Also recall you need the whole Hamiltonian of both mass energy and charge-field energy E (in $H\psi=E\psi$) in the development of the Clebsch Gordon coefficients (in small C boost $r_H=C_M/\xi$ $=e^2 10^{40N}/\xi$ =charge/mass in $\kappa_{oo}=1-r_H/r$ in Energy=E=$1/\sqrt{\kappa_{00}}$). Recall you need at least one level of degeneracy for this Clebsch Goedon para and ortho method to work.(either charge(and so field energy) or mass energy) .

3.1 Casimir Effect

Also for this complex space 2D $0=G_{oo}=E_e+\sigma\bullet p_r$ for two nearby conducting plates the low energy neutrinos can leave (since their cross–section is so low) but the E&M (E_e standing waves) has to remain with some modes (from the *v* and anti *v*), not existing due to not satisfying boundary conditions, because of outside $\Delta\varepsilon$ ground state oscillations implying less energy between the plates and so a attractive force between them (We have thereby derived the Casimir effect).
Thus the zero energy vacuum and left handedness of the neutrino in the weak interaction are only possible in this 2D equation 4 Z plane. If the space-time is not isotropic and homogenous the neutrino must then gain mass m_o (see section 3.3 for what happens to this mass) and it becomes an electron at the horizon r_H if it had enough kinetic energy to begin with. It changes to an electron by scattering off a neutron with at W- and e- resulting along with a proton. So the neutrino transformed into an electron with other decay products. Recall that the electron eq.7 and the neutrino eq.8 are dichotomic variables (one can transform into the other,sect.2) and can share the same spinor as we assumed in section 2. The neutrino in this situation is left handed. γ^5 is the parity operator part of the Cabibbo angle calculation.

3.2 Helicity Implications 2D Isotropic And Homogenous State

From eq.11 $p_x\psi = -ih\partial\psi/\partial x$. We multiply equation $p_x\psi = -ih\partial\psi/\partial x$ in section 1 by normalized ψ^* and integrate over the volume to *define* the expectation value of operator p_x for this *observer representation*:

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

(implies Hilbert space if ψ is normalizable). Or for any given operator 'A' we write in general as a definition of the expectation value: $< A >=< a,t \mid A \mid a,t >$ (3.2.1)
The time development of equation 16 is given by the Heisenberg equations of motion (for equation 16. We can even define the expectation value of the (charge) chirality in terms of a generalization of eq.16 for ψ_e spin ½ particle creation ψ_e from a spin 0 vacuum χ_e. In that regard let χ_e be the spin0 Klein Gordon vacuum state in zero ambient field and so $½\left(1\pm\gamma^5\right)\psi_e=\chi_e$.
Thus the overlap integral of a spin ½ and spin zero field is:

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

So $1/2\left(1\pm\gamma^5\right)$=helicity creation operator for spin ½ Dirac particle: This helicity is the origin of charge as well for a spin ½ Dirac particle. See additional discussion of the nature of charge near the end of 3.2 Alternatively, in a second quantization context, equation 3.3.2 is the equivalent to the helicity coming out of the spin 0 vacuum χ_e and becoming spin½ source charge with $½(1\pm\gamma^5)\equiv a^t$ being the charge helicity creation operator.
The expectation value of γ^5 is also the velocity. Also γ^i (i=x,y,z) is the charge conjugation operator. 3.1.3 Note from section 3.1.1 the field and the wavefunction of the entangled state are related through $e^{ifield}=\psi$=wavefunction. $\gamma^r\sqrt{(\kappa_{rr})}\partial/\partial r(\gamma^r\sqrt{(\kappa_{rr})}\partial\chi/\partial r=0$ where $\psi=(\gamma^r\sqrt{(\kappa_{rr})}\partial\chi/\partial r$ and $½(1\pm\gamma^5)\psi=\chi$. $\langle\gamma^5\rangle=v=\langle c/2\rangle=c/4$ So $1\pm\gamma^5=\cos 13.04\pm\sin 13.04$, $\theta=13.04$=Cabbibo angle.
Here we can then normalize the Cabibbo angle $1+\gamma^5$ term on that 100km/sec object B component of the metric quantization. We then add that CP violating object C 1km/sec as a $\gamma^5 X\gamma^i$ component. You then get a normalized value of .01 for CKM(1,3) and CKM(3,1).
The measured value is .008.

Review

Vacuum eq.10

Recall some solutions to eq.10 gives us a vacuum solution as well. Also recall eq.1, 3 are 2D. Recall the $\kappa_{\mu\nu}$, $g_{\mu\nu}$ metrics (and so R_{ij} and R) were generated in above section 2 (eqs.14,15). In that regard for 2D for a homogenous and isotropic g_{ij} we have identically $R_{\mu\mu}-½g_{\mu\mu}R=0\equiv$ source $=G_{oo}$ since in 2D $R_{\mu\mu}=½g_{\mu\mu}R$ identically (Weinberg, pp.394) with μ=0,... Note the 0 ($G_{oo}=E_{total}$ the energy density source) and we have thereby proven the existence of a net zero energy density eq.9 vacuum. Thus our 2D theory implies the **vacuum is really a vacuum.**

Left handedness

From sect.1 eqs.7 and 8 and 9 are combined. Note also from eq.12 rotation in a homogenous isotropic space-time. So eqs. 7+8 = $G_{oo}=E_e+\sigma\bullet p_r=0$ so $E_e=-\sigma\bullet p_r$. So given a positive E_e (AppendixB) and the negative sign in the above relation implies the neutrino chirality $\sigma\bullet p$ is negative and therefore is left handed.

3.3 Nonhomogenous NonIsotropic Mass Increase For eq.7

But a free falling coordinate system in a large scale gravity field is equivalent to a isotropic and homogenous space-time and so even in a spatially large scale field the neutrino has negligible mass if it is free falling.
To examine the effect of all three ambient metric states 1, ε, $\Delta\varepsilon$ we again start out with a set of initial condition lines on our figure 3. In this case recall that in the presence of a nonisotropic non homogenous space time we can raise the neutrino energy to the ε and repeat and get the muon neutrino with mass $m_{o\nu}$=(3km/1AU)m_e=.01eV (for solar metric inhomogeneity. See Ch.3 section on homogenous isotropic space time). So start with eq. 2AII singlet filled 135° state $1S_{½}$. In that well known case $E=\sqrt{(p^2c^2+m_o^2c^4)}=E=E(1+(m_o^2c^4/2E'))$. $E'\approx E\approx pc>>m_oc^2$; $\psi=e^{i(\omega t-kx)}$ with $k=p/h=E/(hc)$. Set $\hbar=1$,c=1 so $\psi=e^{i(\omega t-kx)}e^{ixmo^{\wedge}2/2E'}$. So we transition through the given $\psi_{e\nu},\psi_{\varepsilon\nu},\psi_{1\nu}$ masses (fig.6,section 6.7) as we move into a stronger and stronger metric gradient. (strong gravitational field) =ψ electron neutrinos can then transform into muon neutrinos. Starting with a isotropic homogenous space time in the ground state we then we go into steeper metric gradients in a inertial frame as seen from at constant metric gradient and higher energies thereby the rest of the states fill consecutively. We apply this result to the derivation of the eq.7+7+7 proton in section 8.1, starting out with infinitesimal eqs. 8+8+8 mass and going into the region of

high nonisotropy, non homogeneity close to object B, thereby gaining mass in the above way. This process is equivalent to adding noise C to eq.8.

Chapter 4 Simultaneous (union) Broken 2D Degeneracy C_M rotation of eq. 7 Implies 2D⊕2D=4D

4.3 2 Simultaneous Equations 16: 2D⊕2D Cartesian Product, Spherical Coordinates and $\sqrt{\kappa_{\mu\nu}}$

Note adding 2D eq.12 δz perturbation gives 4D $(dx_1+idx_2)+(dx_3+idx_4)\equiv dr+idt$ given (eqs5,7b) $dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$ *if* $dr^2\equiv dx^2+dy^2+dz^2$ so that $\gamma^r dr\equiv\gamma^x dx+\gamma^y dy+\gamma^z dz$, $\gamma^i\gamma^j+\gamma^j\gamma^i=0$, $i\neq j,(\gamma^i)^2=1$ (B2), rewritten (with eq14) $(\gamma^x\sqrt{\kappa_{xx}}dx+\gamma^y\sqrt{\kappa_{yy}}dy+\gamma^z\sqrt{\kappa_{zz}}dz+\gamma^t\sqrt{\kappa_{tt}}idt)^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$. Multiply both sides by $1/ds^2$& $(\delta z/\sqrt{dV})^2\equiv\psi^2$ and using operator eq 11 inside the brackets( ) get **Newpde** $\gamma^\mu(\sqrt{\kappa_{\mu\mu}})\partial\psi/\partial x_\mu=(\omega/c)\psi$ for e,ν, $\kappa_{oo}=1-r_H/r=1/\kappa_{rr}$ $r_H=e^2X10^{40N}/m$ (**N**=. -1,0,1.,) (16) $=C_M/\xi_1$ (from* eq.13) C_M=Fiegenbaum point. So: **postulate1→Newpde.** syllogism

Note from eq.1.11 the (dr,dt;dr'dt') has two times in it so can be rewritten as (dr,rdθ,rsinθωdt,cdt)≡ (dr,rdθ,rsinθdϕ,cdt)

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

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

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

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

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

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

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

and so we can then derive the same Clifford algebra (of the γ s) as for the old Dirac equation with the terms in the square brackets (eg.,$[\sqrt{(\kappa_{xx})}dx]\equiv p'_x$) replacing the old dx in that derivation. Also here there is a spherical symmetry so there is no loss in generality in picking the x direction to be r at any given time since there is no θ or ϕ dependence on the metrics like there is for r.

If the two body equation 7 is solved at $r\approx r_H$ (i.e.,our –dr axis, C→0 of eq.3) using the separation of variables and the Frobenius series solution method we get the hyperon energy-charge eigenvalues but here from first principles (i.e.,our postulate) and not from assuming those usual adhoc qcd gauges, gluons, colors, etc. See Ch.8-10 for this Frobenius series method and also see Ch.9. Also $E_n=\mathrm{Rel}(1/\sqrt{g_{oo}})=\mathrm{Rel}(e^{i(2\varepsilon+\Delta\varepsilon)})=1-4\varepsilon^{2/}4+..=1-2\varepsilon^2/2\equiv1-½\alpha$. Multiply both sides by $\hbar c/r$ (for 2 body S state λ=r, sec.16.2), use reduced mass (two body m/2) to get $E=\hbar c/r+(\alpha\hbar c/(2r))=\hbar c/r+(ke^2/2r)$= QM(r=λ/2, 2 body S state)+E&M where we have then derived the fine structure constant α.

N=-1 and dimensionality

Note the N=-1 (GR) is yet another δz perturbation of N=0 δz' perturbation of N=1 observer thereby adding at least 1 independent parameter dimemsion to our $\delta z+(dx_1+idx_2)+(dx_3+idx_4)$ (4+1) explaining why Kaluza Klein 5D $R_{ij}=0$ works so well: GR is really 5D if E&M included. Note these fractal N=-1 fractal scale wound up balls at $r_H=10^{-58}$m are a lot smaller than the Planck length. But if only N=1 observer and N=-1 are used (no N=0) we still have the usual 4D.

4.5 Implications of g_{oo} =1-2e^2/rm$_e$c^2 =1-eA$_o$/mc^{2}v^o) In The Low Temperature Limit Of Small Noise C

For z=0 δz' is big in z'=1+δz and so we have again ±45° min ds and so two possible 45° rotations so through a total of two quadrants for ±δz' in eq.12. one around a axis (SM, appendix A)) and the other around a diagonal (SC), the two electron Boson singlet state in the Ist and 4th quadrants which is the subject of this section...

In fig.2 IVth quadrant could also be a negative velocity electron. So combinations of negative and positive velocity electron (Cooper pairs) are also solutions to eq.1, 2. Solution to eq..3 z=zz+C (where C is noise), z=1+δz is:

$\delta z = \frac{-1\pm\sqrt{1-4C}}{2}$=dr+idt. But if C<1/4 then dt is 0 and **time stops** for eq.7. Note eq.7 has two counterrotating opposite velocity (paired) simultaneous components dr+dt and dr-dt. Note electron scattering by Cooper pairs is time dependent so the scattering stops and so electical resistance drops, and so superconductivity ensues, at small enough noise C or v^2 in Adv/dt/v^2 below.

Or we could as the mainstream does just postulate ad hoc creation and annhilation operators (Bogoliubov) for the Cooper pairs that behave this way and give an energy gap.

In any case *the **time stopping** because the noise C is small (in eq.1) is the real source of superconductivity*.

Geodesics

Recall equation 4.3. g_{oo} =1-2e^2/rm$_e$c^2 ≡1-eA$_o$/mc^{2}v^o). We determined A_o,(andA_1,A_2,A_3) in appendix A4, eq,A2. We plug this A_i into the geodesics

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

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

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

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

$g''_{\alpha\alpha} \equiv g'_{\alpha\alpha}/2$ for large and near constant v,,see eq. 14 also . In the weak field $g^{ii} \approx 1$. Note e=0 for the photon so it is not deflected by these geodesics whereas a gravity field does deflect them. The photon moves in a straight line through a electric or magnetic field. Also use the total differential $\frac{\partial g_{11}}{\partial x^\alpha}dx^\alpha = dg_{11}$ so that using the chain rule gives us:

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

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

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

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

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

Simons developed a similar looking formula to $A_i(dv/dr)_{av}/v^2$ by trial and error. This pairing interaction force $A(dv/dt)/v^2$ drops the flat horizontal energy band (with very tiny variation in energy) saddle point (normally at high energy) associated with a particular layer down to the Fermi level making these energies (band gaps) large and so allowing superconducitivity to occur.

Twisted Graphene

Monolayer graphene is not a superconductor by the way.

But what about two layers? For example a graphene bilayer twisted by 1.1deg rotation creates a quasi Moire' pattern with periodic hexagonal lattice.

It is amazing that in this Moire pattern for each hexagonal structure there are carbons far apart inside the hexagon and carbons close together around the edge of the hexagon making these two groups of carbon atoms distinguishable in terms of their bonding lengths.

So how many high density carbons are in the less dense region of the hexagon?

3+4+5+6+5+4+3=30. How many carbons are in the more dense region of the Moire pattern hexagon boundary? 5*6=30 again. So these two groups have the same aggregate mass (but are distinguishable) just like the 4 Os and one Cu in the cuprates.

So if you twist one layer of graphene that is on top of another layer by 1.1deg it should become a superconductor. And it is.

This pairing interaction force also lowers the energy gap to near the Fermi level.

$\delta z=[-1\pm\sqrt{(1-4C)}]/2$. If $C<1/4$ there is no time and the and so $dt/ds=0$ and so the scattering Hamiltonian is 0. Thus there is no scattering and so no electrical resistance.

This is the true source of superconductivity.

High Pressure

The main constituent of these high pressure superconductors is hydrogen.

Chemical bonding strengths change under high pressure so at some given pressure you would expect the heavier element (eg., nitrogen or sulfur) to behave dynamically as though it was a multiple of the mass of hydrogen since all nuclei are ALMOST a multiple of the mass of hydrogen ANYWAY. Thus at some given pressure you are going to have a antisymmetric normal mode (so relative v=0) of some integer numbers of hydrogens in that $F= Adv/dt/v^2$ term.

So if you have N hydrogens with just ONE other lower nucleus atomic mass m it just takes a small change of the bonding to create that effective mass relation Nh=m (where N is a integer) since the atomic weight m is ALMOST a multiple of h anyway. That antisymmetric normal mode oscillation is then realized. Pressure changes would provide that bonding alteration. For higher mass nuclei added binding energy mass energy starts making integer N harder to realize.

A highly electronegative atom, like that sulfur, would also provide the 'A' in $Adv/dt/v^2=F$. The lattice interaction provides the dv/dt.

Recall the pairing interaction F=A(dv/dt)/v^2. (1)

For a superconductor the same effective masses, including the effects of the bonding with the upper and lower layers, contribute to effective masses moving in the antisymmetric mode so that makes the relative velocity of the two masses v=0 which means that quantum fluctuations are small.

The mainstream is very close to this phenomenology in it's pnictide analysis.

They just use different words for the same thing. For example they call these quantum fluctuations 'nematic'.

They also define nematic QCP: the Quantum Criticality Point

At v=0 critical nematic fluctuations are quenched at high Tc. The mainstream goes further and states that this QCP is where the (orbital) Order, Fermi liquid and nematic states all meet. So at

QCP that v=0 and so we have the critical temperature superconductivity molecular concentrations. Also high pressure quenches these fluctuations thereby making v small.
So the mainstream seems surprisingly close to understanding the (pairing interaction) effects of equation 1. But yet without equation 1 they will never understand the source of the pairing interaction, they will be forever guessing.

4.6 Summary of Consequences of the Uncertainty In Distance (separation) C In $-\delta z=\delta z\delta z+C$ eq.3

1) C as width of a slit determines uncertainty in photon location and resulting wave particle duality (see above section 4.3.8).
2) C is uncertainty in separation of particles which is large at high temperatures. Note degeneracy repulsion (two spin ½ can't be in a single state) is not necessarily time dependent and is zero only for bosons. Also given the already extremely small Brillioun zone bosonization separation (see equation 4.3 for pairing interaction source) then C is small so not much more is needed for C to drop below ¼ to the r axis for Bosons. Thus time axis $\Delta t=0$ so $\Delta v=a\Delta t=0$. (note relative v is big here. Therefore there is no Δv and so no force (F=ma) associated with the time dependent acceleration 'a' for this Boson flowing through a wire with the stationary atoms in the wire. So there is no electrical resistance to the flow of the Bosons in this circuit and we have therefore derived superconductivity from first principles. But there is a force between electrons in a pairing interaction (that creates the Boson) because v between them is so small. Use pairing interaction force mv^2/r between leptons from sect.4.8: $F_{pair}=A(dv/dt)/v^2$ is large. Recall that a superfluid has no viscosity. But doesn't viscosity constitute a force F as well (F/m=a in dv=adt) and isn't helium 4 already a boson so that when C drops below ¼ then dt drops to zero as well? So superfluidity for helium 4 is also a natural outcome of a small C.
At low temperatures you start seeing some of the same phenomena you see in high energy physics (at high temperatures) such as this fractional charge. There is a reciprocity between high energy and low energy physics. That pairing interaction force A(dv/dt)/v^2 that gets larger as v (temperature) in the denominator gets smaller. These forces get into the new pde and play a similar role to the high energy forces.
3) C is separation between particle-antiparticle pair (pair creation). For C<1/4 we leave the 135° and 45° diagonals jump to the r axis and simple ds^2 wave equation dependence (Ch1,section 2). Thus we have derived pair creation and annihilation. The dt is zero giving no time dependence thus stable states. On the superconductivity we derived the pairing interaction (eq.4.5.3) and superfluidity (sect.4.6). So for two paired leptons (via the pairing interaction) the Hamiltonian of each one is then a function of both wavefuctions: $\hbar\partial\psi_1\partial/t=u_1\psi_1\ v_2\psi_2$ and $\hbar\partial\psi_2/\partial t=u_2\psi_1+v_2\psi_2$ which gives the superconducitivity. See Feynman lectures on superconductivity.

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

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

Recall that the mainstream says that working in the Schrodinger representation and starting with the average current (from Dirac eq. ($\not{p}$-mc)$\psi(x)=0$) assumption and so equation 9 gives $J^{(+)}=\int\psi^{(+)t}c\alpha\psi^{(+)}d^3x$. Then using Gordon decomposition of the currents and the Fourier superposition of the $b(p,s)u(p,s)e^{-ipuxu/\hbar}$ solutions (b(p,s) is a normalization constant of $\int\psi^t\psi d^3x$.) to the free particle Dirac equation(1.2.7) we get for the observed current (u and v have tildas):

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

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

Thus we can either set the positive energy v(p,s) or the negative energy u(p,s) equal to zero and so we no longer have a $e^{2ix\theta p\theta/\hbar}$ zitterbewegung contribution to J_u, the zitterbewegung no longer can be seen. Thus we have derived the mainstream idea that the zitterbewegung does not exist. But if we continue on with this derivation we can also show that the zitterbewegung does exist if the electron is in a confined space of about a Compton wavelength in width, so that a nearby confining wall exists then.

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

Note negative energy does exist from $E^2=p^2c^2+m_o^2c^4$ so $E = \sqrt{p^2c^2 + m_o^2c^4}$ so that E can be negative(positrons). Note if p small m can be negative since E=pc then. In $E=mgh+ ½mv^2$ a negative energy E does indeed create absurd results but not if E is also negative since the negative sign cancels out.

Derivation Of Eq.1.2.7 From (uncertainty) Blob (reference 1)

Recall from section 3.4.4 that we can derive the zitterbewegung blob (within the Compton Wavelength) from the equation 1.24.(see reference 2.) Also recall from section 1 that we postulated a blob that was nonzero, non infinite and with constant standard deviation (i.e., we found 3 $\delta\delta z=0$). But that is the same thing as Schrodinger's zitterbewegung blob mentioned above. So we postulated the electron and derived the electron rotated 7 (i.e.,eq.16) from that postulate. We therefore have created a mere trivial tautology.

4.9 Mixed State eq.7+eq.7 Implies There Is No Need For A Dirac Sea

The 1928 solution to the Dirac equation has for the positron and electron simultaneous x,y,z coordinates (bottom of p.94 Bjorken and Drell derivation of the free particle propagator) creating the need for the Dirac sea of filled states so the electron will not annihilate immediately with a collocated negative energy positron which is also a solution to the same Dirac equation. Recall $\psi(+)$ and $\psi(-)$ are separate but (Hermitian) orthogonal eigenstates and so $\langle\psi(+)|\psi(-)\rangle=0$ without a perturbation so we can introduce a displacement $\psi(x)\rightarrow\psi(x+\Delta x)$ for just one of these eigenfunctions. But the mixed state positron and electron separated by a substantial distance Δx will not necessarily annihilate. Note in the eq.7 2D⊕2D (i.e.,$\sqrt{\kappa_{\mu\mu}}\gamma^\mu\partial\psi/\partial x_\mu=(\omega/c)\psi$) equation the electron is at 45° -dr,dt and the positron is at 135° dr',-dt' which means formally they are not in the same location in this formulation of the Dirac equation. In that regard note that $dr/\sqrt{(1-r_H/r)}=dr'$, $r_H=2e'e/m_ec^2=\varepsilon$ so that different e leads in general to different dr' spatial dependence for the $\psi(x)$ in the general representation of the 4X4 Dirac matrices. So in the multiplication of 4 ψs the antiparticle ψ will be given a r_H displacement Δr ($dr\rightarrow dr'$ here) by the$\pm\varepsilon$ term in the associated $\kappa_{\mu\nu}$ So the $\psi(+)$and $\psi(-)$ in the Dirac equation column matrix will have different (x,y,z,t) values for the $\psi(+)$ than for the $\psi(-)$. As an analogy an electron in a given atomic state of a given atom can't decay into a empty state of a completely different atom located somewhere else. Thus perturbation theory (eg.,Fermi's golden rule) cannot lead to the electron spontaneously dropping into a negative energy state since such eq.7 states are not collocated for a given solutions to a single Dirac equation (other positrons from *other* Dirac equation solutions can always wonder in from the outside in the usual positron-electron pair annihilation calculation case but that is not the same thing). Thus the Dirac sea does not have to exist to explain why the electron does not decay into negative energy.

4.10 No Need for a Running Coupling Constant

If the Coulomb V= α/r is used for the coupling instead of $\alpha/(k_H\text{-}r)$ then we must multiply α in the Coulomb term by a floating constant (K) to make the coulomb V give the correct potential energy. Thus if an isolated electron source is used in Z_{00} we have that $(-K\alpha/r)=\alpha/(k_H\text{-}r)$ to define the running coupling constant multiplier "K". The distance k_H corresponds to about $d=10^{-18}m=ke^2/m_\tau c^2$, with an interaction energy of approximately $hc/d=2.48X10^{-8}$joules= 1.55TeV. For 80 GeV, $r\approx 20$ ($\approx$1.55Tev/80Gev) times this distance in colliding electron beam experiments, so $(-K\alpha/r)= \alpha/(r_H\text{-}r) =\alpha/(r(1/20)\text{-}r))= -\alpha/(r(19/20))=(20/19)\alpha/r =1.05\alpha/r$ so K=1.05 which corresponds to a $1/K\alpha\equiv 1/\alpha'\approx 130$ also found by QED (renormalization group) calculations of (Halzen, Quarks). Therefore we can dispense with the running coupling constants, higher order diagrams, the renormalization group, adding infinities to get finite quantities; all we need is the correct potential incorporating $\sqrt{\kappa_{oo}}$.

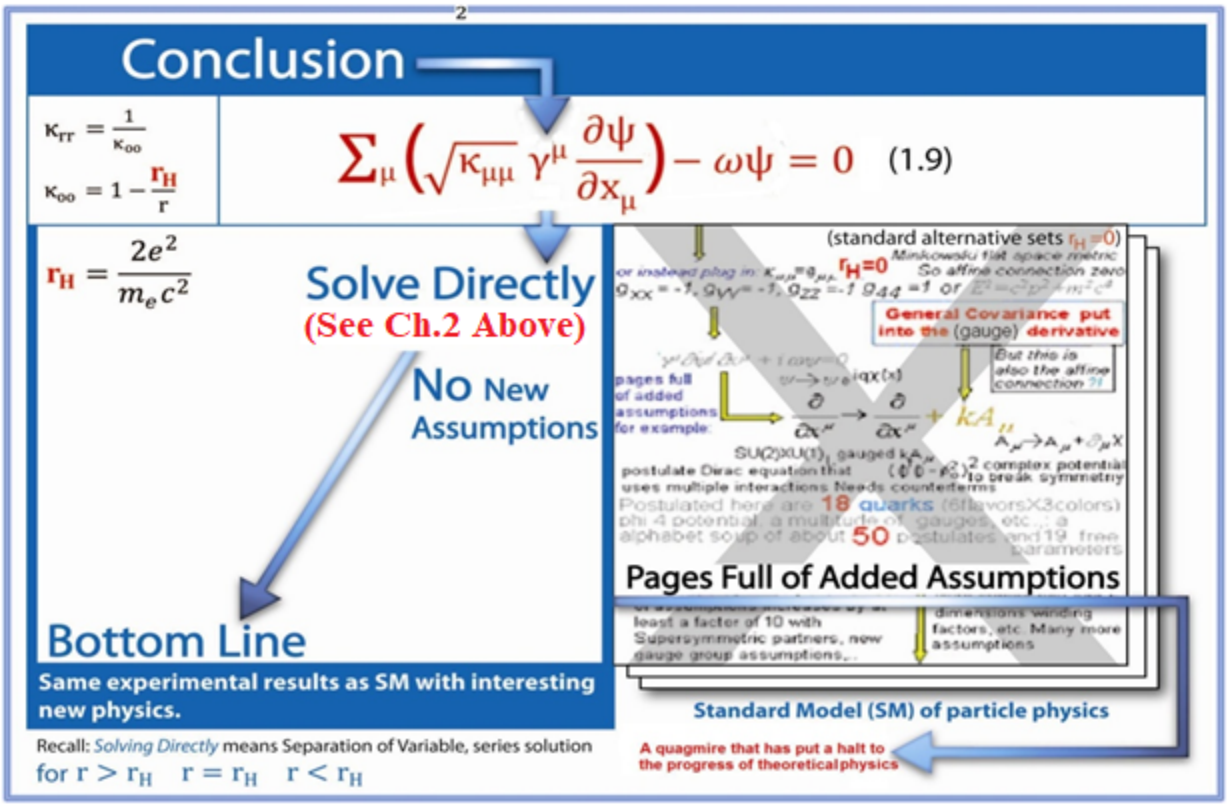
Note that the $\alpha'=\alpha/(1\text{-}[\alpha/3\pi(\ln\chi)]$ running coupling constant formula (Faddeev, 1981)] doesn't work near the singularity (i.e., $\chi\approx e^{3\pi/\alpha}$) because the constant is assumed small over all scales (therefore there really *is no formula to compare* $\alpha/(r\text{-}r_H)$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

4.11 Rotated 1.24 Implies $\kappa_{00}=1\text{-}r_H/r \approx 1/\kappa_{rr}$ So No Klein Paradox As Is In The Original 1928 Dirac Equation

Recall that $\kappa rr=1/(1\text{-}r_H/r)$ in the new pde eq.7. Recall that for the ordinary Dirac equation that the reflection (R_s) and transmission (T_s) coefficients at an abrupt potential rise are:
$R_s= ((1\text{-}\kappa)/1+\kappa))^2$ and $Ts=4\kappa/(1+\kappa)^2$ where $\kappa=p(E+mc^2)/k_2(E+mc^2\text{-}V)$ assuming k_2 (ie.,momentum on right side of barrier) momentum is finite.. Note in section1 $dr'^2=\kappa_{rr}dr^2$ and p_r=mdr/ds in the eq.7+eq.7 mixed state new pde so $p_r=(\sqrt{\kappa_{rr}})p=(1/\sqrt{(1\text{-}r_H/r)})p$ and so $p_r\rightarrow\infty$ so $\kappa\rightarrow\infty$ the huge values of the rest of the numerator and denominator cancel out with some left over finite number. Therefore for the actual abrupt potential rise at $r=r_H$ we find that p_r goes to infinity so $R_s=1$ and $T_s=0$.as expected. Thus nothing makes it through the huge barrier at r_H thereby resolving the Klein paradox: there is no paradox anymore with the new pde. No potentials that have infinite slope. Therefore the new pde applies to the region inside the Compton wavelength just as much as anywhere else. *So* if you drop the $\sqrt{\kappa_{rr}}$ in the new pde all kinds of problems occur inside the Compton wavelength such as more particles moving to the right of the barrier than as were coming in from the left, hence the Klein paradox(4).

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

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



4.12 Mixed State eq.7+eq.7 C>1/4 and C<1/4 Implications For Pair Creation And Annihilation

Note that if C<1/4 in equation 1 ($dz=(-B\pm\sqrt{(B^2-4AC)})/2A$, A=1, B=1) the two points are close together and time disappears since dz is then real for the neighborhood of the origin where opposite charges can exist along the 135° line. So we are off the 45° diagonal and therefore the equation 2 extrema does *not* apply. So the eq.7 2 fermions disappear and we have only that original second boson derivative $\delta ds^2=0$ circle ($\Box^2 A_\mu=0$, $\Box\bullet A=0$) Maxwell equations. So when two fundamental fermions are too near the origin and so get too close together (ie., dr=dr', dt=dt') you only have a boson and the fermions disappear. So we have explained particle-antiparticle annihilation from first principles. In contrast two fermions of equal charge require energies on the order of 100GeV to get this close together in which case they also generate bosons in the same way and again the fermions do disappear from existence. You then generate the W and the Z bosons (since above sect.4.11 nonweak field $k^\nu k_\nu \kappa_{\mu\mu}$=Proca equation term) .

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

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

Also note in the above $\kappa_{rr}=1/\kappa_{tt}$ we have derived GR from our theory in eq. 13-14a. For loosely bound states (eg., $2P_{1/2}$ at $r\approx r_H$) object C contributes a $\xi_{WZ.}$ (see B4)

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

Recall section 4 implies General relativity (recall eq.13,14 and the Schwarzschild metric derivation there). Note this all exists in the context of appendix B MandelbulbLepton results. So it is a local metric normalization to get the ambient eq.4 flat background metric. and so equation 1 and observables. Note also in section 1.2 above we defined the quantum mechanical $[A,H]|a,t\rangle=(\partial A/\partial t)|a,t\rangle$ Heisenberg equations of motion in section 1.2 with $|a,t\rangle$ a eq.2 (7) eigenstate. Note the commutation relation and so second derivatives (H relativistic eq.2 (7) Dirac eq. iteration 2nd derivative) taken twice and subtracted. $(\partial A/\partial t)|a,t\rangle$. For example if 'A' is momentum $p_x= -i\partial/\partial x$. $H= \partial/\partial t$ then [A, so we must use the equations of motion for a curved space. In this ordinary QM case I found for $r<r_H$ that $r=r_o e^{wt'}$ $H]|a,t\rangle=(\partial A/\partial t)|a,t\rangle=(\partial/\partial t)(\partial/\partial x)-(\partial/\partial x)(\partial/\partial t)$=pdot. But $\sqrt{\kappa_{rr}}$ is in the kinetic term in in the new pde with merely perturbative $t'=t\sqrt{\kappa_{oo}}$. But using the C^2 of properties of operator A (C^2 means continuous first and second derivatives and is implied in sect.1.1) in a curved space time we can generalize the Heisenberg equations of motion to curved space *non*perturbatively with: $(A_{i,jk}-A_{i,kj})|a,t\rangle =(R^m_{ijk}A_m)|a,t\rangle$ where R^a_{bcd} is the Riemann Christofell Tensor of the Second Kind and $\kappa_{ab}\rightarrow g_{ab}$. Note all we have done here is to identify A_k as a quantum vector operator here, which it should be. Note again the second derivatives are taken twice and subtracted looking a lot like a generalization of the above Heisenberg equations of motion commutation relations. Note also R^m_{ijk} could even be taken as an eigenvalue of pdot since it is zero when the space is flat, where force is zero. These generalized Heisenberg equations of motion reduce to the above QM form in the limit $\omega\rightarrow 0$, outside the region where angular velocity is very high in the expansion (now it is only one part in 10^5).

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

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

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

5.4. 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, $r'_H=2Gm_e/c^2=10^{-40}r_H$.

Apply to rotations since a isotropic radial force from an artificial object will have no preferred direction. Rotations at least imply a specific axial z direction.

$ds^2=\rho^2[(dr^2/\Delta)+d\theta^2]+(r^2+a^2)\sin^2\theta d\phi^2-c^2dt^2+(2mr/\rho^2)[a\sin^2\theta d\theta-cdt]^2$ Kerr metric (applies to rotations) $\rho^2(r,\theta)=r^2+a^2\cos^2\theta$, $\Delta(r)=r^2-2mr+a^2$.

Next convert to a quadratic equation in dt ($Ax^2+Bx+C=0$ where x =dt. (organize into coefficients of dt and dt^2).The Kerr metric is

$ds^2=\rho^2[(dr^2/\Delta)+d\theta^2]+(r^2+a^2)\sin^2\theta d\phi^2+(2mr/\rho^2)a^2\sin^4\theta d\theta^2-[2(2mr/\rho^2)a\sin^2\theta d\theta cdt]-c^2dt^2(1-(2mr/\rho^2)$ (1)

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

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

$$R_{11}=\tfrac{1}{2}\mu''-\tfrac{1}{4}\lambda'\mu'+\tfrac{1}{4}(\mu')^2-\lambda'/r=0 \quad (5.1.1)$$

$$R_{22}=e^{-\lambda}[1+\tfrac{1}{2}r(\mu'-\lambda')]-1=0 \quad (5.1.2)$$

$$R_{33}=\sin^2\theta\{e^{-\lambda}[1+\tfrac{1}{2}r(\mu'-\lambda')]-1\}=0 \quad (5.1.3)$$

$$R_{oo}=e^{\mu-\lambda}[-\tfrac{1}{2}\mu''+\tfrac{1}{4}\lambda'\mu'-\tfrac{1}{4}(\mu')^2-\mu'/r]=0 \quad (5.1.4)$$

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

(eq. 5.1.1-5.1.4 from pp.303 Sokolnikof): Equation 5.1.2 is a mere repetition of equation 5.1.3. We thus have only three equations on λ and μ to consider. From equations 5.1.1,5.1.4 we deduce that $\lambda'=-\mu'$ so that radial $\lambda=-\mu+\text{constant}=-\mu+C$ where C represents a possible ~constant ambient metric contribution which could be imaginary in the case of the slowly oscillating ambient metric of nearby object B. So $e^{-\mu+C}=e^\lambda$. Then 5.1.2 can be written as:

$$e^{-C}e^\mu(1+r\mu')=1 \quad (5.1.5)$$

Set $e^\mu=\gamma$. So $e^{-\lambda}=\gamma e^{-C}$ and so integrating this first order equation (equation.5.1.11) we get:

$$\gamma=-2m/r+e^C\equiv e^\mu=g_{oo} \text{ and } e^{-\lambda}=(-2m/r+e^C)e^{-C}=1/g_{rr} \quad (5.1.6)$$

From equation 5.1.6 we can identify radial C with also rotational Kerr metric oblateness perturbation Mandelbulb component of (5.1.8 below).Mandelbrot set Fig.6 eq.18 $2m/r=r_H/r=C_M/\xi r=e^{-C}=e^{-(\varepsilon+\Delta\varepsilon)}$. $=\tau+\mu+\Delta\varepsilon$ (eq.18). We end up being at the horizon r_H in equation 5.1.8. So 2m/r is set equal to e^C in eq. 5.1.6. So at the end, at the horizon r_H,in eq.5.1.8, 2m/r is set equal to $e^C=e^{-(\varepsilon+\Delta\varepsilon)}$ in 5.1.6. So $\kappa_{oo}=1-e^{-(\varepsilon+\Delta\varepsilon)}-2m/r$; Given external object B oscillating zitterbewegung for $r<r_C$ (eq.17a) then $e^{-(\varepsilon+\Delta\varepsilon)}\longrightarrow e^{-i(\varepsilon+\Delta\varepsilon)}$, so $\kappa_{oo}=1-e^{-i(\varepsilon+\Delta\varepsilon)}-2m/r$ (5.1.7)

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

Our new pde has spin S and so the self similar ambient metric on the N=0 th fractal scale is the Kerr metric which contains those ambient metric **perturbation rotations** (dθdt T violation so (given CPT) then **CP violation)**

$$ds^2=\rho^2\left(\frac{dr^2}{\Delta}+d\theta^2\right)+\left(r^2+a^2\right)\sin^2\theta d\phi^2-c^2dt^2+\frac{2mr}{\rho^2}\left(a\sin^2\theta d\theta-cdt\right)^2, \quad (5.1.8)$$

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

$\left(\frac{r^2+a^2cos^2\theta}{r^2-2mr+a^2}\right)dr^2+\left(1-\frac{2m}{r^2+a^2cos^2\theta}\right)dt^2$ $\theta\neq0$

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

$$\left(\frac{(r^\wedge)^2}{(r\prime)^2-2mr}\right)dr^2+\left(1-\frac{2mr}{(r^\wedge)^2}\right)dt^2+..=\left(\frac{1}{\frac{(r\prime)^2}{(r^\wedge)^2}-\frac{2mr}{(r^\wedge)^2}}\right)dr^2+\left(1-\frac{2mr}{(r^\wedge)^2}\right)dt^2. \quad (5.1.8)$$

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

$\frac{(r')^2}{(r^\wedge)^2}=\frac{r^2+a^2}{r^2+a^2cos^2\theta}=\frac{1+\frac{a^2}{r^2}}{1+\frac{a^2}{r^2}cos^2\theta}\approx 1/g_{rr}(\approx g_{oo})$. From 5.1.7: $\xi_1=e^{i(\varepsilon+\Delta\varepsilon)}$ for $e^C=e^{i(\varepsilon+\Delta\varepsilon)}$

$=\tau+\mu+\Delta\varepsilon=$zitterbewegung from 5.1.6. $2m/r+e^C$

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

$$=1+\frac{a^2}{r^2}sin^2\theta+..\equiv 1+\frac{\frac{a^2}{r^2}u^2}{2}=(5.1.7)=1+e^C=1+e^{i(\varepsilon+\Delta\varepsilon)}=.$$

(Replace a^2/r^2 Kerr object B term with inertial frame 5.1.7 dragging mass ξ_1. In eq.5.1.8, eq. 17a. Subtract $2mr/(r')^2=r_H/r_H$)

$$1+\xi_1-\frac{r_H}{r_H}=1+\varepsilon+\Delta e+.. \;=e^{i(\varepsilon+\Delta\varepsilon)} \quad (5.1.9)$$

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

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

11.1 Is metric quantization possible? So does it have a Hamiltonian?

Recall eq.5.1.9 object B generation in the Kerr metric $((a/r)\sin\theta)^2=\Delta\varepsilon$ with outside object B r_H $\kappa_{00}=\varepsilon^{i\Delta\varepsilon}$ with inside $\kappa_{00}=1-\Delta\varepsilon$. Finally in the composite 3e frame of reference $\Delta\varepsilon\rightarrow\Delta\varepsilon+\varepsilon$ for both in Eg., $\kappa_{oo}=e^{i(\varepsilon+\Delta\varepsilon)}$ outside object B.

Also recall the fractal separation of variables in the universe wave function Ψ solution to the **Newpde**:

From seperation of variables sect.1: $\Psi=\Pi\psi_N=..\bullet\psi_{-1}\bullet\psi_0\bullet\psi_1\bullet\ldots$

N is the fractal scale. Not also that New pde $\Delta\varepsilon\equiv H_{\Delta\varepsilon}$ or $\varepsilon\equiv H_\varepsilon$ $r>r_H$ have nothing to do with each other (like H_{SHM}&H_J) so $\Delta\varepsilon\varepsilon\psi_N=E\psi_N$ is undefined (just as $H_{SHM}*H_J$ is undefined). In contrast for $r_{(\varepsilon,\Delta\varepsilon)}e^{kt}=\psi_{N+1}$ from new pde cosmological $r_H>r$ there is a common time $t=t'$ in

$$-i\frac{\partial\left(-i\frac{\partial\psi_{N+1}}{\partial t'}\right)}{\partial t}=\varepsilon\Delta\varepsilon\psi_{N+1}$$

on the zitterbewegung cloud radius expansion (see 7.4.2) $r_{\Delta\varepsilon\varepsilon}e^{kt}\equiv\psi_{N+1}$ so that $\varepsilon\Delta\varepsilon\psi_{N+1}$ is defined. So $\langle i|\varepsilon\Delta\varepsilon|i\rangle$ (from $\varepsilon\Delta\varepsilon\psi_{N+1}$) is observable and $\langle i|\varepsilon\Delta\varepsilon|i\rangle$ (from $\varepsilon\Delta\varepsilon\psi_N$) is not observable.

But normally, 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: $\Delta\varepsilon r_H = 0$ in:

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

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

Recall from Newpde (eq. 6.1.8): $E=\frac{1}{\sqrt{\kappa_{00}}}=\frac{1}{\sqrt{1-\frac{r_H}{r}}}$. If $r<r_H$ E (inside r_H) is imaginary. If $r>r_H$ (outside r_H) E is real in $\delta\varepsilon=e^{iEt}$. From Newpde (eg., eq.1.13 Bjorken and Drell)

$i\hbar\frac{\partial\psi}{\partial t}=\frac{\hbar c}{i}\left(\alpha_1\frac{\partial\psi}{\partial x^1}+\alpha_2\frac{\partial\psi}{\partial x^2}+\alpha_3\frac{\partial\psi}{\partial x^3}\right)+\beta mc^2\psi=H\psi$. For electron at rest: $i\hbar\frac{\partial\psi}{\partial t}=\beta mc^2\psi$

so: $\delta z=\psi_r=w^r(0)e^{-i\varepsilon_r\frac{mc^2}{\hbar}t}$ $\varepsilon_r=+1$, r=1,2; $\varepsilon_r=-1$, r=3,4.): Recall from the Mercuron equation 7.4.12) that ε carries the time with it and τ is normalized (δz=ψ=τ+i(ε+Δε)+.. = 1+i(ε+Δε)+. $=e^{i(\varepsilon+\Delta\varepsilon)}$) because it is a constant structure Mandelbulb (at 68.87°) in the Mandelbrot set (fig.6).

So here N=1 fractal scale (5.1.9, D9) fractal $e^{-i\varepsilon_r\frac{mc^2}{\hbar}t}\rightarrow e^{i(\varepsilon+\Delta\varepsilon)}$ (11.1)

Examples of this 5.1.7 e^C ambient metric component

N=0 Composite 3e ut it is also rotating (fractal selfsimilarity in Newpde) Kerr black hole with the inertial frame dragging suppressing it to 1/10000 due to the tiny effect of object B. So we mostly see **a combo New pde r<rH zitterbewegung+Schwarzchild = De Sitter**

For z=0 *just inside r_H,* the *two* positrons *each* have constant ψ (N=0 ch.8,9) inside r_H. So from eq.5.1.9 divide κ_{rr} by 1+ε+ε=1+2ε.$=e^C$ So $\frac{1}{\kappa_{rr}}=(1)(1+2\varepsilon)\equiv 1+2(\varepsilon+\Delta\varepsilon)$ (5.1.9a)

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

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

$$=\frac{1}{(1+\varepsilon\prime-2m/\xi_0 r)}dr^2+\left(1-\frac{2m}{r\xi_0}\right)dt^2, \qquad \varepsilon'\equiv\varepsilon/(1+\varepsilon). \qquad (5.1.10)$$

have been working on the ambient metric (very close to and) on either side of rH for composite 3e and for r>>>rH as well. Just inside rH the ground state being a constant psi from the Frobenius solution (but object C perturbs it) and the just outside is that Meisner effect pion cloud(that virtual creation and annihilation being the changing flux source.), so nuclear physics. For r>>rH you get qed physics.

Equation D9 provides the contributions from each maximal symmetry epsilon source, the B flux quantization necessarily causes the quantization of the ambient metric. . There appear to be 3 sources, the two positrons (are right on rH and so are close to these boundaries) and that huge internal magnetic field. So for the

inside1+2ep +dep get added and we normalize for the second positron observer away by dividing by 1+ep for that observer.

For just outside the flux is small because of the numerous creation and annihilation events inside and so Faraday's law gives the Meisner effect pion cloud. And the added eq.9.22 pion

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" (5.1.9) for zero point energy ε"=.08 $\pi^\pm$ of eq.9.22 (partII) which has to itself increase and decrease with (see 5.1.9) each of these annihilation events and $\pi^{\pm}$ exists just outside r_H (from our Frobenius solution): $\frac{1}{(1+\varepsilon''-2m/\xi_0 r)}dr^2+\left((1-2m/\xi_0 r)\right)dt^2=ds^2$ (5.1.11)

For z=0→z=1 r>>r_H then free space boost sect.2 $\xi_0\to\tau$. Define $\varepsilon'\equiv\frac{\varepsilon}{1+\varepsilon}$. Must normalize again (from A0 for local ambient metrc $\Delta\varepsilon$ change contributions) so multiply by $\frac{1}{1+\varepsilon'}$ (see D9 for z=1 outside)

$$\frac{1}{\left(1+\frac{\Delta\varepsilon}{1+\varepsilon}-2m/\xi_1 r\right)}dr^2+(1-2m/r\xi_1)dt^2=\frac{1}{\left(1+\frac{\Delta\varepsilon}{1+\varepsilon}-2m/\xi_1 r\right)}dr^2+\left(1-\frac{2m}{r\xi_1}\right)dt^2 \quad (5.1.12)$$

6 N=1 Use Ricci curvature to obtain Newpde comoving internal observer Cosmology

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.5.1.2 and eq.5.1.9:

$R_{22}=½\Delta g_{22}=e^{i(\varepsilon+\Delta\varepsilon)}e^{i\pi/2}=\sin(\varepsilon+\Delta\varepsilon)+i\cos(\varepsilon+\Delta\varepsilon)$. (6.1.4)

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

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:

$$\left[\left(\frac{dt}{ds}\sqrt{\kappa_{00}}m_p\right)+m_p\right]F-\hbar c\left(\sqrt{\kappa_{rr}}\frac{d}{dr}+\frac{j+3/2}{r}\right)f=0 \quad (6.1.5)$$
$$\left[\left(\frac{dt}{ds}\sqrt{\kappa_{00}}m_p\right)-m_p\right]f+\hbar c\left(\sqrt{\kappa_{rr}}\frac{d}{dr}-\frac{j-1/2}{r}\right)F=0. \quad (6.1.6)$$

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 $dS/dt\propto m\propto gyJ$ 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 . 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 6.1.5, 6.1.6 compatible with the standard Dirac equation allowing us to substitute the gy into the Heisenberg equations of motion for spin S: $dS/dt\propto m\propto gyJ$ to find the correction to dS/dt. Thus again:

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

$[1/\sqrt{\kappa_{rr}}](3/2+½)=3/2+½gy=3/2+½(1+\Delta gy)$ (6.1.7)

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

Thus solve eq. 5.1.12, 6.1.7,eq.19 ,A0 with eq.6.1.1 values in $\sqrt{\kappa_{rr}}=1/\sqrt{(1+\Delta\varepsilon/(1+\varepsilon))}=1/\sqrt{(1+\Delta\varepsilon/(1+0))}=1/\sqrt{(1+.0005799/1)}$. Thus from equations 6.1.1, 6.1.5, 6.1.7:

$[\sqrt{(1+.0005799)}](3/2+½)=3/2+½(1+\Delta gy)$. Solving for Δgy 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 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 5.1.11

Composite 3e CASE 1: Plus $+r_H$, therefore is the proton + charge component. Eq.6.1.1 &5.1.11,A0 $1/\kappa_{rr} = 1 + r_H/r_H + \varepsilon'' = 2 + \varepsilon''$. ε'' =.08 (eq.9.22). Thus from eq.6.1.7:

$\sqrt{2+\varepsilon''}$(1.5+.5)=1.5+.5(gy), gy=2.8

The gyromagnetic ratio of the proton

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

$1/\kappa_{rr} = 1 - r_H/r_H + \varepsilon'' = \varepsilon$ " Therefore from equation 6.1.7 and case 1 eq.12 $1/\kappa_{rr} = 1 - r_H/r_H + \varepsilon''$

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

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

C2 Separation of Variables

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

$$\left[\left(\frac{dt}{ds}\sqrt{\kappa_{00}}m_p\right)+m_p\right]F-\hbar c\left(\sqrt{\kappa_{rr}}\frac{d}{dr}+\frac{j+3/2}{r}\right)f=0 \qquad (6.1.5)$$

$$\left[\left(\frac{dt}{ds}\sqrt{\kappa_{00}}m_p\right)-m_p\right]f+\hbar c\left(\sqrt{\kappa_{rr}}\frac{d}{dr}-\frac{j-1/2}{r}\right)F=0. \qquad (6.1.6)$$

Comparing the flat space-time Dirac equation to the left side terms of equations 6.1.5and 6.1.6:

$$(dt/ds)\sqrt{\kappa_{oo}}=(1/\kappa_{00})\sqrt{\kappa_{oo}}=(1/\sqrt{\kappa_{oo}})=\text{Energy}=E \qquad (6.1.8)$$

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 6.1.8:,18 $r_{H'}=(1+1+.5)e^2/(m_\tau+m_\mu+m_e)/2=2.5e^2/(2m_pc^2)$. (6.1.9)

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

Next note for the variation in $\psi^*\psi$ is equal to zero at maximum $\psi^*\psi$ probability density where for the hydrogen atom is at $r=n^2a_o=4a_o$ for n=2 and the $\psi_{2,0,0}$ eigenfunction. Also recall eq.B1 ,19$\xi_1=m_Lc^2=(m_\tau+m_\mu+m_e)c^2=2m_pc^2$ normalizes $½ke^2$ (Thus divide $\tau+\mu$ by 2 and then multiply the whole line by 2 to normalize the $m_e/2$.result. $\varepsilon=0$ since no muon ε here.): Recall in eq.19 ξ_o has to be pulled in a Taylor expansion as an operator since it a separate observable So substituting eqs. 5.1.16, 6.1.1 and eq. 5.1.12 for κ_{00}, and B1, 6.1.1 values in eq.6.1.8:

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

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

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

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.

Why Does The Ordinary Dirac Equation ($\kappa_{\mu\nu}$=constant) Require Infinite Fields?
Note from section 1.2 that $\kappa_{\mu\nu}$=possibly nonconstant. So it does not have to be flat space, whereas for the standard Dirac equation $g_{\mu\nu}$=constant in eq. 4.2.1. Also eq.16 has closed form solutions (eg. section 4.9), no infinite fields required as we see in the above eq.6.12.1. So why does the mainstream solution require infinite fields (caused by infinite charges)? To answer that question recall the geodesics $\Gamma^m_{ij}v^iv^j$ give us accelerations, with these v^k s limited to <c. Recall g_{ij} also contains the potentials (of the fields) A_i. We can then take the pathological case of $\int g^{ij}$ $=\int A=\infty$ in the S matrix integral context and $\partial g_{ik}/\partial x^j=\mathbf{0}$ since the mainstream (circa 1928) Dirac equation formalism made the g_{ij} constants in eq.4.2.1. Then $\Gamma^m_{ij}\equiv(g^{km}/2)(\partial g_{ik}/\partial x^j+\partial g_{jk}/\partial x^i-\partial g_{ij}/\partial x^k)=(1/\mathbf{0})(\mathbf{0})$=*un*defined, but *not* zero. Take the $\partial g_{ik}/\partial x^j$ to be mere 0 *limit* values and then $\Gamma^\alpha_{\beta\gamma}$ becomes *finite* then. Furthermore 9.13 (Coulomb potential) would then imply that A_o=1/r (and U(1)) and note the higher orders of the Taylor expansion of the Energy=1/(1-1/r) term (=1-1/r+$(1/r)^2$-$(1/r)^3$...(geometrical series expansion) where we could then represent these n th order $1/r^n$ terms with individual 1/r Coulomb interactions accurate if doing alternatively Feynman vacuum polarization graphs in powers of 1/r). Also we could subtract off the infinities using counterterms in the standard renormalization procedure. *Thus in the context of the S matrix this flat space-time could ironically give nearly the exact answers if pathologically* $\int A=\infty$ and so we *have explained why QED renormalization* works! Thus instead of being a nuisance these QED infinities are a necessity if you *mistakenly* choose to set r_H=0 (so constant κ_{ij}).
But equation 16 is not in general a flat space time (i.e.,.in general $\kappa_{\mu\nu}\neq$constant) so we do not need these infinities and the renormalization and we still keep the precision predictions of QED, where in going from the N+1th fractal scale to the Nth fractal scale $r_H=2GM/c^2\rightarrow 2e^2/m_ec^2$ See sect.3.9 and Ch.1.2.4 where we calculate the Lamb shft and anomalous gyromagnetic ratio in closed form from our eq.16 energy 1.21: E=$1/\sqrt{\kappa_{oo}}=1/\sqrt{(1-r_H/r+\Delta\varepsilon)}$ (Ch.3.9) and the square root in the separable eq.16 (Ch.1.2.4 and section 6.12 for Lamb shift calculation without renormalization.).

Metric quantization (and C) As A Perturbation Of the Hamiltonian
$H_o\psi=E_n\psi_n$
for normalized ψ_ns. We introduce a strong *local* metric perturbation H'=ΔG due to motion through matter let's say so that:
$H'+H=H_{total}$ where H ≡ΔG is due to the matter and H is the total Hamiltonian due to all the types of neutrino in that H_{M+1} of section 4.6.H'=C^2. Because of this metric perturbation $\psi=\Sigma a_i\psi_{Ii}$=orthonormal eigenfunctions of H_o. $|a_i|^2$ is the probability of being in the neutrino state i. The nonground state a_is would be (near) zero for no perturbations with the ground state energy a_i (electron neutrino) largest at lowest energy given for ordinary beta decay for example. Thus the passage through matter creates the nonzero higher metric quantization states (i.e., H' can add energy) with:
$a_k=(1/(\hbar i)\int H'_{lk}e^{i\omega lkt}dt$

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

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

Note: Need infinities if **flat space Dirac 1928 equation**. For flat space $\partial g_{ik}/\partial x^j=\mathbf{0}$ as a limit. Then must take field $g^{km}=1/0=\infty$ to get finite Christoffel symbol $\Gamma^m_{ij}\equiv(g^{km}/2)(\partial g_{ik}/\partial x^j+\partial g_{jk}/\partial x^i-\partial g_{ij}/\partial x^k)=(1/\mathbf{0})(\mathbf{0})=$*un*defined but still implying *non*zero acceleration on the left side of the geodesic equation: $\frac{d^2x^\mu}{ds^2}=-\Gamma^\mu_{\nu\lambda}\frac{dx^\nu}{ds}\frac{dx^\lambda}{ds}$ So we need infinite fields for flat space. Thus QED requires (many such) infinities. But we have in general curved space $g_{ij}=\kappa_{ij}$ in the New pde so do not require that anything be infinite and yet we still obtain for the third order Taylor expansion term of $\sqrt{\kappa_{\mu\nu}}$ the Lamb shift and anomalous gyromagnetic ratio correction (see above sections C2,C3).

So renormalization is a perturbative way (given it's flat space Dirac equation and minimal interaction gauge origins) of calculating these (above) same, *NON*perturbative results, it's a perturbative GR theory. But renormalization gives lots of wrong answers too, eg.,10^{96}grams/cm^3 vacuum density for starters. (So we drop it here since we don't need it any longer for the high precision QED results.) In contrast note near the end of reference 5 our $G_{oo}=0$ for a 2D MS. Thus a vacuum really is a vacuum. Also that large $\xi_1=\tau(1+\varepsilon')$ in r_H in eq.14 is the reason leptons appear point particles (in contrast to the small ξ_0 in the composite 3e baryons).

6.3 **Mixed states of Δε and ε** outside r_H so $1S_{1/2}$ state within r_{HN} $(\Delta x\Delta m_{N=-1}c)=\hbar/2$. $m_{N=-1}=10^{-40}m_e$. For $1S_{1/2}$ state $m_\mu=207m_e$ and so $\Delta x=10^5$LY galaxy. $1S_{1/2}$ state may be flattened since such states are stable since then $g_{oo}=\kappa_{oo}$.

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) ($1/(1-2\varepsilon)$ 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)

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

Case1 $1-2GM/(c^2r)=1-2(v/c)^2=1-(\Delta\varepsilon/(1-2\varepsilon))^2/2$ (6.3.1)

So $1-2(v/c)^2=1-(\Delta\varepsilon/(1-2\varepsilon))^2/2$ so $=(\Delta\varepsilon/(1-2\varepsilon))c/2=.00058/(1-(.06)2)(3X10^8)/2=99$km/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 $g_{oo}=1-2GM/(c^2r)=\mathrm{ReI}\kappa_{oo}=\cos[\Delta\varepsilon+\varepsilon]=1-[\Delta\varepsilon+\varepsilon]^2/2=1-[(\Delta\varepsilon+\varepsilon)^2/(\Delta\varepsilon+\varepsilon)]^2/2=$
$1-[(\Delta\varepsilon^2+\varepsilon^2+2\varepsilon\Delta\varepsilon)/(\Delta\varepsilon+\varepsilon)]^2$

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 $v_N=[\Delta\varepsilon^{N+1}/(2\varepsilon^N)]c$. (6.3.2)
From eq. D18 for example v=m100^Nkm/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) Note there is no Klein paradox at r<Compton wavelength in this theory and also Schrodinger's 1930 paper on the lack of a zitterbewegung does not apply to a region smaller than the Compton wavelength. So the above zitterbewegung analysis does apply in that region. The $\sqrt{\kappa_{oo}} = \sqrt{(1-r_H/r)}$ modifies this a little in that from the source equations for $\kappa_{\mu\nu}$you also need a feed back since the field itself, in the most compact form, also is a eq.4.4.1. G_{oo} energy density (source).

6.10

Fractal δz oscillation

Comoving Coordinate System: What We Observe Of The Ambient Metric

Recall from Newpde (eq. 6.1.8): $E = \frac{1}{\sqrt{\kappa_{00}}} = \frac{1}{\sqrt{1-\frac{r_H}{r}}}$. If r<$r_H$ E (inside r_H) is imaginary. If r>r_H (outside r_H) E is real in $\delta\varepsilon=e^{iEt..}$ From Newpde (eg., eq.1.13 Bjorken and Drell) $i\hbar\frac{\partial\psi}{\partial t} = \frac{\hbar c}{i}\left(\alpha_1\frac{\partial\psi}{\partial x^1} + \alpha_2\frac{\partial\psi}{\partial x^2} + \alpha_3\frac{\partial\psi}{\partial x^3}\right) + \beta mc^2\psi = H\psi$. For electron at rest: $i\hbar\frac{\partial\psi}{\partial t} = \beta mc^2\psi$ so: $\delta z = \psi_r = w^r(0)e^{-i\varepsilon_r\frac{mc^2}{\hbar}t}$ ε_r=+1, r=1,2; ε_r=-1, r=3,4.): So the eq.12 the 45° line has this sinusoidal t variation on that δz rotation. The next higher cosmological independent (but still connected by superposition of speeds) fractal scale N=1 the 45° small Mandelbulb chord ε (Fig6) is now getting smaller with time t α ε as in a separation of variables result: $i\hbar\frac{\partial\psi}{\partial t} = \beta\sum_N(10^{40N}(\omega t)_{\varepsilon+\Delta\varepsilon})\psi = \beta\sum_N(10^{40N}m_{\varepsilon+\Delta\varepsilon}\,c^2/\hbar)\psi$ and so for stationary N=1 δz=$\sqrt{\kappa_{oo}}$dt= $e^{-i\varepsilon_r\frac{mc^2}{\hbar}t} \rightarrow e^{i(\varepsilon+\Delta\varepsilon)}$ (18)
Recall from the Mercuron equation (7.4.12) that ε carries the time with it and τ is normalized (δz=ψ=τ+i(ε+Δε)+.. = 1+i(ε+Δε)+. =$e^{i(\varepsilon+\Delta\varepsilon)}$) ≡ $e^{-i\varepsilon_r\frac{mc^2}{\hbar}t}$)because it is a constant structure Mandelbulb (at 68.87°) in the Mandelbrot set (fig.6). So here N=1 fractal scale (5.1.9) fractal $e^{-i\varepsilon_r\frac{mc^2}{\hbar}t} \rightarrow e^{i(\varepsilon+\Delta\varepsilon)}$. δz =$e^{i(\varepsilon+\Delta\varepsilon)}$ (7.4.13)
so δz =e^{ε} =source→sinhε. So δz= $e^{(i2Ht/\hbar)}$

6.14 More Implications of The Two Metrics Of Equation 13 Of 14 and Eq.11.2 Gaussian Pillbox Approach To General Relativity

From equation 11.2 the κ_{oo}=1-r_H/r all the comoving observers are all at r=r_H so that only circumferencial motion is allowed with the new pde zitterbewung creating some radial motion dr'/ds. Also $dr'^2=\kappa_{rr}dr^2=[1/(1-r_H/r)]dr^2$ so that the dr' space inside this volume is very large. See equation B8 in section B3. The effect of all this math is to flip over r_H/r in the Schwarschild metric to r/r_H in the De Sitter metric (see discussion of eq.11.2) at r=r_H:

$$ds^2=-(1-r^2/\alpha^2)dt^2+(1-r^2/\alpha^2)^{-1}dr^2+d\Omega^2_{n-2} \qquad (6.14.1)$$

which also fulfills the fundamental small C requirement of eq.1.1.14 Dirac equation zitterbewegung (for r<r_C and r≈r_H) and the eq.5 Minkowski metric requirement for α=1. It also keeps our square root $\sqrt{\kappa_{00}}=\sqrt{1-\frac{r_H}{r}}\rightarrow\sqrt{1-\frac{r^2}{r_H{}^2}}$ real. Given the geometric structure of the 4D De Sitter submanifold surface we must live on a 4D submanifold hyperspace in this many point limit. So inside r_H for empty Gaussian Pillbox (since everything is at r_H)

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

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

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

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

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

$x_i= rz_i$ $\quad 2\leq i\leq n$ $\quad z_i$ is the standard imbedding n-2 sphere. R^{n-1}. which also imply the De Sitter metric 6.14.3. Recall from eq. 6.13.6

$$ds^2=-(1-r^2/\alpha^2)dt^2+(1-r^2/\alpha^2)^{-1}dr^2+d\Omega^2_{n-2} \qquad (6.14.3)$$

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

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

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

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

$x^2+y^2+z^2-t^2=0$ of 6.14.1 with also (x=rsinθ, y=rcosθ) $\rightarrow$

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

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

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

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

So these superclusters should have a corresponding smudge in the CBR in exactly the opposite direction!

Comoving Interior Frame that the N=2 observer sees that we see.

Recall N>0≡observer. Here we find what that N=2 fractal scale observer sees what we see if sinμ->sinhμ for r>r_H going to r<r_H in $E=1/\sqrt{\kappa_{oo}}=1/\sqrt{(1-r_H/r)}$ since the E in $\delta z=e^{iEt}\equiv e^{i\mu}$ and so μ

then becomes imaginary. Recall limit R_{ij} as $r \rightarrow 0$ is the source, where gravity creates gravity in the Einstein equations which becomes the modulation of the DeSitter ball. (6.14.2).
$R_{22}=e^{-\lambda}[1+½ r(\mu'-\nu')]-1$ with $\mu=\nu$ (spherical symmetry) and $\mu'=-\nu'$. So as $r \rightarrow 0$, ImR_{22}=. $Im(e^{\mu}-1)=\mu$ +..= $sin\mu=\mu$+..for outside r_H imaginary μ for small r (at the source) so $sin\mu$ becomes a gravitational source (gravity itself can create gravity as a feedback mechanism). The N=2 observer then multiplies by i iR_{22}, $-sin\mu$ and μ to get $R_{22}=-sinh\mu$ to see what the N=2 observer sees that we see inside r_H so:
$R_{22}=e^{-\nu}[1+½ r(\mu'-\nu')]-1=-sinh\nu=(-(e^{\nu}- e^{-\nu})/2)$, $\nu'=-\mu'$ 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 given $\nu'=-\mu'$
$e^{-\nu}[-r(\mu')]= 1-cosh\mu$. Thus
$e^{-\mu}r(d\mu/dr)]=1-cosh\mu$
This can be rewritten as: $e^{\mu}d\mu/(1-cosh\mu)=dr/r$ (6.14.4)
The integration is from $\xi_1= \mu=\varepsilon=1$ to the present day mass of the muon= .06 (X tauon mass).
Integrating equation B from $\varepsilon=1$ to the present ε value we then get:
$ln(r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-ln[e^{\mu}-1]]2$ (6.14.5)
the equation that gives the comoving observer time evolution of the universe. The equation works near the min of the sinusoidal oscillation where we are slightly inside r_H.
The radial component r $=r_{M+1}$ in 6.4.4 is still a function of that r_{bb} mercuron radius
Also the $\kappa_{oo}=1-r^2/r_H^2$ in 6.14.3 (instead of the external observer $\kappa_{oo}=1-r_H/r$) in $E=1/\sqrt{\kappa_{oo}}$ in looking outward (internal observer) at the cosmological oscillation from the inside ($r<r_H$) implies that higher mass for N=2 fractal scale so smaller wavelength and larger energy so larger effect. So metric jumps wirh longer the wavelength on our scale imply higher energy cosmological effects that N=2 sees we see si we see it... So on N=1 fractal scale small wavelength cosmological oscillations (eg., object C $\Delta\varepsilon$ Period=2.5My) have much smaller effects than the larger wavelength oscillations (eg., ε Period=270My).
g factor=g= e/2m and w=gB=$2\pi f$ with f the Larmor frequency which is what you use to measure the g factor(like in MRI)
The anomalous gyromagnetic ratio gy=g-2.
Note if the mass is decreasing then gy (and the g factor) goes up as well.
The difference in gy between 2023 (FermiLab) and 1974 (CERN) is
116592059[22]-11659100[10] =1 part in 10^5 increase which translates to 1 part in 10^8 increase in g since g is about 2000X larger than gy. Note g is increasing corresponding to a decreasing mass m in g=e/2m, by about 1 part in 10^8 over 50 years so about 1 part in 10^10 over 1 year, our predicted value.
Note the sine wave has a period of 10trillion years and we are now at 370billion years, near $\theta=-\pi/2$ in $r=r_o sin\theta$ where the upswing is occurring and so accelerating expansion is occurring. This is where we start out at in the sect.7.3 derivation. Since the metric is inside $r<r_H$ it is also a source as we see in later section 5.4

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

Summary:

Fractal Scale Content Generation From Generalized Heisenberg Equations of Motion

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

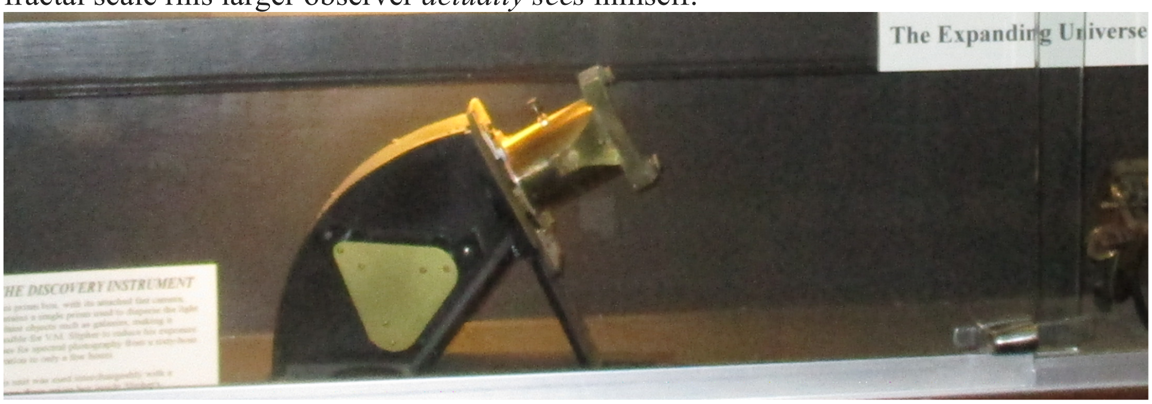
$$(\partial x_{oN})/\partial x_{oN+1})\ (\partial x_{oN})/\partial x_{oN+1})T_{ooN}-T_{ooN}=T_{ooN-1} \qquad (7.2.3)$$

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

On top of the fractal 10^{40}X smaller coupling G (ref.5) baseline this T_{ooN-1} gives a smaller time dependent coshu coefficient which is what we find here.

7.3 Derivation of The Terms in Equation 7.2.3

For free falling frame no coordinate transformation is needed of source T_{oo}. For non free falling comoving frame with N+1fractal eq.1.1.24 motion we do need a coordinate transformation to obtain the perturbation ΔT of T_{oo} caused by this motion (in the new coordinate system we also get 5.1.2: the modified R_{ij}=source describing the evolution of the universe as seen from the outside fractal N+1 scale observer that *he sees that we see*. We got $\ln(r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-\ln[e^{\mu}-1]]2$ in our own coordinate frame). Recall in section 1 the N>0 fractal scale rhis larger observer *actually sees* himself.



THE DISCOVERY INSTRUMENT Spectroscope Slit

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

7.4 Dyadic Coordinate Transformation Of T_{ij} In Eq. 7.2.3 eq., 14 Frame of Reference

Given N+1 fractal cosmological scale (Who just sees the T_{oo}) frame of reference we then do a radial dyadic oordinate transformation to *our* Nth fractal scale frame of reference so that $T_{oo}\to T_{oo}'=T_{oo}+dT_{oo}.\equiv T_{oo}+G_{oo}$ (Section 7.4 attachment).

The Dirac equation object has a radial center of mass of its zitterbewegung. That radius expands due to the **ambient metric expansion** of the next larger N+1th fractal scale (Discovered by Slipher. See his above instrumentation). We define a Z_{oo} E&M energy-momentum tensor 00 component replacement for the G_{oo} Einstein tensor 00 component. The energy is associated with the Coulomb force here, not the gravitational force. The dyadic radial coordinate transformation of Z_{ij} associated with the expansion creates a new z_{oo}. Thus transform the dyadic Z_{oo} to the coordinate system commoving with the radial coordinate expansion and get $Z_{oo}\to Z_{oo}+z_{oo}$ (section 3.1). The new z_{oo} turns out to be the gravitational source with the G in it. The mass is that of the electron so we can then calculate the value of the gravitational constant G. From Ch.1 the object dr as see in the observer primed nonmoving frame is: $dr=\sqrt{\kappa_{rr}}dr'=\sqrt{(1/(1+2\varepsilon))}dr'=dr'/(1+\varepsilon)$. $1/\sqrt{(1+.06)}=1.0654$. Also using $S_{1/2}$ state of equation 16 $\varepsilon=.06006=m_{\mu}+m_e$

From equation 11.4 and $e^{i\omega t}$ oscillation in equation 11.4. $\omega=2c/\lambda$ so that one half of λ equals the actual Compton wavelength in the exponent of section 4.11. Divide the Compton wavelength $2\pi r_M$ by 2π to get the radius r_M so that $r_M=\lambda_M/(2(2\pi))= h/(2m_ec2\pi)= 6.626X10^{-34}/(9.1094X10^{-31}X2.9979X10^8X4\pi)=1.9308X10^{-13}$

From the previous chapter the Heisenberg equations of motion give $e^{i\omega t}$ oscillation (zitterbewegung) both for velocity and position so we use the classical harmonic oscillator probability distribution of radial center of mass of the zitterbewegung cosine oscillation lobe. So the COM (radial) is: $x_{cm}= (\sum xm)/M=\iiint r^3\cos r\sin\theta d\theta d\phi dr/(\iiint r^2\cos r\sin\theta d\theta d\phi dr) =1.036$. As a fraction of half a wavelength (so πphase) r_m we have $1.036/\pi=1/3.0334$ (7.4.1)

Take $H_t=13.74X10^9$ years$=1/2.306X10^{-18}$/s. Consistent with the old definition of the 0-0 component of the old gravity energy momentum tensor G_{oo} we define our single $S_{½}$ state particle (E&M) energy momentum tensor 0-0 component From eq.3.1 Z_{oo} we have: $c^2Z_{oo}/8\pi\equiv\varepsilon =0.06$,. $\varepsilon=½\sqrt{\alpha}$=square root of charge.

$Z_{oo}/8\pi\equiv e^2/2(1+\varepsilon)m_pc^2=8.9875X10^9(1.6X10^{-19})^2/(2c^2(1+\varepsilon)1.6726X10^{-27})=0.065048/c^2$

Also from equation 16 the ambient metric expansion component Δr is:

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

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

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

After doing this Z'_{oo} calculation the resulting (small) z_{oo} is set equal to the Einstein tensor gravity source ansatz $G_{oo}=8\pi Gm_e/c^2$ for this *single* charge source m_e allowing us to solve for the value of the Newtonian gravitational constant G here as well. We have then derived gravity for **all** mass since this single charged m_e electron vacuum source composes all mass on this deepest level as we noted in the section 4.2 discussion of the equivalence principle. Note Lorentz transformation similarities in section 2.3 between $r=r_o+\Delta r$ and $ct=ct_o+c\Delta t$ using $D\sqrt{1-\frac{v^2}{c^2}} \approx D(1-\Delta)$for v<<c with just a sign difference (in 1-Δ, + for time) between the time interval a–nd displacement D interval transformations. Also the t in equation 10.2 and therefore 12.3 is for a light cone coordinate system (we are traveling near the speed of light relative to t=0 point of origin) so $c^2dt^2=dr^2$ and so equation 11.4 does double duty as a r=ct time $x_o{}'$ coordinate. Also note we are trying to find G_{oo} (our ansatz) and we have a large Z_{oo}. Also with $Z_{rr}<<Z_{oo}$ we needn't incorporate Z_{rr}. Note from the derivative of $e^{\omega t}-1$ (from equation 11.4) we have slope$=(e^{\omega t}-1)/H_t=\omega e^{\omega t}$. Also from equation 2AB we have $\delta(r)= \delta(r_o(e^{\omega t}-1))= (1/(e^{\omega t}-1))\delta(r_o)$. Plugging values of equation 7.4.1 2 and 7.4.2 and the resulting equation 4.7.1 into equation 7.4.3 we have in $S_{½}$ state in equation 4.3:

$$\frac{8\pi e^2}{2(1+\varepsilon)m_pc^2}\delta(r) = Z_{00} = R_{00} - \frac{1}{2}g_{00}R,\ \frac{\partial x^0}{\partial X^\alpha}\frac{\partial x^0}{\partial X^\beta}Z_{\alpha\beta} = Z'_{00} = Z_{00} + z_{oo} \approx \quad (7.4.4)$$

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

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

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

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

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

$$=2\left(\frac{e^2}{2(1+\varepsilon)m_p}\right)\left(\frac{r_M}{cm_e3.03(1+\varepsilon)}\right)\left(\frac{[e^{\omega t}-1]\delta(r_0)}{[e^{\omega t}-1]H_t}\right)=G\delta(r_0)$$

Make the cancellations and get:

$2(.065048)[(1.9308\text{X}10^{-13}/(3\text{X}10^8\text{X}9.11\text{X}10^{-31}\text{X}3.0334(1+.0654))] (2.306\text{X}10^{-18})$ =

$=2(.065048)(2.2\text{X}10^8)(2.306\text{X}10^{-18})$ = $6.674\text{X}10^{-11}$ $Nm^2/kg^2 \equiv G$ (7.4.5)

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

Also recall in the free falling frame (So comoving with $M=m_e$ so is constant) fractal scale for $ke^2/((GM')M)=10^{40}$ fractal jump, $ke^2/(m_ec^2)=ke^2/(Mc^2)$ is also constant so if G is going up (in 7.4.4) then M' is going down. Note then $r_H=ke^2/(m_ec^2)\rightarrow 10^{40}Xr_H=r_H(N+1)=$ $=GM'm_e/(m_ec^2)=GM'/c^2$=famous Schwarzschild radius.

To summarize we have then just done a coordinate transformation to the moving frame to find the contributing fields associated with the moving frame. Analogously one does a coordinate transformation to the charge comoving frame to show that current carrying wires have a magnetic field, also a 'new' force, around them. Also note that in the second derivative of eq.7.1.2 $\mathbf{d^2r/dt^2}$ $\mathbf{=r_o\omega^2e^{\omega t}=}$ **radial acceleration.** Thus in equations 7.1.4 and 7.1.5 (originating in section 4) **we have a simple account of the cosmological radial acceleration expansion** (discovered recently) **so we don't need any theoretical constructs such as 'dark energy' to account for it.**

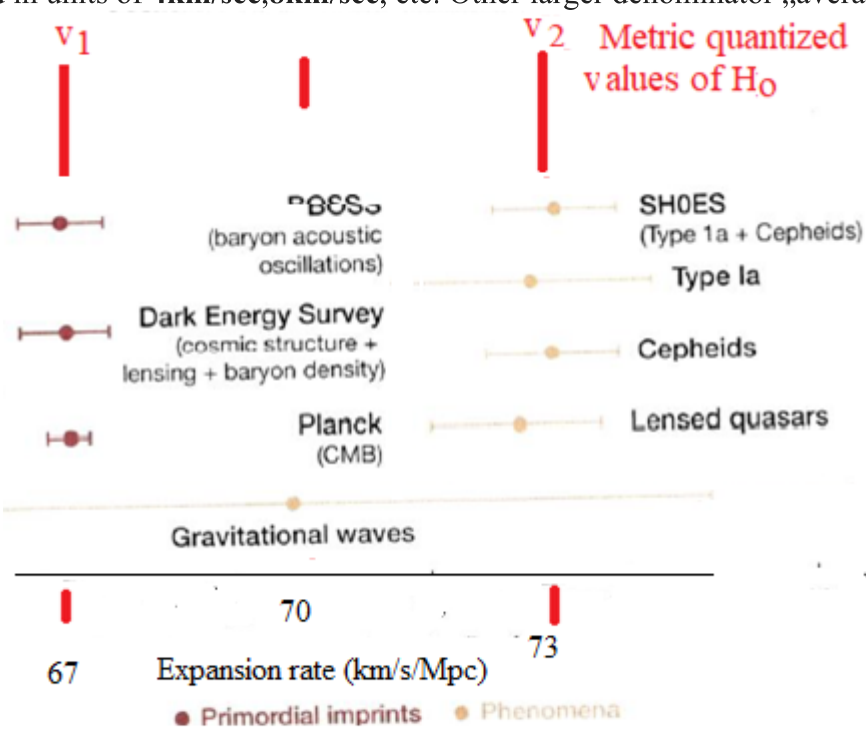
If r_o is the radius of the universe then $r_o\omega^2e^{\omega t}\approx 10^{-10}m/sec^2=a_M$ is the acceleration of all objects around us relative to a inertial reference frame and comprises a accelerating frame of reference. If we make it an inertial frame by adding gravitational perturbation we still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

Note below equation 7.4.5 above that $t=13.8\text{X}10^9$years and use the standard method to translate this time into a Hubble constant. Thus in the standard method this time translates into light years which are $13.8\text{X}10^9/3.26=4.264\text{X}10^9$ parsecs= $4.264\text{X}10^3$ megaparsecs assuming speed c the whole time. So $3\text{X}10^5$km/sec/$4.264\text{X}10^3$ megaparsecs = 70.3km/sec/megaparsec= Hubble's constant for this theory.

7.5 Metric Quantized Hubble Constant

Metric quantization 4.2.3 means (change in speed)/distance is quantized. Given 6billion year object B vibrational metric quantization the radius curve
$\ln(r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-\ln[e^{\mu}-1]]2$ is not smooth but comes in jumps.
I looked at the metric quantization for the 2.5My metric quantization jump interval using those 3 Hubble "constants" 67, 70, 73.3 km/sec/megaparsec.
Recall that for megaparsec is 3.26Megalightyear=(2.5/.821)Megalightyear.
But **2.5 million years is the time between one of those metric quantization jumps.**
So instead of the 3 detected Hubble constants 67km/sec/megaparsec and 70km/sec/megaparsec and 73.3km/sec/megaparsec we have
81.6km/sec/2.5megaly, 85.26km/sec/2.5megaly, 89.3km/sec/2.5megaly. the difference between the contemporary one, the last and the two others then is

89.3km/sec/2.5megaly- 85.26km/sec/2.5megaly,=**4km/sec**/2.5megaly
and 89.3km/sec/2.5megaly- 89.3km/sec/2.5megaly=**8km/sec**/2.5megaly.
So the Hubble constant, with refernence to the 2.5my metric quantization jump time, appears quantized in units of **4km/sec**,**8km/sec**, etc. Other larger denominator „averages" are not accurate.



Hubble Constant Measurements

7.6 Cosmological Constant In This Formulation

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

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

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

Since from equation 7.6.1 $a=a_o(e^{\omega t}-1)$ then a" = (ω^2/c^2)sinhωt=a(Λ/3)= (Λ/3)sinhωt and there results:

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

From section 7.4 above then $\omega=1.99X10^{-18}$ with 1 year=$3.15576X10^7$ seconds, also c=$3X10^8$ m/s. So:

$\Lambda= 3(\omega^2/c^2)=1.32X10^{-52}$ /m^2, which is our calculated value of the cosmological constant.

Alternatively we could use 1/s^2 units and so multiply this result by c^2 to obtain: $1.19X10^{-35}/s^2$. Add to that the above matter (i.e.,ρ) contributions to get $\Lambda=1.658X10^{-35}/s^2$ contribution.

References

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

7.8

Summary

The rebound time is 350by =very large >>14by solving the horizon problem since temperatures could (nearly) come to equilibrium during that time (From recent Hubble survey: "The galaxies look remarkably mature, which is not predicted by galaxy formation models to be the case that early on in the history of the universe." "lots of dust already in the early universe", "CBR is the result of thermodynamic equilibrium" requiring slow expansion then, etc.).

Given these protons we *do not require protogenesis* and we also have an *equal number of particles and antiparticle*s(proton 2e+,e-; extra e-). The rotation gives us *CP violation* since t invariance is broken in the Kerr metric. This formula predicts an age of 370by *explaining these early supermassive black holes* (they had plenty of time to accrete) and the thermodynamic equilibrium required to create the *black body CBR*: all these modern cosmological conundrums are solved here

Also Spherical Bessel Function Oscillation Nodes Inside Mercuron

Given μ is the muon mass 7.4.11 in equation 7.4.12 the smallest radius of this oscillation period is about the radius of that Mercuron). Because of object B rotational energy 51 radial oscillation (270My into 14BY) nodes also exist in the Mercuron creating $(4\pi/3)(51)^3=5.5X10^5$ (gravitational wave spherical Bessel function nodes with Mercuron surface boundary conditions creating the) voids we see today. Note these voids thereby have reduced G in them and are local higher rates of metric g_{ij} expansion regions. GM is invariant. The Sachs Wolfe effect then creates the resulting CBR inhomogeneities.

Fortran Program for Eq.7.4.12 Mercuron

```
program FeedBack
DOUBLE PRECISION e,ex,expp,rM1,rd,rb,rbb,uu,u11,den,eu1,u
DOUBLE PRECISION NN,enddd,bb,ee,rmorbb,Ne,rr
INTEGER N,endd
open(unit=10,file='FeedBack_m',status='unknown')
!FeedbackEquation
```

```
      !e^udu/(1-coshu)=dr/r
      !ln(rM+1/rbb)+2=[1/(e^u-1)-ln[e^u-1]]2
      e=2.718281828
      u11=.06
      endd=100
      enddd=endd*1.0
      uu=.06/enddd
      Ne=1000.0
      Do 1000 N=100,1000
      Ne=Ne-1.0
      rr=n/100.0
      rbb=30.0*(10.0**6)*1600.0
      rbb=1.0
     ! rd=2.65*(10**13)
      u=Ne*uu
      eu1=(e**u)-1.0
      ex=(2.0/eu1)-(2.0*LOG(eu1))-2.0
      expp=(ex)
      rM1=(e**expp)*rbb  !ln logarithitnm
      rM1=e**ex
      !rMorbb
      !bb=log(ee)
      if (ex.GT.36.0)THEN
      goto 2001
      endif
      write(10,2000) rr,rM1
 1000   CONTINUE
 2000   format(f7.2,1x,1x,1x,f60.6)
 2001   end
```

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

Use muon mass to find our position in the universe at specific time

We derived the Mercuron equation $\ln(r_{M+1}/r_{bb})+2=[1/(e^m-1)-\ln[e^m-1]]2$ (m is the muon mass) above. Note it gives a slow r_M rise for 360by and then a much faster rise in the last 10^{10}years (Use the 13.7by t intersection point for local linear). So we see that the muon mass m is going down with time, about 1 part in 10^{10} over 1 year, our predicted value.

g factor=g= e/2m and w=gB=2pif with f the Larmor frequency which is what you use to measure the g factor(like in MRI)

The anomalous gyromagnetic ratio gy=g-2.

Note if the mass is decreasing then gy (and so the g factor) goes up as well.

The difference in gy between 2023 (FermiLab) and 1974 (CERN) is 116592059[22]-11659100[10] =1 part in 10^5 increase in gy which translates to 1 part in 10^8 increase in g since g is about 2000X larger than gy. Note g is increasing corresponding to a decreasing mass m in g=e/2m, by about 1 part in 10^8 over 50 years so about 1 part in 10^{10} over 1 year, our predicted value.

Awesome! So Fermi lab just picked up (in 2023) a data point from the Mercuron equation, the respective decrease in mass of the muon!! But the Mercuron equation gives **the evolution of the** (N=2) **universe** (r(t)=**radius)** as a function of time at the bottom of the sine wave which we can thereby follow by measuring the mass of the muon at given times!

Oscillation of $\delta z(\equiv\psi)$ on a given fractal scale

Here we multiply eq. 11 result $p\psi=-i\partial\psi/\partial x$ by ψ^* and integrate over volume to define the expectation value:

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

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

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

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

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

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

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

Recall from Newpde (eq. 6.1.8): $E=\frac{1}{\sqrt{\kappa_{00}}}=\frac{1}{\sqrt{1-\frac{r_H}{r}}}$. If $r<r_H$ E (inside r_H) is imaginary. If $r>r_H$ (outside r_H) E is real in $\delta\varepsilon=e^{iEt.}$

From Newpde (eg., eq.1.13 Bjorken and Drell) $i\hbar\frac{\partial\psi}{\partial t}=\frac{\hbar c}{i}\left(\alpha_1\frac{\partial\psi}{\partial x^1}+\alpha_2\frac{\partial\psi}{\partial x^2}+\alpha_3\frac{\partial\psi}{\partial x^3}\right)+\beta mc^2\psi=H\psi$. For electron at rest: $i\hbar\frac{\partial\psi}{\partial t}=\beta mc^2\psi$ so: $\delta z=\psi_r=w^r(0)e^{-i\varepsilon_r\frac{mc^2}{\hbar}t}$ $\varepsilon_r=+1$, $r=1,2$; $\varepsilon_r=-1$, $r=3,4$.): This implies an oscillation frequency of $\omega=mc^2/\hbar$. which is fractal here. So the eq.12 the 45° line has this ω oscillation as a (given that eq.7-9 δz variation) rotation. On our own fractal cosmological scale we are in the expansion stage of one such oscillation. Thus the fractalness of the Newpde explains cosmology. The next higher cosmological scale is independent (but still connected by superposition of speeds implying a separation of variables result: $i\hbar\frac{\partial\psi}{\partial t}=\beta\sum_N(10^{40N}(\omega t)_{\varepsilon+\Delta\varepsilon})\psi \;=\beta\sum_N(10^{40N}m_{\varepsilon+\Delta\varepsilon}\,c^2/\hbar)\psi$). By the way fractal scale N=1 the 45° small Mandelbulb chord ε (Fig6) is now, given this ω, getting smaller with time(fig6) so t α ε. So cosmologically for stationary N=1 $\delta z=\sqrt{\kappa_{oo}}dt=e^{-i\varepsilon_r\frac{mc^2}{\hbar}t}\rightarrow e^{i(\varepsilon+\Delta\varepsilon)}$ (7.1.13)

so $\delta z=e^{\varepsilon}$ =source→sinhε. Thereafter we have the usual sinusoidall curve 5 trillion year period. For fractal scale N=2 observer $e^{i\varepsilon}\rightarrow e^{\varepsilon}$ in moving to insde r_H. for the N=2 observer to see what we see. $\psi=\delta z$ = vertical axis in below figure. Also an object B accelerational expansion is occurring right now in a object B 6by zitterewebegung period sound wave.

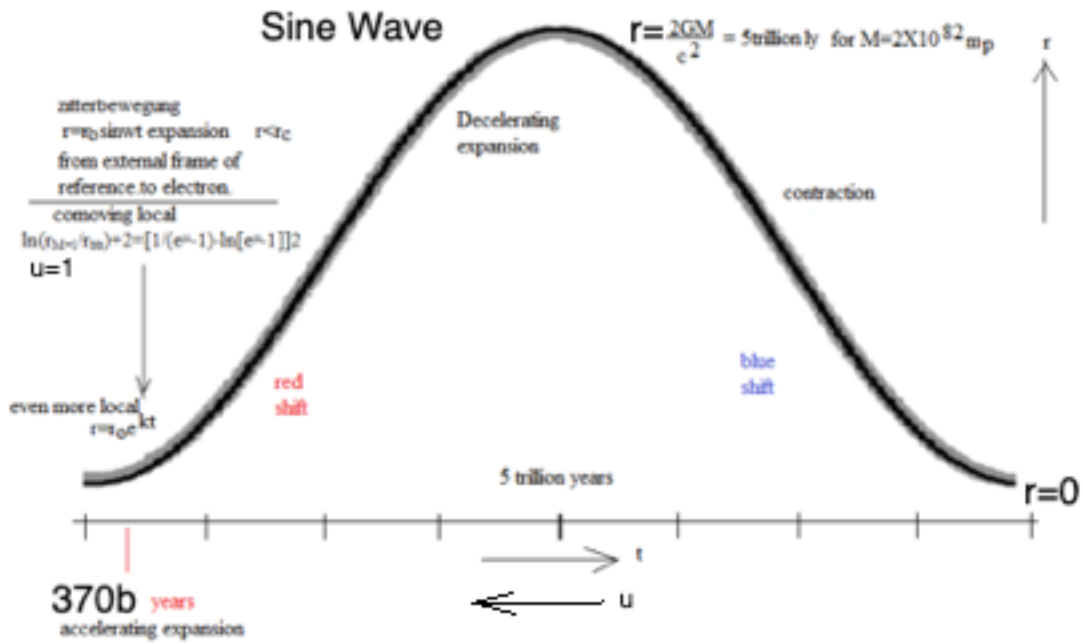


fig.10

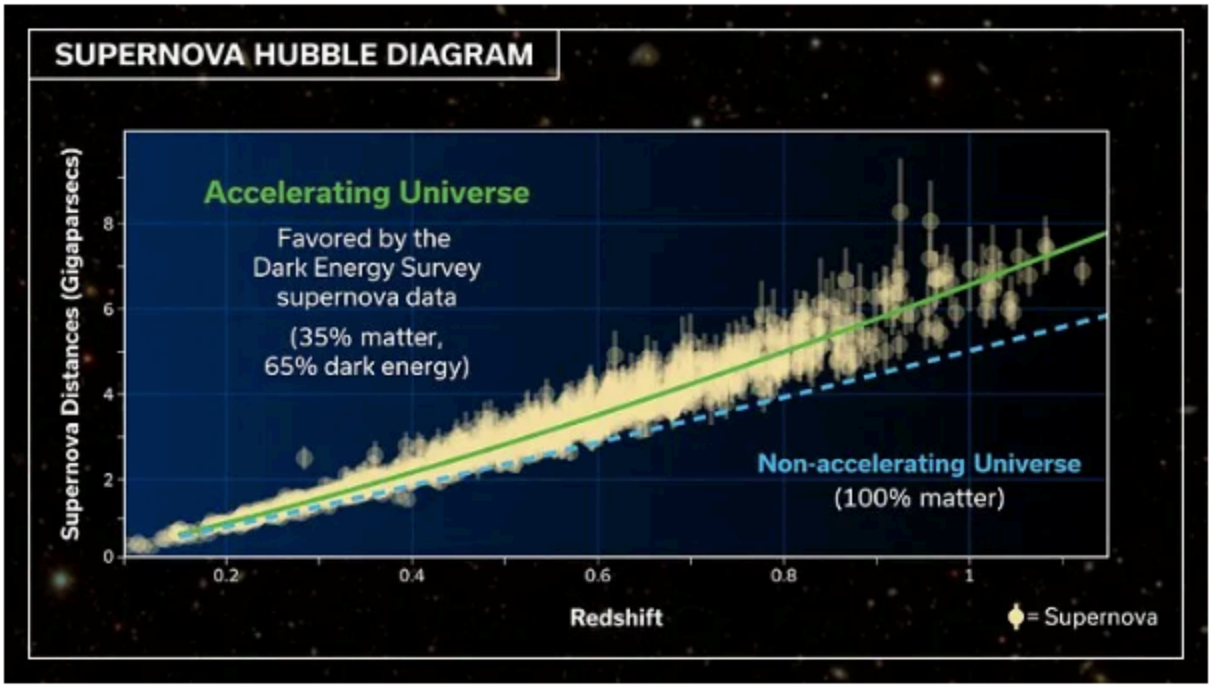
Sine Wave

The 5 trillion years represents the period of object A we are inside. Note approximate exponential curve bottom left.implying our sinh*u* source Laplace Beltrami formulation. $dr'^2=g_{rr}dr^2=(1/(1-r_H/r))dr^2$. so dr' is very big when we are close to r_H, which is where we are right now. But the object B 6by period zitterbewegung oscillations fuzz out r_H by about 1 part in 10^5, so $10^{-5}=\Delta r_H/r_H$. So we can move to the outside of r_H since we are expanding and rH is stationary ($r_H= 2GM/c^2$ is invariant.) We are still just inside r_H and so the Mercuron equation still holds (It used a Laplace-Beltrami sinhu source for R_{22}.)

Average Acceleration

If we assumed a *linear expansion* at constant acceleration 'a' up to 2X our (linear) time* $\approx 2X10^{11}$y=2t $=2X10^{11}X365.25X24X3600=2(3X10^{18})$sec we can then use v=at. (but our actual $a=e^{ikt}$ is not linear). From above graph we are also about halfway to the straightline slope c (We cannot use v=c anyway here because v=at is a nonrelativistic relation.). So since we assumed a linear expansion we can use $a=v/t= 3X10^8/3X10^{18})=10^{-10}m/s^2$ $=1A/s^2$=MOND which is approximately what is seen today .$d=(1/2)at^2$ gives the universe sized d. .
*actual time is 370by. But his method is still correct since this v is really about average v during this 13.7by period. ThereforeMOND comes out of the Mercuron equation.
Note the $a=k^2e^{kt}$ so the radial acceleration is increasing . $\ln(r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-\ln[e^{\mu}-1]]2$
rM+1=(rbb)exp(1/(e^u-1))= exp(1/u). As u gets smaller r(M+1 gets bigger. Time=1/u) The data

supports this:



A diagram tracing the history of cosmic expansion (Image credit: DES Collaboration)

"There are tantalizing hints that dark energy changes with time.

Ftg10

7.10 Construct The Standard Model Lagrangian

Note we have derived from first principles (i.e.,from postulate 1) the new pde equation for the electron (eq.7 eq.16, pde for the neutrino (eq.8) Maxwell's equations for the photon, the Proca equation for the Z and the W (Ch.3) and the found the mass for the Z and the W (4.2.1). We even found the Fermi 4 point from the object C perturbations. The distance to object B determines mass and we found that it is equivalent to a scalar field (Higgs) source of mass in sect.4.1.5. We have no gluons or quarks or color in this model but we can at least derive the phenomenology these concepts predict with our eqs 16+16+16 at $r=r_H$ strong force model (ie., eqs16+16+16 $r=r_H$, Ch.9,10)

So from the postulate of 1 we can now construct the standard model Largrangian, or at least predict the associated phenomenology, from all these results for the as observed on the N=1 fractal scale observing the N=0 fractal scale.Nth fractal scale. Here it is:

1

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

2

$$M^2 W^+_\mu W^-_\mu - \tfrac{1}{2}\partial_\nu Z^0_\mu \partial_\nu Z^0_\mu - \tfrac{1}{2c^2_w}M^2 Z^0_\mu Z^0_\mu - \tfrac{1}{2}\partial_\mu A_\nu \partial_\mu A_\nu - \tfrac{1}{2}\partial_\mu H \partial_\mu H -$$
$$\tfrac{1}{2}m^2_h H^2 - \partial_\mu \phi^+ \partial_\mu \phi^- - M^2\phi^+\phi^- - \tfrac{1}{2}\partial_\mu \phi^0 \partial_\mu \phi^0 - \tfrac{1}{2c^2_w}M\phi^0\phi^0 - \beta_h[\tfrac{2M^2}{g^2} +$$
$$\tfrac{2M}{g}H + \tfrac{1}{2}(H^2 + \phi^0\phi^0 + 2\phi^+\phi^-)] + \tfrac{2M^4}{g^2}\alpha_h - igc_w[\partial_\nu Z^0_\mu(W^+_\mu W^-_\nu -$$
$$W^+_\nu W^-_\mu) - Z^0_\nu(W^+_\mu \partial_\nu W^-_\mu - W^-_\mu \partial_\nu W^+_\mu) + Z^0_\mu(W^+_\nu \partial_\nu W^-_\mu -$$
$$W^-_\nu \partial_\nu W^+_\mu)] - igs_w[\partial_\nu A_\mu(W^+_\mu W^-_\nu - W^+_\nu W^-_\mu) - A_\nu(W^+_\mu \partial_\nu W^-_\mu -$$
$$W^-_\mu \partial_\nu W^+_\mu) + A_\mu(W^+_\nu \partial_\nu W^-_\mu - W^-_\nu \partial_\nu W^+_\mu)] - \tfrac{1}{2}g^2 W^+_\mu W^-_\mu W^+_\nu W^-_\nu +$$
$$\tfrac{1}{2}g^2 W^+_\mu W^-_\nu W^+_\mu W^-_\nu + g^2 c^2_w(Z^0_\mu W^+_\mu Z^0_\nu W^-_\nu - Z^0_\mu Z^0_\mu W^+_\nu W^-_\nu) +$$
$$g^2 s^2_w(A_\mu W^+_\mu A_\nu W^-_\nu - A_\mu A_\mu W^+_\nu W^-_\nu) + g^2 s_w c_w[A_\mu Z^0_\nu(W^+_\mu W^-_\nu -$$
$$W^+_\nu W^-_\mu) - 2A_\mu Z^0_\mu W^+_\nu W^-_\nu] - g\alpha[H^3 + H\phi^0\phi^0 + 2H\phi^+\phi^-] -$$
$$\tfrac{1}{8}g^2\alpha_h[H^4 + (\phi^0)^4 + 4(\phi^+\phi^-)^2 + 4(\phi^0)^2\phi^+\phi^- + 4H^2\phi^+\phi^- + 2(\phi^0)^2 H^2] -$$
$$gMW^+_\mu W^-_\mu H - \tfrac{1}{2}g\tfrac{M}{c^2_w}Z^0_\mu Z^0_\mu H - \tfrac{1}{2}ig[W^+_\mu(\phi^0\partial_\mu\phi^- - \phi^-\partial_\mu\phi^0) -$$
$$W^-_\mu(\phi^0\partial_\mu\phi^+ - \phi^+\partial_\mu\phi^0)] + \tfrac{1}{2}g[W^+_\mu(H\partial_\mu\phi^- - \phi^-\partial_\mu H) - W^-_\mu(H\partial_\mu\phi^+ -$$
$$\phi^+\partial_\mu H)] + \tfrac{1}{2}g\tfrac{1}{c_w}(Z^0_\mu(H\partial_\mu\phi^0 - \phi^0\partial_\mu H) - ig\tfrac{s^2_w}{c_w}MZ^0_\mu(W^+_\mu\phi^- - W^-_\mu\phi^+) +$$
$$igs_w MA_\mu(W^+_\mu\phi^- - W^-_\mu\phi^+) - ig\tfrac{1-2c^2_w}{2c_w}Z^0_\mu(\phi^+\partial_\mu\phi^- - \phi^-\partial_\mu\phi^+) +$$
$$igs_w A_\mu(\phi^+\partial_\mu\phi^- - \phi^-\partial_\mu\phi^+) - \tfrac{1}{4}g^2 W^+_\mu W^-_\mu[H^2 + (\phi^0)^2 + 2\phi^+\phi^-] -$$
$$\tfrac{1}{4}g^2\tfrac{1}{c^2_w}Z^0_\mu Z^0_\mu[H^2 + (\phi^0)^2 + 2(2s^2_w - 1)^2\phi^+\phi^-] - \tfrac{1}{2}g^2\tfrac{s^2_w}{c_w}Z^0_\mu\phi^0(W^+_\mu\phi^- +$$
$$W^-_\mu\phi^+) - \tfrac{1}{2}ig^2\tfrac{s^2_w}{c_w}Z^0_\mu H(W^+_\mu\phi^- - W^-_\mu\phi^+) + \tfrac{1}{2}g^2 s_w A_\mu\phi^0(W^+_\mu\phi^- +$$
$$W^-_\mu\phi^+) + \tfrac{1}{2}ig^2 s_w A_\mu H(W^+_\mu\phi^- - W^-_\mu\phi^+) - g^2\tfrac{s_w}{c_w}(2c^2_w - 1)Z^0_\mu A_\mu\phi^+\phi^- -$$
$$g^1 s^2_w A_\mu A_\mu\phi^+\phi^- - \bar{e}^\lambda(\gamma\partial + m^\lambda_e)e^\lambda - \bar{\nu}^\lambda\gamma\partial\nu^\lambda - \bar{u}^\lambda_j(\gamma\partial + m^\lambda_u)u^\lambda_j -$$

3

$$\bar{d}^\lambda_j(\gamma\partial + m^\lambda_d)d^\lambda_j + igs_w A_\mu[-(\bar{e}^\lambda\gamma^\mu e^\lambda) + \tfrac{2}{3}(\bar{u}^\lambda_j\gamma^\mu u^\lambda_j) - \tfrac{1}{3}(\bar{d}^\lambda_j\gamma^\mu d^\lambda_j)] +$$
$$\tfrac{ig}{4c_w}Z^0_\mu[(\bar{\nu}^\lambda\gamma^\mu(1+\gamma^5)\nu^\lambda) + (\bar{e}^\lambda\gamma^\mu(4s^2_w - 1 - \gamma^5)e^\lambda) + (\bar{u}^\lambda_j\gamma^\mu(\tfrac{4}{3}s^2_w -$$
$$1 - \gamma^5)u^\lambda_j) + (\bar{d}^\lambda_j\gamma^\mu(1 - \tfrac{8}{3}s^2_w - \gamma^5)d^\lambda_j)] + \tfrac{ig}{2\sqrt{2}}W^+_\mu[(\bar{\nu}^\lambda\gamma^\mu(1+\gamma^5)e^\lambda) +$$
$$(\bar{u}^\lambda_j\gamma^\mu(1+\gamma^5)C_{\lambda\kappa}d^\kappa_j)] + \tfrac{ig}{2\sqrt{2}}W^-_\mu[(\bar{e}^\lambda\gamma^\mu(1+\gamma^5)\nu^\lambda) + (\bar{d}^\kappa_j C^\dagger_{\lambda\kappa}\gamma^\mu(1 +$$
$$\gamma^5)u^\lambda_j)] + \tfrac{ig}{2\sqrt{2}}\tfrac{m^\lambda_e}{M}[-\phi^+(\bar{\nu}^\lambda(1-\gamma^5)e^\lambda) + \phi^-(\bar{e}^\lambda(1+\gamma^5)\nu^\lambda)] -$$

4

$$\tfrac{g}{2}\tfrac{m^\lambda_e}{M}[H(\bar{e}^\lambda e^\lambda) + i\phi^0(\bar{e}^\lambda\gamma^5 e^\lambda)] + \tfrac{ig}{2M\sqrt{2}}\phi^+[-m^\kappa_d(\bar{u}^\lambda_j C_{\lambda\kappa}(1-\gamma^5)d^\kappa_j) +$$
$$m^\lambda_u(\bar{u}^\lambda_j C_{\lambda\kappa}(1+\gamma^5)d^\kappa_j] + \tfrac{ig}{2M\sqrt{2}}\phi^-[m^\lambda_d(\bar{d}^\lambda_j C^\dagger_{\lambda\kappa}(1+\gamma^5)u^\kappa_j) - m^\kappa_u(\bar{d}^\lambda_j C^\dagger_{\lambda\kappa}(1 -$$
$$\gamma^5)u^\kappa_j] - \tfrac{g}{2}\tfrac{m^\lambda_u}{M}H(\bar{u}^\lambda_j u^\lambda_j) - \tfrac{g}{2}\tfrac{m^\lambda_d}{M}H(\bar{d}^\lambda_j d^\lambda_j) + \tfrac{ig}{2}\tfrac{m^\lambda_u}{M}\phi^0(\bar{u}^\lambda_j\gamma^5 u^\lambda_j) -$$
$$\tfrac{ig}{2}\tfrac{m^\lambda_d}{M}\phi^0(\bar{d}^\lambda_j\gamma^5 d^\lambda_j) + \bar{X}^+(\partial^2 - M^2)X^+ + \bar{X}^-(\partial^2 - M^2)X^- + \bar{X}^0(\partial^2 -$$

5

$$\tfrac{M^2}{c^2_w})X^0 + \bar{Y}\partial^2 Y + igc_w W^+_\mu(\partial_\mu\bar{X}^0 X^- - \partial_\mu\bar{X}^+ X^0) + igs_w W^+_\mu(\partial_\mu\bar{Y}X^- -$$
$$\partial_\mu\bar{X}^+ Y) + igc_w W^-_\mu(\partial_\mu\bar{X}^- X^0 - \partial_\mu\bar{X}^0 X^+) + igs_w W^-_\mu(\partial_\mu\bar{X}^- Y -$$
$$\partial_\mu\bar{Y}X^+) + igc_w Z^0_\mu(\partial_\mu\bar{X}^+ X^+ - \partial_\mu\bar{X}^- X^-) + igs_w A_\mu(\partial_\mu\bar{X}^+ X^+ -$$
$$\partial_\mu\bar{X}^- X^-) - \tfrac{1}{2}gM[\bar{X}^+ X^+ H + \bar{X}^- X^- H + \tfrac{1}{c^2_w}\bar{X}^0 X^0 H] +$$
$$\tfrac{1-2c^2_w}{2c_w}igM[\bar{X}^+ X^0\phi^+ - \bar{X}^- X^0\phi^-] + \tfrac{1}{2c_w}igM[\bar{X}^0 X^-\phi^+ - \bar{X}^0 X^+\phi^-] +$$
$$igMs_w[\bar{X}^0 X^-\phi^+ - \bar{X}^0 X^+\phi^-] + \tfrac{1}{2}igM[\bar{X}^+ X^+\phi^0 - \bar{X}^- X^-\phi^0]$$

Fig. 11

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

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