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

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

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

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

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

For **N**=0 Newpde $r=r_H$ $2P_{3/2}$ state composite 3e is the baryons (QCD not required) and Newpde $r=r_H$ composite e,ν is the 4 Standard electroweak Model Bosons (4 eq.12 rotations→Ch.6)

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 (Ch.5): 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 limit of a Cauchy sequence of rational numbers is a Cauchy real number (Cantor 1872). 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 (eg.,the Newpde in 'results'below) making this a Ultimate Occam's Razor postulate(0) implying the ultimate physics theory, a important result indeed. Nothing is more Occam than postulate0.

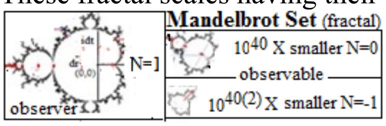
Introduction But we need to define the algebra first and use it to write the postulate. So define 1)*numbers* 1≡1+0 and **0≡**0X0,1≡1X1 as *symbol* **z=zz**: the *simplest* algebraic definition of **0**. So **2)Postulate** *real* number **0** *if* **z'=0** and **z'=1** plugged into z'=z'z'+C (**eq.1**) results in *some* C=0 constant(ie δC=0).

Applications

Note the implied z=zz+C iteration (required to prove postulate real 0 if z_o=z=0) numbers possibly are larger so don't have to be postulated. So we can merely *list* 1+1≡2, etc (*defined* to be a+b=c) with the symbolic rules defined (eg.,ring-field def. like a+b=b+a). with no new axioms.

. So the first *required* application is

•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 $z_{N+1}=z_Nz_N$-C. Constraint **δC=0** requires we reject the Cs for which -δC=δ(z_{N+1}-z_Nz_N) =δ(∞-∞)≠0. The Cs that are left over define the fractal **Mandelbrot set** C_M=C=δz'=10^{40N}δz, N=integer with that subset C=0. These fractal scales having their own δz then perturb that **z=1** 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 |δz|>>1. Then solve equation 3 as a quadratic equation so

$$\delta z=(-1\pm\sqrt{1+4C})/2\equiv dr+idt \text{ if } C\leq -\tfrac{1}{4} \text{ (complex) (4)}$$

Note the Mandelbrot set iteration (ie., $z_{N+1}=z_Nz_N$-C) for this δC=0 *extremum* C=-¼ is a rational number Cauchy sequence -¼, -3/16, -55/256, ..,**0** thereby proving our above postulated *real#0* math.We must also

•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,ν (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!

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) ≡$ds^2+ds_3=ds_1^2$. **Circle**≡δz=$dse^{i\theta}$= $dse^{i(\Delta\theta+\theta_o)}$= $dse^{i((\cos\theta dr+\sin\theta dt)/(ds)+\theta_o)}$, θ_o=45° min of δds^2=0 given eq.7 constraint for N=0 δz' perturbation of eq5 flat space. We define k≡dr/ds, ω≡dt/ds, sinθ≡r, cosθ≡t. $dse^{i45°}$≡ds'. Take ordinary derivative dr (since flat space)

of 'Circle' $\frac{\partial\left(dse'^{i\left(\frac{rdr}{ds}+\frac{tdt}{ds}\right)}\right)}{\partial r}=i\frac{dr}{ds}\delta z$ so $\frac{\partial\left(dse^{i(rk+wt)}\right)}{\partial r}=ik\delta z$, thus $k\delta z=-i\frac{\partial\delta z}{\partial r}$ (11). N=0 small δz' =C_M/ξ is a rotation on that circle at 45° so modified eq.7: (dr-δz')+(dt+δz')≡dr'+dt'=ds (12) Define κ_{rr}≡$(dr/dr')^2$= $(dr/(dr-\delta z'))^2$= $1/(1-r_H/r)^2$ =$A_1/(1-r_H/r)$ +$A_2/(1-r_H/r)^2$. The partial fractions A_I can be split off from RN and so κ_{rr}≈1/[1-r_H/r]. From eq.7a dr'dt'=$\sqrt{\kappa_{rr}}dr'\sqrt{\kappa_{oo}}dt'$=drdt so $\kappa_{rr}=1/\kappa_{oo}$ (13)

•**Both z=0,z=1** together (in eq1. Use 3D orthogonality to get (2D+2Dcurved space)). Thus δz'+δz= (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 $\gamma^r dr\equiv\gamma^x dx+\gamma^y dy+\gamma^z dz$, $\gamma^j\gamma^i+\gamma^j\gamma^i=0$, i≠j,$(\gamma^i)^2=1$. From eq,12,13 $(\gamma^x\sqrt{\kappa_{xx}}dx+\gamma^y\sqrt{\kappa_{yy}}dy+\gamma^z\sqrt{\kappa_{zz}}dz+\gamma^t\sqrt{\kappa_{tt}}idt)^2$= $\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$. Multiply both sides by $\hbar^2/ds^2$ and $\delta z^2\equiv\psi^2$ use eq11 inside brackets( ) get 4D QM $\gamma^\mu(\sqrt{\kappa_{\mu\mu}})\partial\psi/\partial x_\mu=(\omega/c)\psi$≡Newpde for e,ν, κ_{oo}=1-r_H/r =1/κ_{rr}, r_H=C_M/ξ=e^2X10^{40N}/m (**N**=. -1,0,1.,).

- So **Postulate** 0→**Newpde** (get Copenhagen stuff directly from postulate 0 (appendix A) **)**

Solutions to Newpde

(above is N=1 eq.7,8,9 e,v with **N=0 perturbations** are eq.12 and Newpde)

N=0 perturbations (of Newpde ground state m_e)

At $\mathbf{r \approx r_H}$ and N=0 eq.12, 4 quadrant e,v rotation extremum perturbations

$1S_{1/2}$μ **$2S_{1/2}$** τ SM (appendix C)

$2P_{3/2}$ $2P_{1/2}$ 3e is baryon core(QCD not required). (Part2) SM(eg.Cabbibo)

At $\mathbf{r >> r_H}$ becomes usual Dirac equation e solutions with *non*relativistic limit the Schrodinger equation and SM perturbations. The 3rd order Taylor expansion component(1) of $\sqrt{\kappa_{rr}}$ gets the anomalous gyromagnetic ratio so don't need the renormalization infinities.(appendixB).

N=0 κ_{oo} same for metric quantization halo application $g_{oo}=\kappa_{oo}$ (Part3: quantized halo speeds.

N=-1 is GR. $e^2X10^{40(-1)}=e^2/10^{40}\equiv Gm_e^2$, solve for G. So given eq,13,14 $\kappa_{\mu\nu}\equiv g_{\mu\nu}$ Schwarzchild metric.

N=1 $\delta z'=\delta z e^{iwt}$ Dirac eq zitterbewegung oscillation. We are in the **cosmological expansion** stage .

AppendixA shows Copenhagen δz=ψ physics comes *directly from postulate 0,* modifies δz=ψ ofNewpde

Math symbols needed to write Newpde: Note the implied z=zz+C iteration (required to prove postulate real 0 if z_o=z=0) numbers possibly are the larger 1+1≡2, 2+1≡3.etc as *defined* symbols a+b=c and algebra rules (eg.,ring-field def. like a+b≡b+a). *with no new axioms*.

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

So the *simplest idea imaginable* 0 implies all *fundamental math-physics.* no more, no less(eg simply 4D)

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

Reminder:

Also this "s*ome* C" is required in our (above) postulate because then *possibly* 'some' o*ther* C≈δz interval can contain at least the smaller nonzero Cauchy sequence values necessary for defining the real number 0. But that postulate 0 means some C is still required to be small (C≈0) and so in a eq.5 Fitzgerald contracted (by γ) frame of reference (fig6 τ+μ) as in $C=C_M/\gamma= C_M/mass\equiv r_H$ which thereby *implies* both mass (α γ) and charge $C_M=e^2$

When we postulate 0 we are also implicitly postulating the real# nature of 0.

Summary This **Theory is** 0 The rest is a real **number** 0 **definition**

We need to define the algebra first and use it to write postulate0. So define **numbers** 1≡1+0, and 0≡0X0,1≡1X1 as symbol z=zz the simplest algebraic definition of **0**. **So**

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

Can't be more Occam than postulate(0). All the rest is those 2 'plug in' **applications**. So must

1) **plug z=0** into **eq.1** (given the implied z=zz+C eq1 iteration) to get the 2D (fractal) Mandelbrot set to prove postulate real 0. Iteration numbers might be bigger 1+1≡2,1+2≡3 etc.,with *defined* symbols a+b≡c and algebra rules eg., a+b≡b+a. So the *postulate generates real# math* without extra axioms
2) **plug z=1** into **eq.1** and get 2D Dirac equation.

Both Mandelbrot and Dirac results together give 2+2=4D Newpde (plus some Copenhagen stuff)

Solve the differential equation (Newpde) to get the physical universe, no more, no less.

backups: davidmaker.com

Conclusion: Ultimate Occam's razor postulate(0) implies ultimate math-physics.

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 $\psi^*\psi$. 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!

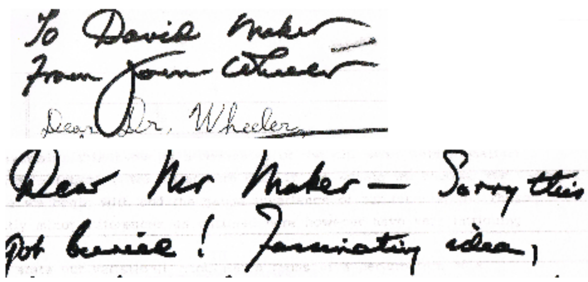
Reinhart Engelmann, Oct 2009

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'.



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 0 & applications

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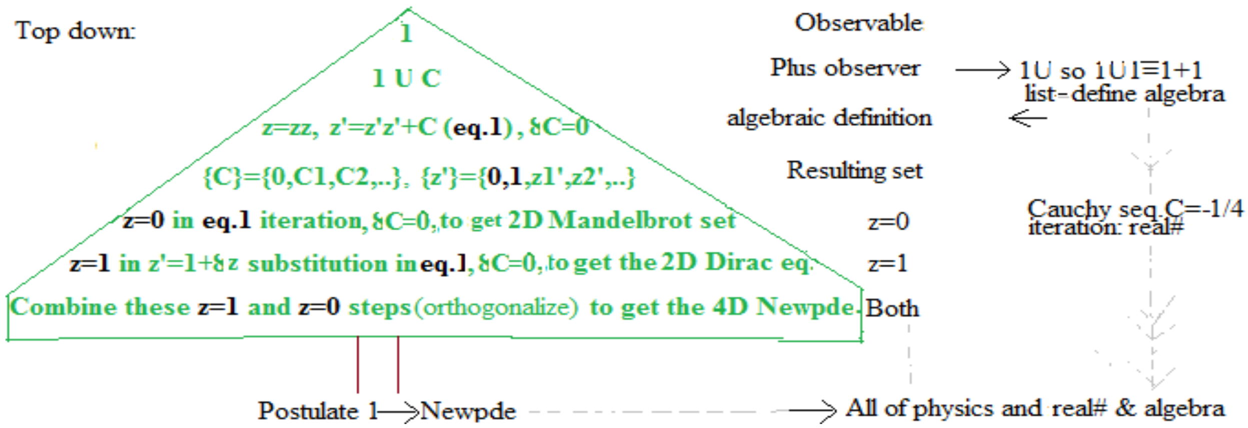


1 Math Details

All mathematicians know that the limit of a Cauchy sequence of rational numbers is a Cauchy real number (Cantor(7) 1872). So all we did here is show we postulated real#0 by using it to derive a rational Cauchy sequence with limit 0. We did this because that same postulate (of real#0) math *also* implies fundamental theoretical physics (eg.,the Newpde 'solutions'below) making this a Ultimate Occam's Razor postulate(0) implying the ultimate physics theory, a important result indeed. Nothing is more Occam than postulate0.

Theory But we need to define the algebra first and use it to write the postulate. So define 1)*numbers* 1≡1+0 and **0≡**0X0,1≡1X1 as *symbol* **z=zz**: the *simplest* algebraic definition of **0**. So **2)Postulate** *real* number **0** *if* **z'=0** and **z'=1** plugged into z'=z'z'+C (**eq.1**) results in *some* C=0 constant(ie δC=0)

These 2 lines are the Ultimate Occam's razor origin of 1)algebra and 2)math-physics. Note the implied z=zz+C iteration numbers possibly are the larger 1+1≡2, 1+2≡3, etc (*defined* to be a+b=c) with the symbolic rules generated (eg.,ring-field def.) like a+b=b+a) with no new axioms. So *postulate 0 generates* the numbers and so the anguage of mathematics that we can now write with (See Ch.7). The rest is just those (above) 2 plugin **Applications:**

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

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

These 2 lines are the Ultimate Occam's razor origin of 1)algebra and 2)math-physics. The rest is2

Applications

Note the implied z=zz+C iteration (required to prove postulate real 0.below if z_o=z=0). Iteration numbers possibly are bigger so they can generate-define bigger numbers (defined number *list*) 1+1≡2,(1+1)+1≡3,.etc.,(*defined* to be a+b=c) and their respective *defined* symbolic relations (eg.,ring-fields) like a+b=b+a. So the first required application is

•**plug z=0** into **eq.1** gets *ALL* the C solutions. Note the z=zz+C iteration is $z_{N+1}=z_N z_N$-C. Constraint **δC=0** requires we reject the Cs for which $-\delta C=\delta(z_{N+1}-z_N z_N)=\delta(\infty-\infty)\neq 0$. The Cs that are left over define the **Mandelbrot set** C_M=C (with C=0 a subset) eg.$\delta z'=10^{40N}\delta z$, N=integer.

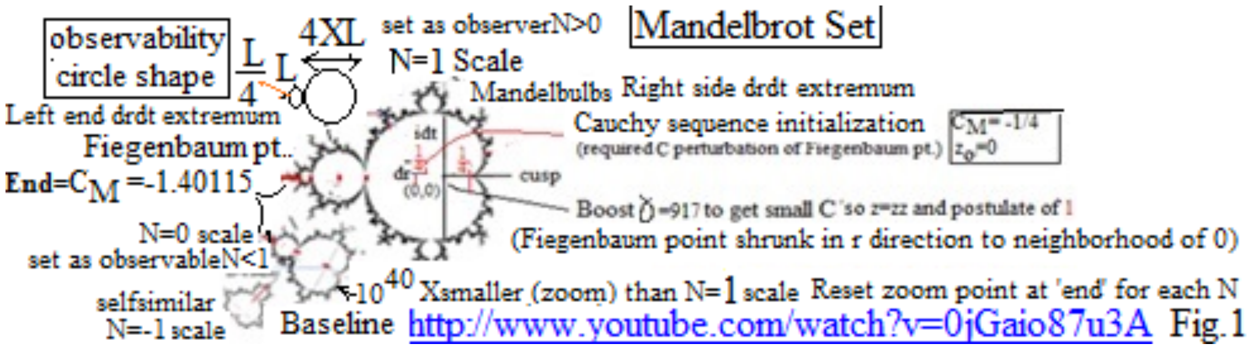


Fig.1

Thes fractal scales having their own δz then perturb that **z=1** on its own fracral scale so put z=**1**+δz in **eq.1** to get (1+δz)=(1+δz)(1+δz)+C so that: δz+δzδz=C (3)
Define N≤0 as 'observable' fractal scales. Thus define the 'observer' fractal scales as N≥1 implying |δz|>>1.Then solve eq.3 as a quadratic equation so

$$\delta z=(-1\pm\sqrt{1+4C})/2\equiv dr+idt \text{ if } C\leq -\tfrac{1}{4} \text{ (complex)} \quad (4)$$

Note the Mandelbrot set iteration (ie., $z_{N+1}=z_N z_N$-C) for this δC=0 *extremum* C=-¼ is a z_o=0 (the only C_M extremum (eg.,sect.1.6) that is a) rational number, here with the unique Cauchy sequence -¼, -3/16, -55/256, ...,**0** thereby proving we have postulated *real#****0*** (math). QED
The other Cs not 0 never have to be real numbers in this iteration sense because at the end we use the small C limit (0) to satisfy our z=zz postulate. The (Postulate 0) 3rd application implies we

•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)] =

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

=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≡ds_1(→±**e**) Squaring&eq.5 gives circle in e,ν (dr,dt) 2nd,3rd quadrants (7)
& dr+dt=ds, dr-dt=0, light cone (→ν) in same (dr,dt) plane 1st quadrant (8)
&. dr-dt=ds, dr+dt=0, light cone (→$\bar{\nu}$) in same (dr,dt) plane 4th quadrant. (9)
& dr+dt=0,dr-dt=0 so dr=dt=0 defines vacuum (while eq.4 derives space-time)
Quadrants give *positive* scalar drdt of eq.7 (if *not* vacuum) imply the eq.5 *non* infinite extremum imaginary≡drdt+dtdr=0≡$\gamma^i dr\gamma^j dt+\gamma^j dt\gamma^i dr=(\gamma^i\gamma^j+\gamma^j\gamma^i)drdt$ so $(\gamma^i\gamma^j+\gamma^j\gamma^i)=0$, i≠j(from releq5 $\gamma^j\gamma^j=1$)(7a
Thus from eqs5,7a: $ds^2=dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$ (10)
We square eqs.7 or 8 or 9 $ds_1^2=(dr+dt)(dr+dt)=(-dr-dt)(-dr-dt=[dr^2+dt^2]+(drdt+dtdr)$ $\equiv ds^2+ds_3=ds_1^2$. **Circle**≡$\delta z=dse^{i\theta}=dse^{i(\Delta\theta+\theta o)}=dse^{i((\cos\theta dr+\sin\theta dt)/(ds)+\theta o)}$, θ_o=45° min of $\delta ds^2=0$ given eq.7 constraint for N=0 δz' perturbation of eq5 flat space. We define k≡dr/ds, ω≡dt/ds, sinθ≡r, cosθ≡t. $dse^{i45°}$≡ds'.Take ordinary derivative dr (since flat space)

of 'Circle' $\frac{\partial\left(dse\prime^{i\left(\frac{rdr}{ds}+\frac{tdt}{ds}\right)}\right)}{\partial r}=i\frac{dr}{ds}\delta z$ so $\frac{\partial\left(dse^{i(rk+wt)}\right)}{\partial r}=ik\delta z,\qquad k\delta z=-i\frac{\partial\delta z}{\partial r}$ (11).
Recall from the Mandelbrot set iteration rational Cauchy seq. starting at –¼ rational# sequence has limit of 0 so 0 is a real number. Note for required small C→0 (for the z=zz postulate 0 to hold) ≈ δz≈dr along the dr axis, with the limit of the real number limit 0 where our Cs are real numbers and so our eigenvalues dr/ds are real observables. So given δz≡ψ, p_r≡ħk, Note k=dr/ds here is a real number. Then from eq.11 we can write $\langle p_r\rangle^*=\int(p_r\psi)^*\psi d\tau=\int\psi^*p_r\psi d\tau=\langle p_r\rangle$.
Therefore p_r=ħk is Hermitian. Thus the Mandelbrot set iteration here did double duty also as proof of the real number eigenvalues(observables) in eq.11. Cancel that $e^{i45°}$coefficient

(45°=π/4) then multiply both sides of eq.11 by ħ and define δz≡ψ, p≡ħk. Eq.11: the familiar **'observables'** p_r in $$p_r\psi = i\hbar\frac{\partial\psi}{\partial r} \quad (11)$$
Repeat eq.3 for the τ, μ respective δz Mandelbrot set lobes in fig.6 so they each have their own neutrino *v*: Lepton generations.
That means the **mathematics *and* the physics** come from (**postulate** 0): *everything*. Recall from eq.7 that dr+dt=ds. So combining in quadrature eqs 7&11 SNR X δz= (dr/ds+dt/ds)δz =((dr+dt)/ds)δz=(1)δz (11c) and so having come *full circle* back to sect.1 postulate 0 as a real

Thus that all important Mandelbrot set iteration here did double duty also as proof of the real number eigenvalues(observables) in eq.11. Cancel that $e^{i45°}$coefficient (45°=π/4) then multiply both sides of eq.11 by ħ and define δz≡ψ, p≡ħk. The familiar '**observables'**p_r in $p_r\psi = i\hbar\frac{\partial\psi}{\partial r}$

That figure 1 Mandelbrot set structure can be pulled out of the zoom clutter because of the above 4X *circle* observability sequence in fig1
We can pull out the above 4X *circle* observability sequence in fig1 from the zoom clutter
Recall C is a function on the complex (dr,idt) plane so $\delta C = \left(\frac{\partial C}{\partial r}\right)_t dr + \left(\frac{\partial C}{\partial t}\right)_r idt = 0$ (12)
implying there are several δC=0 (dr,idt) extreme possible here. The first 1D extremum is provided by eq.4 and is that dr axis extremum C_M=- ¼ which incidently is the only rational number extremum on our C_M, Another extemum clearly is that ∂C/∂t=0, dr=constant, The last 1D extemum is ∂C/∂r, dt constant N=2 (observable internal QMS jumps in fig 1, partIII) with the rest unobservable.
The only 2D dr,idt extremum we divide eq.12 by dt so that fig.1 4X sequence of those o*bservable* circles drdt= $darea_M$≠0 (so eq.11 observables) the real δC=0 extremum given the decreasing observable *real* circle radius sequence $\lim_{m\to\infty}\frac{\partial C}{\partial(drdt)_m}dr_m = \lim_{m\to\infty}\frac{\partial C}{\partial area_m}dr_m = \lim_{m\to\infty}\frac{\partial C}{\partial Circle_m}dr_m = KX0 = 0$ (since dr_∞≈0)=Fiegenbaum point = f^α=(-1.40115.,i0) = C_M≡end and our final *realization of δC=0.* So random circles in the zoom don't do δC=0. Note if a circle (or many circles) is rotated (U), translated (D), shrunk (S) equally in both dimensions (i.e., $(\partial x^j/\partial x'^k)f^j = f^k \equiv \begin{bmatrix} f_{1N} \\ f_{2N}\end{bmatrix} = S_N\begin{bmatrix} U_{11} & U_{12} \\ U_{21} & U_{22}\end{bmatrix}\begin{bmatrix} f \\ 0\end{bmatrix} + \begin{bmatrix} D_{1N} \\ D_{2N}\end{bmatrix}$) it is still a circle, eq.11 still holds, so *it's still an observable* as seen in the N fractal scale zoom. Thus you can pick out from that zoom these fig.1 Mandelbrot set extremum 4Xdiameter circles as the only o**bservables** *and*δC=0 extremum geometry in all that clutter. Reset the zoom, restart at such $S_NC_M= 10^{40N}C_M$ in eq.17.

1.3 Source of r_H=C_M/ξ≡e^2/m input into the Newpde
So for **N=0** eq.3 δz+δzδz=C reads C≈δz. So that postulated small C≈0 implies an eq.5 Lorentz (Fitzgerald) contraction (9) 1/γ boosted frame of reference (fig.6) **small C**≈δz/γ=C_M/ξ =δz' (10) to make C small with fig6 giving the only stable multi eq.7 object (τ+μ)/2=m_p≡ξ_1

1.4 δC=0 so take variation of C=C_M=ξδz
So this same ξ is merely large in eq.10 with this N=0 δz' the curved space perturbation δz' in eqs.11,16. Also in *sect.1 z'*=1+δz *z* is called the perturbation z'. So on N=0 ***δC=0*** =δ(δz)=δ(*z'*-1) =δ*z*=0 so even perturbation *z* is the extreme of |=-1 or *z*=0 corresponding to fundamental z=0,1.

So take variation $\delta C = \delta C_M = (\delta\xi)\delta z + \xi\delta\delta z = 0$. Also recall ansatz $z=1+\delta z$. So
δz is small so $\delta\xi$ and ξ can be large (**unstable large mass $\tau+\mu$,** fig.6). (14)
And extremum perturbation $z=1$ is the reduced mass $\tau+\mu=2m_p$. For large
$|\delta z|$ in the above variation then
$\delta\xi$ and ξ can be small (**stable small mass: electron** ground state δz (15)
with perturbation $z=-1$

For N=1 At high energy Lorentz boost $1/\gamma$ of $\lambda=\delta z=dr$ then gets small relative to 1 and so $\delta\delta z$ gets bigger and we start approaching N=0 instead and so eq.5 fails except for observables since for them we still keep (circle) $dr^2-dt^2=ds^2$= radius^2 constant thereby expressing 'large $\delta\delta z$' as a rotation in slightly modified eq.7: $(dr-\delta z')+(dt+\delta z')\equiv dr'+dt'=ds$ (16)

For N=0 $\theta_o=45°$ min of $\delta ds^2=0$ given eq.7 constraint $\delta z'$ perturbation of eq5 flat space and so $\delta z'$ in eq.12 is large relative to dr,dt. So given the max extremum for ds^2 is on the axis' each extreme are $\Delta\theta=\pm45°$ So in eq.12 the 4 rotations 45°+45°=90° define 4 Bosons (see **appendix A).** But **for N=-1** 45°-45° N<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 $\kappa_{rr}\approx1/[1-((C_M/\xi_1)r))]$ (17)
(C_M defined to be e^2 charge, $\gamma\equiv\xi_1$ mass). So: $ds^2=\kappa_{rr}dr'^2+\kappa_{oo}dt'^2$ (18)
From eq.7a $dr'dt'=\sqrt{\kappa_{rr}}dr'\sqrt{\kappa_{oo}}dt'=drdt$ so $\kappa_{rr}=1/\kappa_{oo}$ (19)
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* $dr^2\equiv dx^2+dy^2+dz^2$ (3D orthogonality) so that$\gamma^r dr\equiv\gamma^x dx+\gamma^y dy+\gamma^z dz$, $\gamma^i\gamma^i+\gamma^j\gamma^i=0$, $i\neq j$, $(\gamma^i)^2=1$, rewritten (with invariant (8) $\kappa_{\mu\nu}$ eq.17-19) $(\gamma^x\sqrt{\kappa_{xx}}dx+\gamma^y\sqrt{\kappa_{yy}}dy+\gamma^z\sqrt{\kappa_{zz}}dz+\gamma^t\sqrt{\kappa_{tt}}idt)^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$. 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

$$\gamma^\mu(\sqrt{\kappa_{\mu\mu}})\partial\psi/\partial x_\mu=(\omega/c)\psi \quad (20)$$

$\equiv$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 0**. So we really did just postulate 0. So

Postulate 0→Newpde

After these above 3 applications all we do is just solve the differential equation (Newpde.)
For example note Newpde composite 3e $r=r_H$ $2P_{3/2}$ stable state (fig6) with no QCD.

1.6 Contrast with QCD

The electron (solution to that new pde) spends 1/3 of its time in each $2P_{3/2}$ (at $r=r_H$) lobe, *explaining the lobe multiples of 1/3e fractional charge* (The 'lobes' can be named 'quarks' or George if you want). The lobes are locked into the center of mass, can't leave, *giving asymptotic freedom* (otherwise yet another ad hoc postulate of qcd). The two positrons are ultrarelativistic (γ=917, sect.7.5, $3e=(\gamma m_e+\gamma m_e)=m_{p\delta\delta}$) so the field line separation is narrowed into plates explaining the strong force (otherwise postulated by qcd). Also there are 6 2P states *explaining the 6 quark flavors.* P wave scattering *gives the jets.* We have *stability* ($dt'^2=(1-r_H/r)dt^2$) since the dt' clocks stop at $r=r_H$. That 2 γ ray scattering off the 3rd mass (in $2P_{3/2}$) diagonal metric(eq.14) time reversal invariance also reverses the γ ray pair annihilation with the subsequent $e^\pm$ pair creation inside the r_H volume given $\sigma=\pi r_H^2\approx$ (1/20)barn making it merely a virtual creation-annihilation event. So our $2P_{3/2}$ composite 3e (proton) at $r=r_H$ is the *only* stable multi e composite. So quarks don't exist, it's all just 2 Newpde positrons and electron in $2P_{3/2}$ at $r=r_H$ states.

1.6 Origin of Mass is 3 extreme Mandelbulbs

Recall postulate of 1 requires that at the end of all these derivations that $C\approx 0$. Thus we require a Fitzgerald contracted C provided by a eq.5 frame of reference γ of moving the eq.7 object. .From equation 3 for N=0 $C\approx\delta z$ So $C=\delta z/\gamma=C_M/\gamma\equiv C_M/\xi$. So that $\xi m_e\gamma$ ($=\tau+\mu=2m_p$ in Mandelbrot set fig.6 for *smallest* stable (so most *observable)* λ_C) in $C=C_M/\gamma=C_M/\text{mass}\equiv r_H$ which also thereby *requires* us to define both mass α γ and charge $C_M=e^2$

Again N=0 equation 10 $\delta z=C_M/\xi$ satisfies extreme condition equation 3 (that is straight from the postulate) and the (eq11) circular C N=0 nonflat perturbation makes an ξ observable mass (energy operator H). So that 45° extreme δz small (circle) Mandelbulb μ and the 67.87° tiny Mandelbulb circle then are both observable Newpde masses, so leptons. But μ is not a constant in time because of N=1 eq.12 angle Newpde zitterbewegung variable time t in $\delta z=e^{i\omega t}$ contribution (eq.17) to the δz chord in the small Mandelbulb of the 45° (fig6 below). In contrast the next higher energy the 68.7° =Arctan($\delta z/C_M$) is from eq.4 quadratic equation solution at the Fiegenbaum point (so it gives our 2 *fundamental extreme* excited state tiny Mandelbulb) mass τ that does not change over cosmological time in N=1 allowing us to normalize it to 1). Note these are Mandelbulb radii just as eq.7-9 are in fig6, fig4, fig3 of the section 1 eq.3 application for the τ, μ respective Mandelbulb radii δz lobes in fig.6 so they *each* must have their own neutrino *v*.eq.7,8,9 with its electron' and neutrino still the core equations even for the muon and tauon thereby deriving the 3 generations of leptons.

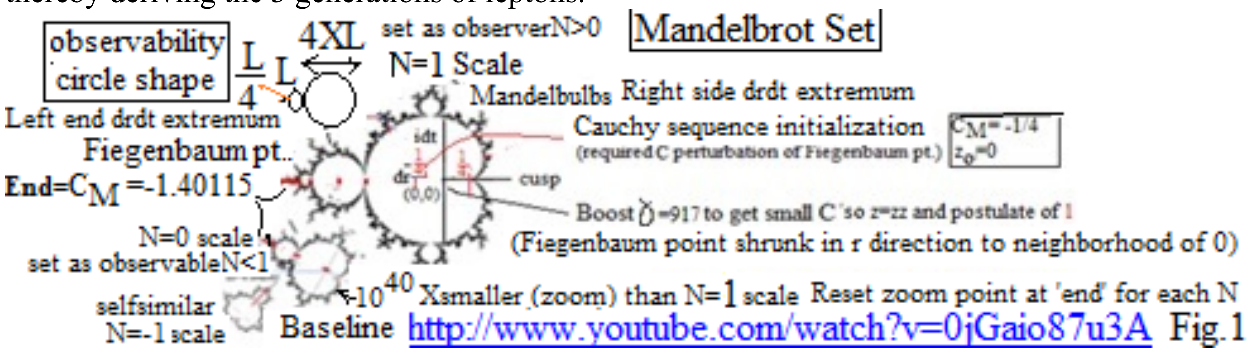


Fig.1

Note these 2D τ,μ Mandelbulbs can be on a flat 2D plane or this spherical 2D $2P_{3/2}$ at $r=r_H$ shell

Note the above 3e composite spherical $2P_{3/2}$ shell at $r=r_H$ is the only other stable 2D space (in addition to these z=0 flat 2D) Newpde groung state to define these Mandelbulbs on. Thus high energy 2D $\tau+\mu$ Mandelbulbs provide 3e stability in μ and 3e in τ so $\mu+\tau=3e+3e=(\gamma m_e.+\gamma m_e)_\tau+(\gamma m_e.+\gamma m_e)_\mu$ as 2 $2P_{3/2}$ orbitals with S and L inside the horizon r_H so unobserved so all that is seen from the outside is (no longer the inside 2P) net J=S'=½**.**

For N=0 observable z'=1+δz soz' is perturbation z.

z'=0, $r=r_H$ **15**, the high energy $r=r_H$ 2D spherical shell then is a domain of these same 2D Mandelbulbs μ, τ giving on the 2D shell: $\mu+\tau=3e+3e=(\gamma m_e.+\gamma m_e)_\tau+(\gamma m_e.+\gamma m_e)_\mu=3e+3e=m_p+m_p$. two body motion equipartition of energy of the intereacting positrons in each of two **baryons** each with **J=S'= ½.** Eq 11b so for each positron $\delta z'=r_H=C_M/\xi_o=C_M/m_e$ in eq.16.

z'=1, **14**, **r'$_H$<<r$_H$** (so not that shell) because for z=1 $\xi_1 >> \xi_o$ 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 $\delta z=r'_H=C_M/\xi_1=C_M/(\tau+\mu)$ (21) in eq16

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)

Recall eq.3 $\delta z+\delta z\delta z$=C. So for N=1 observer $|\delta z|>>1$ so $\delta z\delta z$=C. Given eq.3 for N=0 $|\delta z|>>|\delta z\delta z|$, (C≈δz sect.1for N=0, eq10).

B Mandelbrot set gives 3 masses: eq.3 68.7° τ, 45° extremum μ on either flat space or on the the $2P_{3/2}$ shell at r=r$_H$.

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 real numbers. Thus we really did just **postulate** 0.

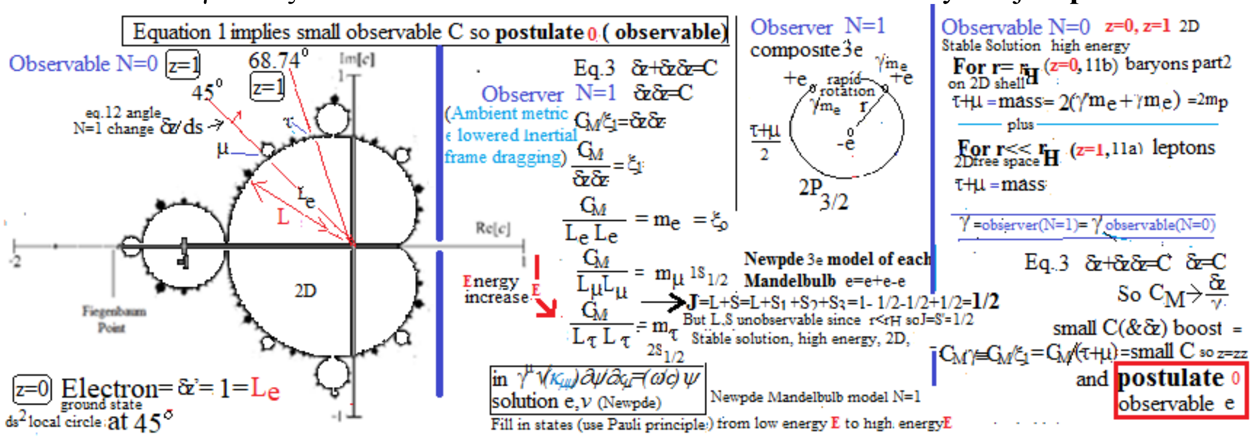


Fig.6 **Conclusion**

So the **smallC** at the end was required. So we really did just **postulate 0**

So we just do ***what is simplest*** (let Occam be your guide), just **postulate** 0: 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 0 in this context (uniquely algebraically defined by z=zz) is this ultimate. Occam' razor object. Nothing is more Occam than postulate0. So we have the Ultimate Occam's Razor postulate(0) implying the ultimate physics theory, a important result indeed.

1.7 Fractal mass and cosmology

Note in section 4.3 the (fractally) selfsimilar to electron (ignoring zitterbewegung for the moment) Kerr metric here is rotating at near c at the equator but inertially frame drags (eg., ergosphere) to the point we see it internally (almost) only as a Schwarschild metric. Due to the drop in inertial frame dragging caused by object B however the eq.4.11 Kerr term $(a/r)^2$ is not zero anymore which in the above figure6 is equal to the $C_M/(\delta z\delta z)$ (with $r^2=|\delta z|^2$, define $a^2=C_M$) =mass= $1+\varepsilon+\Delta\varepsilon$ (see above fig6) whose Newpde fractal mass-energy- zitterbewegung frequency ω is also in the zitterewegung exponent. We call the charge= C_M which in other units and off the light cone is e^2. Note also δz (in $C_M/(\delta z\delta z)$ is also determined by the frame of reference so by the magnitude of the Lorentz transformation γ boost of δz creating (small C) ξ input into eq.17 in $r_{H.} = C_M/\xi$.

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.($\omega=\omega_o 10^{-40N}$). 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 inverse separation of variables result: $i\hbar\frac{\partial\psi}{\partial t} = \beta\sum_N(10^{-40N}(\omega t)_{\varepsilon+\Delta\varepsilon})\psi = \beta\sum_N(10^{-40N}m_{\varepsilon+\Delta\varepsilon}\,c^2/\hbar)\psi$). Note this means that 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 (see 5.1.9) for stationary

$$N=1\ \delta z=\sqrt{\kappa_{oo}}dt=e^{-i\varepsilon_r\frac{mc^2}{\hbar}t} \rightarrow e^{i(\varepsilon+\Delta\varepsilon)} \qquad (22)$$

But seen from inside at N=1 (5.1.18) $E=1/\sqrt{\kappa_{oo}}=1/\sqrt{(1-r_H/r)}$ then $r<r_H$ & E becomes imaginary because of the square root is negative in $e^{iEt/h} = \delta z = \sqrt{\kappa_{oo}}dt = e^{-i\varepsilon_r\frac{mc^2}{\hbar}t} \rightarrow e^{(\varepsilon+\Delta\varepsilon)}$ (23)

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)

Results: Recall from ultimate Occam's razor **Postulate** 0 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 γ=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 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,*v* 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, 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 $\kappa_{oo}=1-r_H/r=1/\kappa_{rr}$: 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**0 instead.

1.10 Intuitive Notion (of postulate 0⇔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).

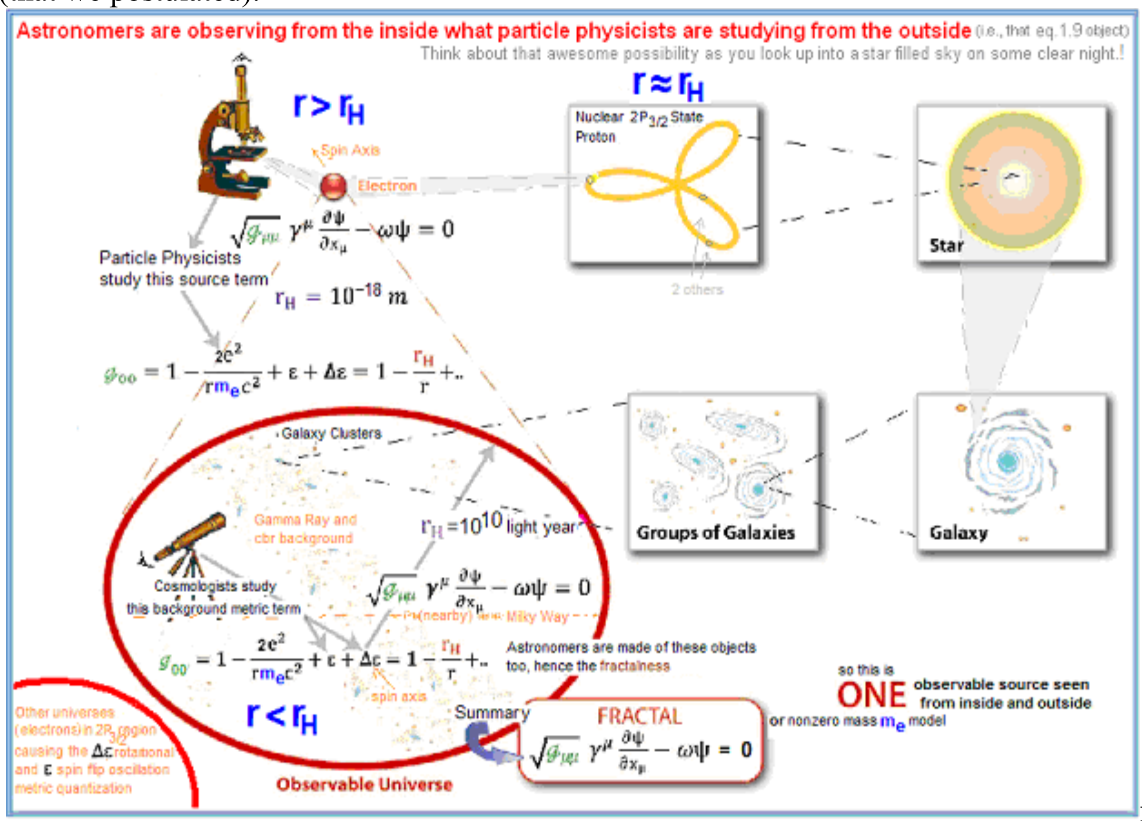


fig2

(↑lowest left corner) Object B caused caused metric quantization jumps: void→galaxy→globular,,etc. X100 scale change metric quantization jumps (PartIII)

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.". Cantor proved the real# were dense with a binary # (1,0) (Our z=zz solutions also implying 15 and appendix F). Thus we capture all the core real# properties with postulate1 and binary 1,0

(8)Tensor Analysis, Sokolnikoff, John Wiley

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

Ch.2 *Other* results of postulate0 besides the Newpde eg.,the Copenhagen stuff

Recall from eq.3 for fractal scale N=0 we have C≈δz (2.1)
with C the Mandelbrot set. The interior of the inner boundary (fig3) of the electron, muon and tauon Mandelbulbs for small angle δz/ds rotations is filled with C points so we can impose a given C^2 continuous envelope function over these points such as δz*δz and it's integral over a volume V_o given by $(\int[(\delta z^*\delta z)/V_o]dV)/V_o= (\int[C^*C/V_o]dV)/V_o$ (from eq.2.1) which gives a measure of the number of C s in V_o thereby implying $\delta z^*\delta z/V_o^2$ is a probability density. So if the number $\int[C^*C/V_o]dV/V_o$ is equal to 1 then the total probability is 1 that the electron is in V_o. So we did not have to postulate noise C for the purpose of introducing probabilities, we derived it instead given that the Mandelbrot set is plenty noisy with all those C points**.** Also recall the solution to (postulate 1) z=zz is 1,o. Recall eq.11b that the electron is δz=-1. In z=1-δz, δz*δz is -1*-1=1 and so from eq. C1 can then be interpreted as probability density, the probability of z being o. Recall z=o is the $\xi_o=m_e$ electron solution(11b) to the new pde so δz*δz=1 is the probability we have just an electron (11b). Note z=zz even 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 and even contains the normalization to 1 here. So it is not a postulate anymore. (Thus Bohr was very close to the postulate of 0, and so using z=zz here.). Note this result came directly out of the postulate of 0, not the Newpde.

Note also that 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 analogous to creating a $\delta z\equiv\psi=\frac{1}{\sqrt{2}}(|\uparrow\downarrow> -|\downarrow\uparrow>)$ singlet state relation with spin S of two opposite spin 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 correlations of the idler-signal correlations.. We could then label these two parts of eq.7 *observer* and *object* with associated eq.7 wavefunctions ψ_1, ψ_2 and combined singlet ψ. Thus if we observe ψ_1 (idler) spin up we must infer that there is a ψ_2 spin down (signal from eq.7) *and* so our singlet wavefunction ψ. So we 'collapsed' our wavefunction to our singlet wave function ψ by observing ψ_1 since *we knew the singlet wave function* existed at the beginning (ala Bertlemann's socks) and so we know ψ_2. Then apply the same mathematical reasoning to every other such analog of $\delta z\equiv\psi=\frac{1}{\sqrt{2}}(|\uparrow\downarrow> -|\downarrow\uparrow>)$ singlet cases (eg.,H,V polarized photon emission) and we will also have thereby derived the correlation functions in 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** 0.

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

Also recall from appendix C dr^2+dt^2 is a second derivative *operator* wave equation (C1,eq.11) that holds all the way around the circle and gives the wave equation, waves. In eq.16, N=1 error magnitude C≈δz (sect.2.3) is also a δz' angle measure on the dr,idt plane. One extremum ds (z=0) is at 45° so the largest C is on the diagonals (45°) where we have eq.5 extremum holding: particles. So a wide slit has high uncertainty, so large C (rotation angle) so we are at 45° (eg., particles, Newpde photoelectric effect). For a *small slit* we have less uncertainty in position so smaller C, not large enough for 45°, so only the *wave equation* A1 holds (then small slit diffraction). Thus we derived "wave particle duality" here. So complenarity is derived here, not postulated.

Also recall wave equation eq.A1 iteration of the New pde with eq.11 operator formalism. So dr/ds=k in the sect.1 circle $\delta z=dse^{i\theta}$ θ exponent kx with $k=2\pi/\lambda.\equiv p/\hbar$. Multiplying both sides by ħ with $\hbar k\equiv mv$ as before we then have the DeBroglie equation that relates particle momentum to wavelength in quantum mechanics as we allready mentioned in section 1. Equation 11c (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.11c counting N does not require the (well known) quantization of the E&M field with SHM.

By the way the Casimir force is simply then the relativistic component of the Van der Waals force, has nothing to do with zero point energy vacuum fluctuations. See Robert Jaffe paper from 2005.

2.2Fractal 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 $\Delta x\Delta(mc)\geq\hbar$. for smallest (minimal) mass (δE=0) so flat Δx plate for decreasing inertial frame dragging due to nearby galaxy masses.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 Planck constant?
Which is the same κ_{oo} that gave us the Lamb shift. Galaxies calibrate this 10^{2N} since that is where the relation $g_{oo}=\kappa_{oo}$ is applied, the fundamental relation in metric quantization. Thus we also got metric quantization (structure stability) for protostar nebula=10X1,LY, globular cluster-dwarf galsxy=$10X10^2$ LY, **galaxy =$10X10^4$LY**, Local group $10X10^6$LY, giant bubbles $10X10^8$LY, all a multiple of the galaxy value
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 (macroscopic ≈ N=1 scale, thermal equilibrim also)
Note that a "single state δz per particle" comes out of 1 particle per δz state per solution in 11 and eq. So the number of ways W of filling g_i single states with n_i particles is $g_i!/(n_k!(g_i-n_i)!$

You take a Log of both sides and use Stirling's approximation and you get the Fermi Dirac distribution for example thereby giving us klnW≡S and so thermodynamics.

2.3 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 5.1 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 in the Kerr allows a pileup of δzs at a given time just as in Everett's many worlds hypothesis. But note the Newpde 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.

By the way the Casimir force is simply then the relativistic component of the Van der Waals force, has nothing to do with zero point energy vacuum fluctuations. See Robert Jaffe paper from 2005.

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 we get for the observed current (u and v have tildas):

$J^k=\int d^3p\{\Sigma_{\pm s}[|b(p,s)|^2+|d(p,s)|^2]p^kc^2/E + i\Sigma_{\pm s,\pm s'}b^*(-p,s')d^*(p,s)e^{2ix\theta p\theta/\hbar}u(-p,s')\sigma^{k0}v(p,s)$
$i\Sigma_{\pm s,\pm s'}b(p,s')d(p,s)e^{2ix\theta p\theta/\hbar}v(p,s')\sigma^{k0}u(p,s)$. (2.2)

(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+ ½mv² a negative energy E does indeed create absurd results but not if E is also negative since the negative sign cancels out.

Derivation Of Newpde 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.

2.10 No Need for a Running Coupling Constant

If the Coulomb V= α/r is used for the coupling instead of $\alpha/(k_H-r)$ 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 $(-K\alpha/r)=\alpha/(k_H-r)$ 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≈20 (≈1.55Tev/80Gev) times this distance in colliding electron beam experiments, so $(-K\alpha/r)=\alpha/(r_H-r)=\alpha/(r(1/20)-r))=-\alpha/(r(19/20))=(20/19)\alpha/r=1.05\alpha/r$ so K=1.05 which corresponds to a $1/K\alpha\equiv1/\alpha'\approx130$ 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 $\sqrt{\kappa_{oo}}$.

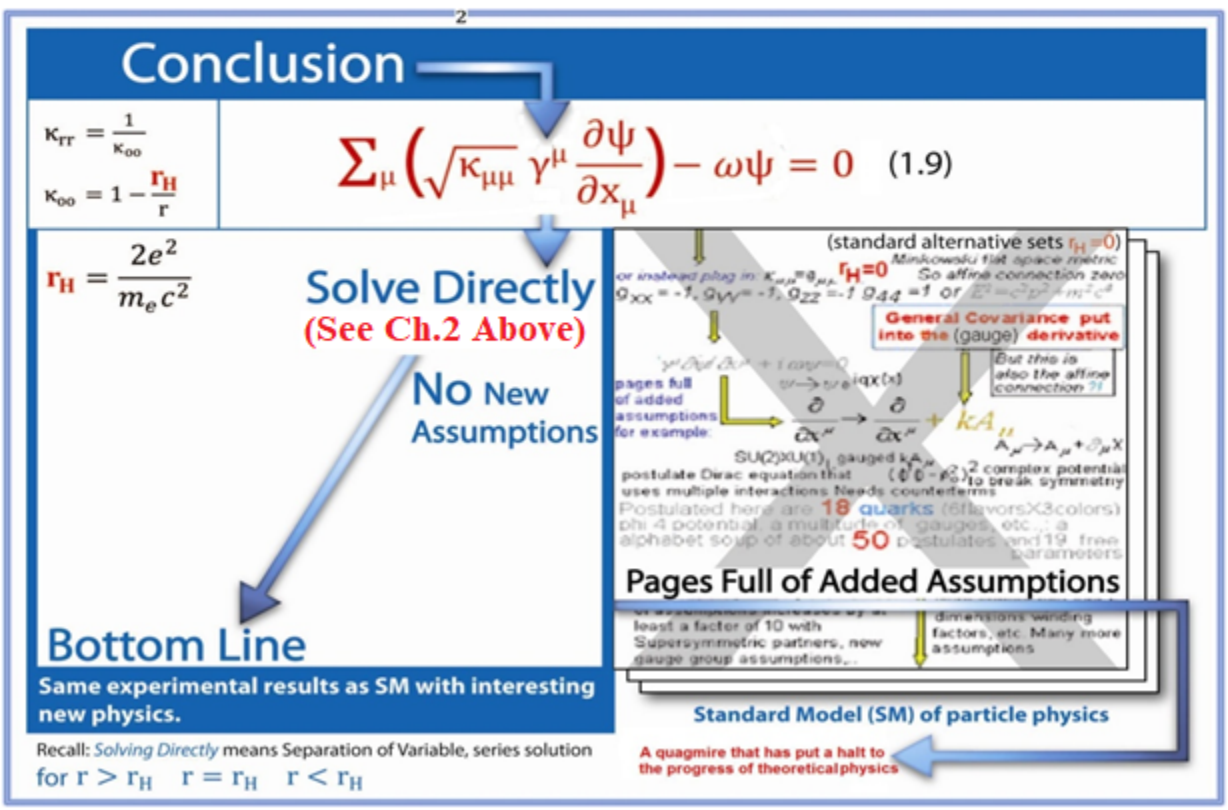
Note that the $\alpha'=\alpha/(1-[\alpha/3\pi(\ln\chi)]$ running coupling constant formula (Faddeev, 1981)] doesn't work near the singularity (i.e., $\chi\approx e^{3\pi/\alpha}$) because the constant is assumed small over all scales (therefore there really *is no formula to compare* $\alpha/(r-r_H)$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

2.11 Rotated 17,18,19 Implies $\kappa_{00}=1-r_H/r\approx1/\kappa_{rr}$ So No Klein Paradox As Is In The Original 1928 Dirac Equation

Recall that $\kappa rr=1/(1-r_H/r)$ 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: $R_s= ((1-\kappa)/1+\kappa))^2$ and $Ts=4\kappa/(1+\kappa)^2$ where $\kappa=p(E+mc^2)/k_2(E+mc^2-V)$ 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 $p_r=(\sqrt{\kappa_{rr}})p=(1/\sqrt{(1-r_H/r)})p$ 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.



2.12 Why does the minimal gauge interaction work? Here we derive the connection between particle and field Green's functions propagators for the single vertex diagram.

The mainstream assumes that the field and particle propagators connect in the Hamiltonian in the usual gauge field formulation.. Why can I add the field(potential) V in this way in the Hamiltonian? Find origin of Pair Creation And Annihilation.

Note that if C<1/4 in equation 1 ($dz=(-B\pm\sqrt{(B^2+AC)})/2A$, 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. nonweak field $k^\nu k_\nu \kappa_{\mu\mu}$=Proca equation term sect.6.2) .

3 Consequences of eq.13,14,15 and N=-1General Relativity Having 10 Unknowns & 6 Independent Equations plus 4 harmonic (Newpde zitterbewegung) equations

Recall section 1 implies General relativity (recall eqs.17,18,19 and the Schwarzschild metric derivation there). 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

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

Recall section 1 implies General relativity (recall eq.17,18,19 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 Newpde (7) eigenstate. Note the commutation relation and so second derivatives (H relativistic A1 (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).

3.1 κ_{00} and κ_{rr} in Newpde implied by eqs.17,18,19: GR Implications of 10 Unknowns But 6 Independent Equations: Gaussian Pillbox Approach To General Relativity

From equation 19 the $\kappa_{oo}=1-r_H/r$ 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 $r=r_H$:

$$ds^2=-(1-r^2/\alpha^2)dt^2+(1-r^2/\alpha^2)^{-1}dr^2+ d\Omega^2_{n-2} \qquad (3.1)$$

which also fulfills the fundamental small C requirement of eq.1.1.14 Dirac equation zitterbewegung (for $r<r_C$ and $r\approx r_H$) and the eq.5 Minkowski metric requirement for $\alpha=1$. 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 $ds^2=-dx_o^2+\Sigma_{i=1}^n dx_i^2$ **(6 equations)**

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 $r<r_H$)

$x_o=\sqrt{(\alpha^2-r^2)}\sinh(t/\alpha)$: **(4 equations)** (3.2)

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

$x_i= rz_i$ $2\leq i\leq n$ z_i is the standard imbedding n-2 sphere. R^{n-1}. which also imply the De Sitter metric 5.3. Recall from eq. 5.1 $ds^2=-(1-r^2/\alpha^2)dt^2+(1-r^2/\alpha^2)^{-1}dr^2+ d\Omega^2_{n-2}$ (3.3)

$\alpha\rightarrow i\alpha$, $r\rightarrow ir$ 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 $x=r\sin\theta$, $y=r\cos\theta$, $\theta=\omega t$ from the new pde

Define time from 2R=t you get the light cone for $\alpha\rightarrow i\alpha$ in equation 3.2.

$x^2+y^2+z^2-t^2=0$ of 5.0.1 with also $(x=r\sin\theta, y=r\cos\theta)\rightarrow$

$(x=\sqrt{(\alpha^2-r^2)}\sinh(t/\alpha), y=\sqrt{(\alpha^2-r^2)}\cosh(t/\alpha))$, $\alpha\rightarrow i\alpha$. 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!

3.2. N=-1 is General relativity. $(10^{-40})e^2=Gm_e^2)$ in r_H

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

Found GR from N=-1 in eq.17 and eq.18 so we can now write the Ricci tensor R_{uv} (since we can do a diadic rotational transformation on the Schwarzchild metric to get the Kerr metric. 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) $\rho^2(r,\theta)=r^2+a^2\cos^2\theta$, $\Delta(r)=r^2-2mr+a^2$ self similar perturbation Kerr metric since frame dragging decreased by external object B, sect.C6)

Next we can conver this metric t to a quadratic equation in dt ($Ax^2+Bx+C=0$ where x =dt. (organize into coefficients of dt and dt^2).Set $r\approx r_H$ and we can analyze the EHT physics of the horizon r_H. We find oscillatory dz direction forces (that creates beams?). Also the fractalness implies breakthrough propulsion (davidmaker STAIF.)

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

Note the N=-1 (GR) is yet another δz perturbation of N=0 $\delta z'$ 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 and is a *physically valid theory* since these fractal N=-1 fractal scale (Mandelbrot sets out to the Fiegenbaum point) wound up balls at $r_H=10^{-58}$m are even a lot smaller than even the(usual) Planck length diameter balls. But if only N=1 observer and N=-1 are used (no N=0) we still have the usual 4D which is classical GR.

***Left end* small drdt in Mandelbrot set implies 10^{82} objects (including objects A,B,C)**

The Fiegenbaum point (11a) is the only part of the Mandlebrot set we zoom from.. At the Fiegenbaum point (imaginary) time $X10^{-40}=\Delta$ and real −1.40115 (sect.1). At the very beginning (top) C was defined to be constant *only* at $C\approx 0$ ($\|C\|<<1$). So at the end of all these derivations we still have to have a small C. This implies a boosted SR Lorentz transformation universal reference frame to random (since this transformation cancels noise C in eq.2, fig6), small C_M subset $C\approx\delta z'$ (from eq.3) =real distance =real$\delta z/\gamma=1.4011/\gamma=C_M/\gamma\equiv C_M/\xi_1$ using large ξ_1. Note at the Fiegenbaum point distance $1.4011/\gamma$ shrinks a lot but time $X10^{-40}\gamma$ doesn't get much bigger since it was so small to begin with at the Fiegenbaum point. Eq.1 then means we have Ockam's razor optimized **postulated** 0. Given the New pde r_H we only see the $r_H=e^2 10^{40N}/m$ with 10^{82} 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 $S_NC_M=10^{40N}C_M$ in eq.17. The splits are in 3 directions from the orbs. There appear to be about 2.5 splits going by each second (given my PC baud rate) and the next Mandelbrot set comes up in about 62 seconds. So $3^{2.7X62}=10^N$ so 172log3=N=82. So there are 10^{82} splits. So there are about 10^{82}splits per initial split. But each of these Mandelbrot set Fiegenbaum points is a $C_M/\xi\equiv r_H$ in electron (eq.13

above). So for each larger electron there are **10^{82} constituent electrons**. Also the scale difference between Mandelbrot sets as seen in the zoom is about **10^{40}, the scale change** between the classical electron radius and 10^{11}ly with the C noising giving us our fractal universe.
Recall again we got from eq.3 δz+δzδz=C with quadratic equation result:
$\delta z = \frac{-1\pm\sqrt{1-4C}}{2}$. is real for noise C<¼ creating our noise on the N=0 th fractal scale. So ¼=(3/2)kT/(m_pc^2). So T is 20MK. So here we have *derived the average temperature of the universe* (stellar average). That z'=1+δz substitution also introduces Lorentz transformation rotational and translation noise that does not effect the number of splits, analogous to how a homeomorphism does not change the number of holes (which is a Topological invariant).
So the excess C noise (due to that small C' boost) causes the Fiegenbaum point neighborhood internal structure to become randomized (as our present universe is) but the number of electrons (10^{82}) remains invariant. See appendix D mixed state case2 for further organizational effects.
$N=r^D$. So the **fractal dimension=** D=logN/logr=log(splits)/log(#r_H in scale jump) =log10^{80}/log10^{40}=log($(10^{40})^2$)/log(10^{40})= 2 . (See appendix E for Hausdorf dimension & measure) which is the same as the 2D of eq.4 and the Mandelbrot set. The next smaller (subatomic) fractal scale $r_1=r_H=2e^2/m_ec^2$, N=0th, $r_2=r_H=2GM/c^2$ is defined as the N=1 th where $M=10^{82}m_e$ with $r_2=10^{40}r_1$ So the Fiegenbaum pt. gave us a lot of physics:
eg. **#of electrons in the universe, the universe size, temp.** With 10^{82} electrons between any two fractal scales we are also *certainly allowed objects B&C* in the Newpde $2P_{2/3}$ state at $r=r_H$.

Ch.4 Object B Perturbation to $\kappa_{\alpha\beta}$

Found General Relativity (GR) GR from eq.17- eq.19 so Schwarchild metric and do a dyadic coordinate transformation on it to get the Kerr metric a nd all these free space metrics to get all the solutions to $R_{ij}=0$. N=-1 , $e^2 10^{40(-1)}=e^2/10^{40}=Gm_e^2$, solve for G,so get GR. So we can now write the Ricci tensor R_{uv} (and self similar perturbation Kerr metric since frame dragging decreased by external object B, AppendixB). Also for fractal scale N=0, $r_H=2e^2/m_ec^2$, and for N=-1 $r'_H=2Gm_e/c^2=10^{-40}r_H$.

4.1 Fractal mass and cosmology

From Newpde (eg., eq.1.13 Bjorken and Drell special case) $i\hbar\frac{\partial\psi}{\partial t}=\frac{\hbar c}{i}\left(\alpha_1\frac{\partial\psi}{\partial x^1}+\alpha_2\frac{\partial\psi}{\partial x^2}+\alpha_3\frac{\partial\psi}{\partial x^3}\right)+\beta mc^2\psi=H\psi$. 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.): (4.0)This implies an oscillation frequency of ω=mc²/ħ. which is fractal here ($\omega=\omega_o 10^{-40N}$). So the eq.12 the 45° line has this ω oscillation as a (that eq.7-9 δz variation) rotation at radius ds. On our own fractal cosmological scale N=1 we are in the expansion stage of one such oscillation. Thus the fractalness of the Newpde explains cosmology. The next higher cosmological scale is independent (but still connected by relativistc superposition of speeds implying a inverse separation of variables result: $i\hbar\frac{\partial\psi}{\partial t}=\beta\sum_N(10^{-40N}(\omega t)_{\varepsilon+\Delta\varepsilon})\psi\ =\beta\sum_N(10^{-40N}m_{\varepsilon+\Delta\varepsilon}c^2/\hbar)\psi$). Note this means that 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. (See Mercuron equation) 6.3a. But the fig6 Mandelbulb 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. (4.1)

Set $e^{(-\varepsilon+\Delta\varepsilon/2)2}$ =δ|$e^{i\tau tz}$| Newpde cosmological zitterbewegung oscillation but τ constant(fig6), doesn't vary in cosmological time tc. So cosmologically (eq. 6.11) outside r_H of object B for N=0 use tz. For N=1 use tc for cosmologically relevant time dependence.

Define average$(e^{i(\tau+\varepsilon+\Delta\varepsilon)tz}) \equiv \delta\overline{z_0}$, So |δz|=$|e^{-i\varepsilon_r\frac{mc^2}{\hbar}t}|\delta\overline{z_0}| = \delta\overline{z}_o e^{i\omega t}|$==$e^{i(\tau+\varepsilon+\Delta\varepsilon))tz+i(-\varepsilon+\Delta\varepsilon(1/2))tc}$= $\delta\hat{z}_0 e^{i(\varepsilon+\Delta\varepsilon(1/2))2}$=$\delta\hat{z}_0\sqrt{\kappa_{rr}}$ in $dr'^2=\kappa_{rr}dr^2=e^C\kappa_{00}dr^2$= $e^{i(-\varepsilon+\Delta\varepsilon/2)2}\kappa_{00}dr^2$ (4.2)
But seen from inside at N=1 E=1/√κ_{oo}=1/√(1-r_H/r) then r<r_H & E becomes imaginary in $e^{iEt/h}$ =δz=√κ_{oo}dt= $e^{-i\varepsilon_r\frac{mc^2}{\hbar}t} \rightarrow e^{(-\varepsilon+\Delta\varepsilon/2)2}$ (6.2)
The negative sign from equation B2a below. The reduced mass ground state rotater (Δε/2) for ε for this κ_{00} part of derivation). Ricci tensor (is given by oscillating source
Ricci tensor = R_{ij}=-1/2)Δ(g_{ij}) where Δ is the Laplace-Beltrami second derivative operator) is not zero and the right side is the metric source. Recall limit R_{ij} as r→0 is the source, where alternatively gravity creates gravity feedback loop in the Einstein equations which becomes the modulation of the DeSitter ball implied by the zitterbewegung oscillation. Geometrically, the Ricci curvature is the mathematical object that controls the (comoving *observer*) *growth rate of the volume* of metric balls in a manifold in this case given by the New pde source zitterbewegung.

N=2 observer sees that we see: Comoving Interior N=1 Frame r<r_H

Recall N>0≡observer. Here we find what that N=2 fractal scale observer sees that we see if sinμ->sinhμ for r>r_H going to r<r_H in E=1/√κ_{oo}=1/√(1-r_H/r) since the E in δz=e^{iEt}≡$e^{i\mu}$ and so μ then becomes imaginary.
R_{22}=$e^{-\lambda}$[1+½ r(μ'-ν')]-1 with μ=ν (spherical symmetry) and μ'=-ν'. So as r→0 , ImR_{22}=. Im(e^μ-1)=μ +..= sinμ=μ+..for outside r_H imaginary μ for small r (at the source) so zitterbewegung sinμ becomes a gravitational source (alternatively gravity itself can create gravity in a feedback mechanism). The N=2 observer then multiplies by i iR_{22}, -isinμ and μ to get R_{22}=-sinhμ to see what the N=2 observer sees that we see inside r_H so:
R_{22}=$e^{-\nu}$[1+½ r(μ'-ν')]-1=-sinhν=(-(e^ν- $e^{-\nu}$)/2), ν'=-μ' so
(e^μ-1=-sinhμ for positive μ in sinhμ then the μ=ε in the e^μ on the left is negative (4.2a).
Object B mostly contributes to μ' in -rμ' , with object C providing a tiny pertutbation of μ', mplying there is no such positive sinhμ constraint for object C. Thus the object C *perturbation* μ_c in $e^{\mu c}$ coefficient can be positive or negative
$e^{-\mu}$[-r(μ')]=-sinhμ-$e^{-\mu}$+1=(-(-$e^{-\mu}$+ e^μ)/2)-$e^{-\mu}$+1=(-($e^{-\mu}$+e^μ)/2)+1=-coshμ+1. So given ν'=-μ'
$e^{-\nu}$[-r(μ')]= 1-coshμ. Thus
$e^{-\mu}$r(dμ/dr)]=1-coshμ
This can be rewritten as: e^μdμ/(1-coshμ)=dr/r
We set the phase μ so that when t=0 then r=0 so use r=sinωt in eq.4.1. Given the fractal universe a temporarily comoving proper frame at minimum radius lowest γ must imply a μ Mandelbulb chord 45° intersection that implies minimally the Newpde ground state (Which can't go away analogously as for a hydrogen atom orbital electron.) Δε electron for comoving outside observer where then at time=0, in 4.1,4.2 τ-ε≈ωt=Δε ≈1-1=0 so that ωt=Δε when sinωt≈0. So the integration of 4.3 is from ξ_1= μ=ε=1 to the present day mass of the μ=muon=.06 (X tauon mass) giving us: ln(r_{M+1}/r_{bb})+2=[1/(e^μ-1)-ln[e^μ-1]]2 (4.3a)
implying gr=e/2m gyromagnetic ratio (μ=m) is changing with time as was discovered recently at Fermi lab 2023 (Ch.7) with CERN 1974 gr muon data for comparison.

4.2 **Derivation of Newpde N=1 metric from nonrotating and rotating perturbative contribution of object B** sinhμ≈0 present day so now R_{22}≈0

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

From eqs13-15 but with ambient metric ansatz: $ds^2=-e^{\lambda}(dr)^2-r^2d\theta^2-r^2\sin\theta d\phi^2+e^{\mu}dt^2$ (4.3) so that $g_{oo}=e^{\mu}$, $g_{rr}=e^{\lambda}$. From eq. $R_{ij}=0$ for spherical symmetry in free space and N=0

$$R_{11}=\tfrac{1}{2}\mu''-\tfrac{1}{4}\lambda'\mu'+\tfrac{1}{4}(\mu')^2-\lambda'/r=0 \quad (4.4)$$

$$R_{22}=e^{-\lambda}[1+\tfrac{1}{2}r(\mu'-\lambda')]-1=0 \quad (4.5)$$

$$R_{33}=\sin^2\theta\{e^{-\lambda}[1+\tfrac{1}{2}r(\mu'-\lambda')]-1\}=0 \quad (4.6)$$

$$R_{oo}=e^{\mu-\lambda}[-\tfrac{1}{2}\mu''+\tfrac{1}{4}\lambda'\mu'-\tfrac{1}{4}(\mu')^2-\mu'/r]=0 \quad (4.7)$$

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

(eq. 4.4-4.7 from pp.303 Sokolnikof(8)): Equation 4.4 is a mere repetition of equation 4.6. We thus have only three equations on λ and μ to consider. From equations 4.4, 4.7 we deduce that λ'=-μ' so that radial λ=-μ+constant =-μ+C where C represents a possible ~constant ambient metric contribution which C could be imaginary in the case of the slowly oscillating ambent metric of nearby object B from 4.2. So $e^{-\mu+C}=e^{\lambda}$. Then 4.3 can be written as: $e^{-C}e^{\mu}(1+r\mu')=1$(4.9 Set $e^{\mu}=\gamma$. So $e^{-\lambda}=\gamma e^{-C}$ ε and Δε are time dependent. So integrating this first order equation (equation 49) we get: $\gamma=-2m/r+e^C\equiv e^{\mu}=g_{oo}$ and $e^{-\lambda}=(-2m/r+e^C)e^{-C}=1/g_{rr}$ or $e^{-\lambda}=1/\kappa_{rr}=1/(1-2m'/r)$, $2m/r+e^C=\kappa_{00}$. With (reduced mass ground state rotater (Δε/2) for charged if -ε) dr zitterbewegung from 4.1 $\kappa_{rr}dr^2=e^C\kappa_{00}dr'^2=e^{i(-\varepsilon+\Delta\varepsilon/2)2}\kappa_{00}dr^2$ from 4.2. We found

$$\kappa_{00}=e^C-2m/r=e^{i(-\varepsilon+\Delta\varepsilon/2)2}-2m/r \quad (4.10)$$

Δε here is reduced ground state mass Δε/2 as in Schrodinger eq $E=\Delta\varepsilon/2=1/\sqrt{\kappa_{00}}$. (4.10a)

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

4.2 Add **Perturbative Kerr rotation $(a/r)^2$ to r_H/r in κ_{rr}** Here nothing gets added to r_H/r in κ_{oo}

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)**

$$ds^2=\rho^2\left(\frac{dr^2}{\Delta}+d\theta^2\right)+\left(r^2+a^2\right)\sin^2\theta d\phi^2-c^2dt^2+\frac{2mr}{\rho^2}\left(a\sin^2\theta d\theta-cdt\right)^2, \quad (4.11)$$

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

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

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

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

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

$=\left(1+\frac{a^2}{r^2}\right)\left(1-\frac{a^2}{r^2}cos^2\theta\right)+..=1-\frac{a^4}{r^4}cos^2\theta-\frac{a^2}{r^2}cos^2\theta+\frac{a^2}{r^2}+..=1+\frac{a^2}{r^2}(1-cos^2\theta)+.=$
$1+\frac{a^2}{r^2}sin^2\theta+..\equiv 1+\left(\frac{a}{r}\right)^2u^2=\left(\text{from fig. 6 mass}=\frac{C_M}{\delta z\delta z}\right)=1+(\varepsilon+\Delta\varepsilon)+..$ (4.12)
since ε+Δε are time dependent, and add 2m/r to this 1+ε+Δε at the end. Δε is *total* (Mandlebulb) mass as in $C_M/(\delta z\delta z)=(a/r)^2$ in fig6 contribruting to inertial frame dragging drop

We can normalize out 1+ε over a region we know it is (at least appromately) a constant. That in turn makes the metric coefficients at r>>>0 flat which is what they should be. In contrast rotation adds to κ_{rr} (4.12) and only oblates 2m/r in κ_{oo}.

Summary: Our Newpde metric including the effect of object B (with $\tau+\mu=2m_p=\xi_1$.) is for the τ+μ+e Mandelbulbs in Fig6

τ+μ in free space $r_H=e^2 10^{40(0)}/2m_Pc^2$, $\kappa_{00}=e^{i(\Delta\varepsilon/1-2\varepsilon)}-r_H/r$, $\kappa_{rr}=1+\Delta\varepsilon/(1+\varepsilon)-r_H/r$ Leptons (4.13)

τ+μ on $2P_{3/2}$ sphere at $r_H=r$, $r_H=e^2 10^{40(0)}/2m_ec^2$,comoving with $\gamma=m_p/m_e$. Baryons, part2 (4.14)

Imaginary iΔε in this cosmological background metric $\kappa_{00}=e^{i\Delta\varepsilon}$ 4.13 makes no contribution to the Lamb shift but is the core of partIII cosmological application $g_{oo}=\kappa_{oo}$ of eq 4.13 of this paper.

5 N=0 eq.4.13 Application κ_{00} example: anomalous gyromagnetic ratio

Separation Of Variables On New Pde.

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

$$\left[\left(\frac{dt}{ds}\sqrt{\kappa_{00}}m_p\right)+m_p\right]F-\hbar c\left(\sqrt{\kappa_{rr}}\frac{d}{dr}+\frac{j+3/2}{r}\right)f=0 \qquad 5.1$$

$$\left[\left(\frac{dt}{ds}\sqrt{\kappa_{00}}m_p\right)-m_p\right]f+\hbar c\left(\sqrt{\kappa_{rr}}\frac{d}{dr}-\frac{j-1/2}{r}\right)F=0. \qquad 5.2$$

Using the above Dirac equation component we find the anomalous gyromagnetic ratio Δgy for the spin polarized F=0 case. Recall the usual calculation of rate of the change of spin S gives dS/dt∝m∝gyJ from the Heisenberg equations of motion. We note that $1/\sqrt{\kappa_{rr}}$ rescales dr in $\left(\sqrt{\kappa_{rr}}\frac{d}{dr}+\frac{j+3/2}{r}\right)f$ in equation 4.1 with κ_{rr} from 4.13. 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 4.1, 4.2 compatible with the standard Dirac equation allowing us to substitute the gy into the Heisenberg equations of motion for spin S: dS/dt∝m∝gyJ to find the correction to dS/dt. Thus again:

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

$[1/\sqrt{\kappa_{rr}}](3/2+½)=3/2+½gy= 3/2+½(1+\Delta gy)$ 5.3

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

Thus solve eq. 4.13 with Eq.4.1 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 equation .1:

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

If we set ε≠0 (so Δε/(1+ε)) instead of Δε) in the same κ_{oo} in Newpde we get the anomalous gyromagnetic ratio correction of the muon in the same way.

Composite 3e: Meisner effect For B just outside r_H. (where the zero point energy particle eq. 9.22 is .08=$\pi^{\pm}$) See 4.14

Composite 3e CASE 1: Plus $+r_H$, therefore is the proton + charge component. Eq.4.14: $1/\kappa_{rr} = 1+r_H/r_H + \varepsilon'' = 2+\varepsilon''$. ε'' =.08 (eq.9.22). Thus from eq.5.3 $\sqrt{2+\varepsilon''}(1.5+.5)=1.5+.5(gy)$, 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 4.17 and case 1 eq.4.13 $1/\kappa_{rr} = 1-r_H/r_H+\varepsilon''$ $\sqrt{\varepsilon''}$ (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.

5.1 N=0 eq.4.13 κ_{00} application example: Lamb shift

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

$$\left[\left(\frac{dt}{ds}\sqrt{\kappa_{00}}m_p\right)+m_p\right]F-\hbar c\left(\sqrt{\kappa_{rr}}\frac{d}{dr}+\frac{j+3/2}{r}\right)f=0 \qquad 5.4$$

$$\left[\left(\frac{dt}{ds}\sqrt{\kappa_{00}}m_p\right)-m_p\right]f+\hbar c\left(\sqrt{\kappa_{rr}}\frac{d}{dr}-\frac{j-1/2}{r}\right)F=0. \qquad 5.5$$

Comparing the flat space-time Dirac equation to the left side terms of equations 4.6 and 4.7:

$$(dt/ds)\sqrt{\kappa_{oo}}=(1/\kappa_{00})\sqrt{\kappa_{oo}}=(1/\sqrt{\kappa_{oo}})=\text{Energy}=E \qquad 5.6$$

Note for electron motion around hydrogen proton $mv^2/r=ke^2/r^2$ so KE=$\frac{1}{2}mv^2$= $(\frac{1}{2})ke^2/r$ =PE potential energy in PE+KE=E. So for the electron (but not the tauon or muon that are not in this orbit) $PE_e=\frac{1}{2}e^2/r$. . Here write the hydrogen energy and pull out the electron contribution 4.10a. So in eq.4.2 and 4.4 $r_{H'}=(1+1+.5)e^2/(m_\tau+m_\mu+m_e)/2=2.5e^2/(2m_pc^2)$. 5.7

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.4.4 eq.14 $\xi_1=m_Lc^2=(m_\tau+m_\mu+m_e)c^2=2m_pc^2$ normalizes $\frac{1}{2}ke^2$ (Thus divide $\tau+\mu$ by 2 and then multiply the whole line by 2 to normalize the $m_e/2$ result. ε=0 since no muon ε here.): Recall in eeq.11a ξ_o has to be pulled in a Taylor expansion as an operator since it a separate observable. So substituting eqs.4.1 for κ_{00}, values in eq.5.4:

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

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

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

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

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

=hf=6.626X10^{-34} 27,360,000 so that f=27MHz Lamb shift.

The other 1050Mhz comes from the zitterbewegung cloud.

Note: Need infinities if **flat space Dirac 1928 equation**. For flat space $\partial g_{ik}/\partial x^j=\mathbf{0}$ as a limit. Then must take field $g^{km}=1/0=\infty$ to get finite Christoffel symbol $\Gamma^m_{ij}\equiv(g^{km}/2)(\partial g_{ik}/\partial x^j+\partial g_{jk}/\partial x^i-\partial g_{ij}/\partial x^k)=(1/\mathbf{0})(\mathbf{0})=$*un*defined but still implying *non*zero acceleration on the left side of the geodesic equation: $\frac{d^2x^\mu}{ds^2}=-\Gamma^\mu_{\nu\lambda}\frac{dx^\nu}{ds}\frac{dx^\lambda}{ds}$ So we need infinite fields for flat space. Thus QED requires (many such) infinities. But we have in general curved space $g_{ij}=\kappa_{ij}$ in the New pde so do not require that anything be infinite and yet we still obtain for the third order Taylor expansion term of $\sqrt{\kappa_{\mu\nu}}$ the Lamb shift and anomalous gyromagnetic ratio correction (see above sections 5.3,5.4).

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.4.13,11a is the reason leptons appear point particles (in contrast to the small ξ_0 in the composite 3e baryons).

5.2 eq.4.13 κ_{00} application example: metric quantization in 4.13

We have yet to use the $e^{i(\Delta\varepsilon/(1-2\varepsilon))}$in: $\kappa_{00}=e^{i(\Delta\varepsilon/(1-2\varepsilon))}-r_H/r$. Note $mv^2/r=GMm/r^2$ is always true (eg.,globulars orbiting out of plane) but so is $g_{oo}=\kappa_{00}$ *in the plane* of a flattened galaxy (rotating central black hole planar effect partIII). That $g_{oo}=\kappa_{oo}$ in the *halo of the Milky Way galaxy* is the fundamental equation of metric quantization. So again $mv^2/r=GMm/r^2$ so $GM/r=v^2$ COM in the galaxy halo(circular orbits) (1/(1-2ε) term from κ_{00} in 4.13) so

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

$\mathrm{Rel}\kappa_{oo}=\cos\mu$ from 4.13 κ_{00}

Case1 $1-2GM/(c^2r)=1-2(v/c)^2=1-(\Delta\varepsilon/(1-2\varepsilon))^2/2$ (5.7)

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

The $\Delta\varepsilon^2$ is just the above first case (Case 1) so just take the mixed state cross term $[\varepsilon\Delta\varepsilon/(\varepsilon+\Delta\varepsilon))]=c[\Delta\varepsilon/(1+\Delta\varepsilon/\varepsilon))]/2=c[\Delta\varepsilon+\Delta\varepsilon^2/\varepsilon+...\Delta\varepsilon^{N+1}/\varepsilon^N+.]/2=\Sigma v_N$. Note each term in this expansion is itself a (mixed state) operator. So there can't be a single v in the large gradient 2nd case so in the equation just above we can take $v_N=[\Delta\varepsilon^{N+1}/(2\varepsilon^N)]c$. (5.8)

From eq. 5.7 for example $v=m100^N$km/sec. m=2,N=1 here (Local arm). In part III we list hundreds of examples of 4.23: (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.5.7) 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)

5.3 Recall 4.13 also leads to **metric quantization $\kappa_{oo}=e^{i\Delta\varepsilon}$** where $\Delta\varepsilon>0$ in halos is thereby an introduction to part III on Mixed States

So does metric quantization have a Hamiltonian?

Recall eq.4.9 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 <i|εΔε|i> (from $\varepsilon\Delta\varepsilon\psi_{N+1}$) is observable and <i|εΔε|i> (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 Δε is N+1 th and r_H Nth so as an operator equation: $\Delta\varepsilon r_H=0$ in:

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

Metric quantization (and object 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).

5.4 Implications of $g_{oo}=1-2e^2/rm_ec^2=1-eA_o/mc^2v^o$) 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 4^{th} 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. $g_{oo}=1-2e^2/rm_ec^2 \equiv 1-eA_o/mc^2v^o$). We determined A_o,(andA_1,A_2,A_3) in appendix A4, eq,A2. We plug this A_i into the geodesics

$$\frac{d^2x^\mu}{ds^2} = -\Gamma^\mu_{\nu\lambda}\frac{dx^\nu}{ds}\frac{dx^\lambda}{ds} \qquad (5.9)$$

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 $$g_{ii} \equiv \eta_{ii}+h_{ii} = 1-\frac{eA_i(x,t)}{m_\tau c^2 v^i}, i\neq 0, \qquad (5.10)$$

$A'_0 \equiv e\phi/m_\tau c^2$, $g_{00} \equiv 1-\frac{e\phi(x,t)}{m_\tau c^2} = 1-A_0^{'}$, 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 4.24 into equation 4.23, 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 (5.11). 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 5.11 $(A/v^2)(dv/dr)_{av}$. 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.

5.3 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 Ch.2).

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.4.3) 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.

6 Object C perturbation of eq.4.13 κ_{00}

The third object in our proton, we derive the effects of the energy gap of object C

Rotation between orthogonal axis' extreme in equation 16

Recall from sect.1 eq.3 that $\delta C=\delta(\delta z+\delta z\delta z)=\delta\delta\delta\delta z(1)+\delta\delta z(\delta z)+(\delta z)\delta\delta z=\delta C=0$ so C is split between $\delta\delta z$ noise and $\delta z\delta z$ and classical ds^2 proper time. Note for N=1 $|\delta z|>>1$ and $C_M>>1$. So eq.5 holds then. So for high energies as γ is boosted observer $\delta z/\gamma$, C/γ gets smaller than the huge N=1 scale (so higher energy, smaller wavelength beam probes) $\delta\delta z(1)/ds$ noise angle gets relatively larger (relative to $\delta(\delta z\delta z)/ds$, sect.1) until finally the next smaller (and next smaller one after that at N=-1) is the N=0 fractal scale

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

These rotations are

I→II, II→III,III→IV,IV→I required extremum to eq.16 extremum rotations in eq.7-9 plane give SM Bosons at high interaction COM energies(where δδz gets big). N_{ob} =0

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 $\theta\delta z \equiv (dr/ds)\delta z = -i\partial(\delta z)/\partial r$ 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 $\theta\theta\delta z' = (d^2/dr^2)z' + (d^2/dt^2)\delta z'$ (6.1)

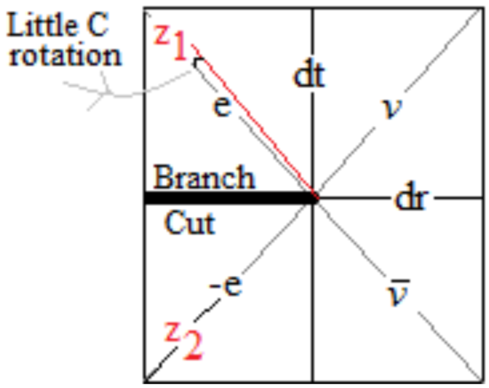


fig.3 for **45°-45°**

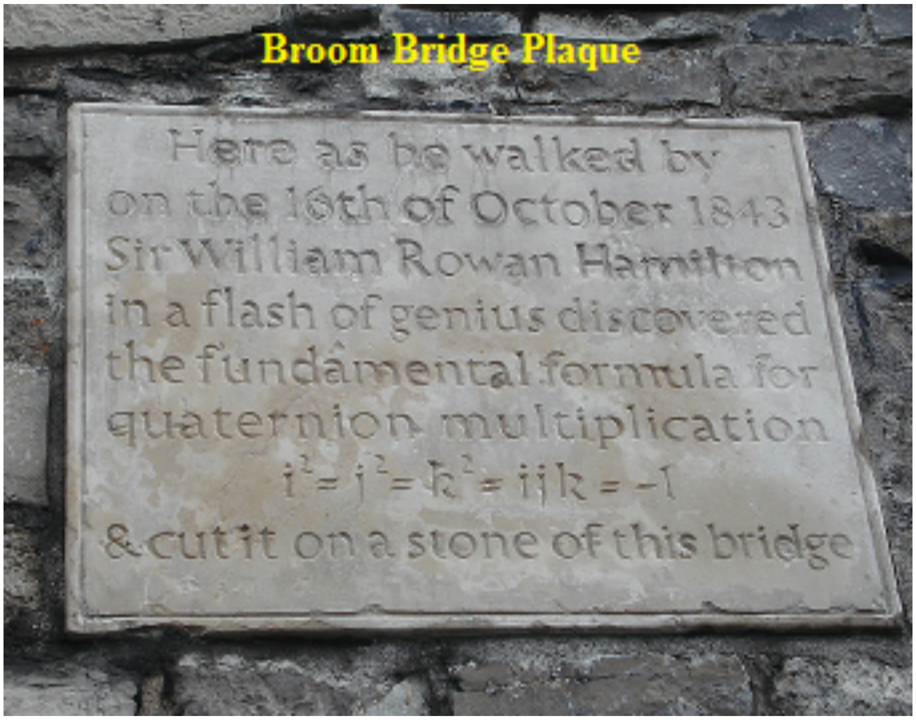
Note also the para two body spin states ΔS=½ -½ =0 (sect.4.5, pairing interaction).

Note we also get these Laplacians characteristic of the Boson field equations by those 45°+45° rotations so Newpde implies Bosons accompany our leptons (given the δz'), **so these leptons exhibit "force".**

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

So z=0 allows a large C z rotation application from the 4 different axis' max extremum (of Newpde 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.6.1 $(dr^2+dt^2)z''$ from some initial extremum angle(s) θ. Eq.16 solutions imply complex 2D plane Stern Gerlach dichotomic rotations using eq.6.1 thereby using Pauli matrices σ_i algebra, which maps one-to-one to the quaternionA algebra. Using eq.12 we start at some initial angle θ and rotate by 90° the noise rotations are: $C = \delta z'' = [e_L, \nu_L]^T \equiv \delta z'(\uparrow) + \delta z'(\downarrow) \equiv \psi(\uparrow) + \psi(\downarrow)$ has a eq.12 infinitesimal unitary generator $\delta z'' \equiv U = 1-(i/2)\varepsilon n^*\sigma)$, $n \equiv \theta/\varepsilon$ in $ds^2 = U^tU$. But in the limit $n\to\infty$ 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 Newpde 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.6.1 $(dr^2+dt^2+..)\delta z'' = (dr^2+dt^2+..)e^{quaternionA}$Bosons because of eq.6.1.

6.2 Then use eq. 16 and quaternions to rotate δz" since the quaternion formulation is isomorphic to the Pauli matrices. $dr' = \delta z_r = \kappa_{rr}dr$ for **Quaternion** A $\kappa_{ii} = e^{iAi}$.



6.2 Quaternion ansatz $\kappa_{rr}=e^{iAr}$ instead of $\kappa_{rr}=(dr/dr')^{2\cdot}$ in eq.18. N=0.

for the eq.16:large θ= 45°+45° rotation (for N=0 so large $\delta z'=\theta r_H$). Instead of the equation 17,19 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)) $E=1/\sqrt{\kappa_{oo}}=1/\sqrt{e^{iAi}}.=e^{i-A/2}$. 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 $\pm$ and $1-(-\varepsilon+r_H/r)$ 0 charge. (6.0)

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 $\pi^{\pm},\pi^{o}$. 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

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

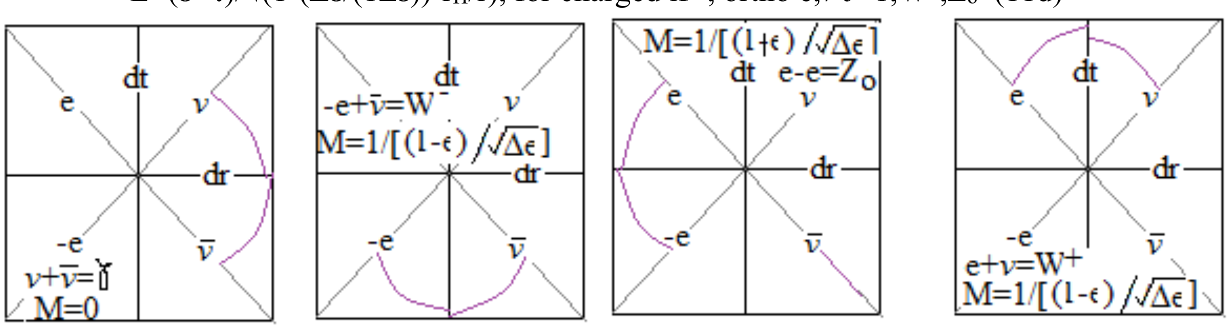


fig4

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

6.2 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:

6.2 Quadrants IV→I rotation eq.6.2 $(dr^2+dt^2+..)e^{\text{quaternion } A}$ =rotated through C_M in Newpde. example C_M in eq.561 is a 90° CCW rotation from 45° through *ν* and anti*ν*

A is the 4 potential. From eq.15 we find after taking logs of both sides that $A_o=1/A_r$ (6.2)

Pretending we have a only two i,j quaternions but still use the quaternion rules we first do the r derivative: From eq. 6.1 $dr^2\delta z=(\partial^2/\partial r^2)(\exp(iA_r+jA_o))=(\partial/\partial r[(i\partial A_r\partial r+\partial A_o/\partial r)(\exp(iA_r+jA_o)]$
$=\partial/\partial r[(\partial/\partial r)iA_r+(\partial/\partial r)jA_o)(\exp(iA_r+jA_o)+[i\partial A_r/\partial r+j\partial A_o/\partial r]\partial/\partial r(iA_r+jA_o)(\exp(iA_r+jA_o)+$
$(i\partial^2 Ar/\partial r^2+j\partial^2A_o/\partial r^2)(\exp(iA_r+jA_o)+[i\partial A_r/\partial r+j\partial A_o/\partial r][i\partial A_r/\partial r+j\partial/\partial r(A_o)]\exp(iA_r+jA_o)$ (6.3)

Then do the time derivative second derivative $\partial^2/\partial t^2(\exp(iA_r+jA_o)=(\partial/\partial t[(i\partial A_r\partial t+\partial A_o/\partial t)$
$(\exp(iA_r+jA_o)]=\partial/\partial t[(\partial/\partial t)iA_r+(\partial/\partial t)jA_o)(\exp(iA_r+jA_o)+$
$[i\partial A_r/\partial r+j\partial A_o/\partial t]\partial/\partial r(iA_r+jA_o)(\exp(iA_r+jA_o)+(i\partial^2A_r/\partial t^2+j\partial^2A_o/\partial t^2)(\exp(iA_r+jA_o)$
$+[i\partial A_r/\partial t+j\partial A_o/\partial t][i\partial A_r/\partial t+j\partial/\partial t(A_o)]\exp(iA_r+jA_o)$ (6.4)

Adding eq. 6.2 to eq. 6.4 to obtain the total D'Alambertian 6.3+6.4=
$[i\partial^2A_r/\partial r^2+i\partial^2A_r/\partial t^2]+[j\partial^2A_o/\partial r^2+j\partial^2A_o/\partial t^2]+ii(\partial Ar/\partial r)^2+ij(\partial A_r/\partial r)(\partial A_o/\partial r)$
$+ji(\partial A_o/\partial r)(\partial A_r/\partial r)+jj(\partial A_o/\partial r)^2++ii(\partial Ar/\partial t)^2+ij(\partial A_r/\partial t)(\partial A_o/\partial t)+ji(\partial A_o/\partial t)(\partial A_r/\partial t)+jj(\partial A_o/\partial t)^2$.

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

Plugging in 6.2 and 6.4 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: $\partial A_r/\partial r+\partial A_o/\partial t=0$ (6.5)
$i[\partial^2A_r/\partial r^2+i\partial^2A_r/\partial t^2]=0$, $j[\partial^2A_o/\partial r^2+i\partial^2A_o/\partial t^2]=0$ or $\partial^2A_\mu/\partial r^2+\partial^2A_\mu/\partial t^2+..=1$ (6.6)

6.4 and 6.5 are **Maxwell's equations** (Lorentz gauge formulation) in free space, if μ=1,2,3,4.

$$\Box^2A_\mu=1,\ \Box\bullet A_\mu=0 \quad (6.7)$$

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 7.

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

For the **composite e,*ν*** on those required large z=0 eq.16 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 $\mathbf{r=r_H}$. Do similar math to 5.2-5.7 math and get instead a Proca equation The limit ε→1=τ (5.13) in ξ_1 at $r=r_H$.since Hund's rule implies $\mu=\varepsilon=1S_{½}$ $\leq 2S_{½}=\tau=1$. So the ε is negative in Δε/(1-ε) as in case 1 charged as in ch.3 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 $\varepsilon\to 1$ to case 1 in Ch5.
$E=1/\sqrt{(\kappa_{oo})}-1=[1/\sqrt{(1-\Delta\varepsilon/(1+\varepsilon)-r_H/r)}]-1=[1/\sqrt{(\Delta\varepsilon/(1+\varepsilon))}]-1$. $E_t=E+E=2/\sqrt{(\Delta\varepsilon/(1+\varepsilon))}-1=Z_o$ 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.6.2-6.7) 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

6.3 NONhomogeneous and NONisotropic Space-Time
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 $R_{\mu\mu}-\frac{1}{2}g_{\mu\mu}R=0$ (6.8) ≡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 $G_{oo}=0$. 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.
Left handedness
From sect.1 eqs.7 and 8 and 9 are combined. Note also from eq.16 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 and the negative sign in the above relation implies the neutrino chirality $\sigma\bullet p$ is negative and therefore is left handed.
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) .
6.4 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*: $< p,t\,|\,p\,|\,p,t >\equiv\int\psi^t p\psi dV$

(implies Hilbert space if ψ is normalizable). Or for any given operator 'A' we write in general as a definition of the expectation value: $< A >=< a,t \mid A \mid a,t >$ (6.9)

The time development of Newpde is given by the Heisenberg equations of motion (for Newpde. We can even define the expectation value of the (charge) chirality in terms of a generalization of Newpde 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 $½(1\pm\gamma^5)\psi_e = \chi_e$. Thus the overlap integral of a spin ½ and spin zero field is:

$$\text{<helicity of charge>} \equiv \int \psi_e^t \chi_e dV = \int \psi_e^t 1/2(1\pm\gamma^5)\psi_e dV \qquad (6.10)$$

So $1/2(1\pm\gamma^5)$=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 section 1 as C_M. Alternatively, in a second quantization context, equation 6.10 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. 6.11. Note the field and the wavefunction of the entangled state are related through e^{ifield}=ψ=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 $½(1\pm\gamma^5)\psi=\chi$. $<\gamma^5> = v = <c/2> = c/4$ So $1\pm\gamma^5 = \cos 13.04 \pm \sin 13.04$, θ=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.

6.5 Object B Effect On Inertial Frame Dragging

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 $(a/r)^2=m_ec^2$ (4.9) result used in eq.4.9. So Newpde ground state $m_ec^2 \equiv <H_e>$ is the fundamental Hamiltonian eigenvalue defining idea for composite e,v, $r=r_H$ implying Fermi 4 point $E=\int\psi^tH\psi dV=\int\psi^t\psi HdV=\int\psi^t\psi G$

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

$$\equiv \iiint_0^{r_H} \psi_1\psi_2 G \equiv \iiint_0^{r_H} \psi_1\psi_2(2m_ec^2)dV_{rH} = \iiint_0^{V_{rH}} \psi_1(2m_ec^2)\psi_2 dV_{r_H} \quad (6.8)$$

Object C adds it own spin (eg., as in 2nd derivative eq.6.1) 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

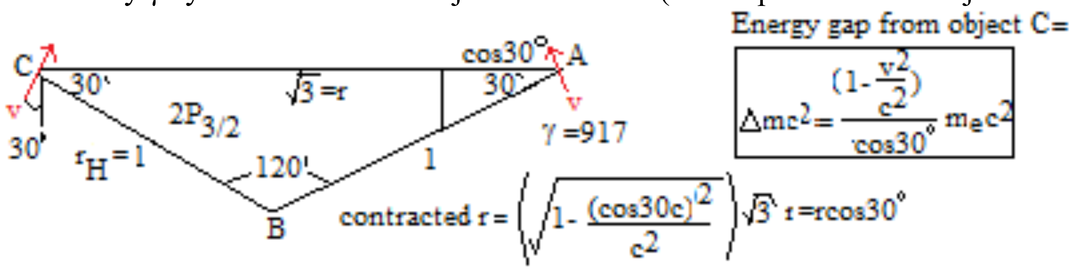
$$\Sigma((\gamma^\mu\sqrt{\kappa_{\mu\mu}}dx_\mu)-i\kappa)(\gamma^\nu\sqrt{\kappa_{\nu\nu}}dx_\nu+i\kappa)\chi = \Sigma((\gamma^\mu\sqrt{\kappa_{\mu\mu}}dx_\mu)-i\kappa)\psi \text{ so } ½(1\pm\gamma^5)\psi=\chi. \qquad (6.12)$$

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 $S_{½} \propto e^{i\phi/2} \equiv \psi_1$, the original ortho $2P_{1/2}$ particle is chiral $\chi=\psi_2\equiv½(1-\gamma^5)\psi=½(1-\gamma^5e^{i3\phi/2})\psi$. Initial $2P_{1/2}$ electron ψ is constant. Start with initial ortho state χ. These γ^5 terms then modify equation A8 to read $=\iiint_0^{V_{rH}} \psi_1\psi_2(2m_ec^2)dV_{rH} = \iint\psi_{S1/2}{}^*(2m_ec^2V_{rH}))\chi dV_\phi =$

$K\int\langle e^{i\frac{i\phi}{2}}[\Delta\varepsilon V_{r_H}]\left(1-\gamma^5 e^{i\phi\frac{3}{2}}\right)\psi\rangle\, d\phi = KG_F\int\langle e^{i\phi/2}-\gamma^5 i e^{i(4/2)\phi}\rangle d\phi = KG_F\left(\frac{2e^{i\phi}}{i}\Big|_0^{2\pi+C} - \frac{2\gamma^5 e^{i4\phi}}{i4}\Big|_0^{2\pi+C}\right)$ = k1(1/4+iγ^5)= k(.225+i$\gamma^5$0.974) =k(cos13°+iγ^5sin13°) **deriving the 13° Cabbibo angle**. With previously mentioned CP result(direct evidence of fractal universe) get CKM matrix

6.6 Object C Effect on Inertial Frame Dragging and G_F found by using eq.6.8 again (N=1 ambient cosmological metric)

Review of $2P_{3/2}$ Next higher fractal scale (X10^{40}), cosmological scale. Recall from eq.4.1 m_ec^2 =Δε is the energy gap for object B vibrational stable iegenstates of composite 3e (vibrational perturbation r is the only variable in Frobenius solution, partII Ch.8,9,10) proton. Observor in objectA. Δm_ec^2 gap=object C scissors eigenstates. is what we see at object A but Δm_ec^2 gets boosted by γ by rotation into the object B direction.(to compare with the object B m_ec^2 gap).



From fig 7 $r^2=1^2+1^2+2(1)(1)\cos 120°=3$, so r=√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 Δm_ec^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_ec^2 with this Δm_ec^2. Going into the AB frame automatically boosts $\Delta m_{ec}{}^2$ to $\gamma\Delta m_ec^2$. 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 Δm_ec^2 "time" CA onto BA= cosθ=projection of BA onto CA. But m_ec^2 is the result of object B of both of the motion and inertial frame dragging reduction (2.9) so its γ is large. To make a comparison of ΔE to AB mass m_ec^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_ec^2: So again

$$t'=\gamma(ct-\beta x) = kmc^2 = t' = km_ec^2 = \gamma\beta r_{CA} = \left(\frac{1}{\sqrt{1-\frac{v^2}{c^2}}}\right)\beta\left(\sqrt{1-\frac{cos^2 30°c^2}{c^2}}\sqrt{3}\right) = \gamma\beta cos30°$$

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

$$\frac{k\gamma\Delta m_e c^2}{km_ec^2} = \frac{\gamma\beta\left(\frac{x}{\gamma}\right)}{\gamma\beta r_{CA}} = \frac{1\beta 1}{\gamma\beta cos30°} = \frac{1}{\gamma cos30°}$$ so

$$\Delta m_e c^2 = \frac{\beta m_e c^2}{\beta cos30°°\gamma^2} = \frac{\left(1-\frac{v^2}{c^2}\right)m_e c^2}{cos30°} \qquad (6.12)$$

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 ($m_e c^2$. 6.8). So to summarize $\Delta E= (m_e c^2/((cos30°)917^2) = m_e c^2/728000$. So the energy gap caused by object C is $\Delta E=(m_e c^2/((cos30°)917^2) = m_e c^2/728000$. 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.6.9 Fermi 4 point it is entirely different than a mere 'weak' E&M. So for weak decay from equation 5.10 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 $\Delta E=1.19X10^{-19}/1.6X10^{-19}=.7$eV 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 $\Delta E=1.19X10^{-19}/1.6X10^{-19}=.7$eV 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 $\psi=\psi_N$.

The neutrino mass increases with nonistopic homogenous space-time (sect.6.3) and our direction of motion here) whereas that Kerr metric $(a/r)^2$ term (4.12) in general is isotropic and homogenous and so only effects the electron mass.

6.7 Multiple Applications Of The eq.5 Lorentz transformation 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 from eq.5.. 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 from eq.11 wher $p\rightarrow H$ giving 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 7.12)

$l_e = \binom{v_{EL}}{e_L}$

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.

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

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

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

6.8 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, Δε 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. C2 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 $\psi=e^{i(\omega t-kx)}e^{ixmo^2/2E'}$. So we transition through the given $\psi_{e\nu},\psi_{\varepsilon\nu}$, $\psi_{1\nu}$ masses (fig.6) 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.

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

Since we have now derived M_W, M_Z and their associated Proca equations, and Dirac equations for m_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, $gsin\theta_W=e$, $g'cos\theta_W=e$; solve for g and g', etc., We will have thereby derived the standard model from first principles (i.e.,postulate0). **It no longer contains free parameters.**

Note C_M=Figenbaum pt really is the U(1) charge and equation 16 rotation is on the complex plane so it really implies SU(2) (5.1) with the sect.6.8 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.16 which comes out of the Newpde given we even found the magnitude of its itnput parameters (eg., G_F , Cabbibo angle 6.4).

6.10 Construct The Standard Model Lagrangian

In ch.6 (see 6.8) we construct the Standard electroweak model from those rotations in equation 16 which came out of the postulate 1. Note we have derived from first principles (i.e.,from **postulate 1**) the new pde equation for the electron (eq.7 Newpde, pde for the neutrino (eq.8,9) in appendix A the 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 (sect.6.2). We even found the Fermi 4 point from the object C perturbations (section 6.7). The distance to object B determines mass and we found that it is equivalent to a scalar field (Higgs) source of mass in sect.6.7. 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 at $r=r_H$ strong force model (ie., composite 3e $2P_{3/2}$ at $r=r_H$ state of Newpde sect.1 eq. $r=r_H$, 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. Here it is:

1

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

2

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

3

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

4

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

5

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

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.

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

•So the *simplest idea imaginable* 0 implies all *fundamental math-physics.* no more, no less (eg., We simply have 4D and *not* the myriad of other dimensions as in string theory or hundreds of mainstream assumptions in the SM of fig.11.

7 Origin of the mathematics symbols needed to write down and use the Newpde

7.1 List- Define Mathematics

All mathematicians know that the limit of a Cauchy sequence of rational numbers is a Cauchy real number (Cantor(7) 1872). So all we did here is show we postulated real#0 by using it to derive a rational Cauchy sequence with limit 0. We did this because that same postulate (of real#0) math *also* implies fundamental theoretical physics (eg.,the Newpde 'solutions'sect1) making this a Ultimate Occam's Razor postulate(0) implying the ultimate physics theory, a important result indeed. Nothing is more Occam than postulate0.

Theory But we need to define the algebra first and use it to write the postulate. So define 1)*numbers* 1≡1+0 and **0≡**0X0,1≡1X1 as *symbol* **z=zz**: the *simplest* algebraic definition of **0**. So **2)Postulate** *real* number **0** *if* **z'=0** and **z'=1** plugged into z'=z'z'+C (**eq.1**) results in *some* C=0 constant(ie δC=0)

These 2 lines are the Ultimate Occam's razor origin of 1)algebra and 2)math-physics. Note the implied z=zz+C iteration numbers possibly are the larger 1+1≡2, 1+2≡3, etc (*defined* to be a+b=c) with the symbolic rules generated (eg.,ring-field def.) like a+b=b+a) with no new axioms. So *postulate 0 generates* the numbers and so the language of mathematics that we can now write with. The rest is just those (above) 2 plugin **Applications:**

Plug 0 into **eq.1** and get the Mandelbrot set
Plug 1 into **eq.1** and get the Dirac eq.
Dirac plus Mandelbrot gets the Newpde
So Ultimate Occam's razor postulate(0) implies ultimate math-physics

We can include set theory as *definitions* for example.

Postulate 0 and define 1∪C≡1+C. if A∩B=∅. 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 from 1∪C≡1+C.

Because of our postulate of 0 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.

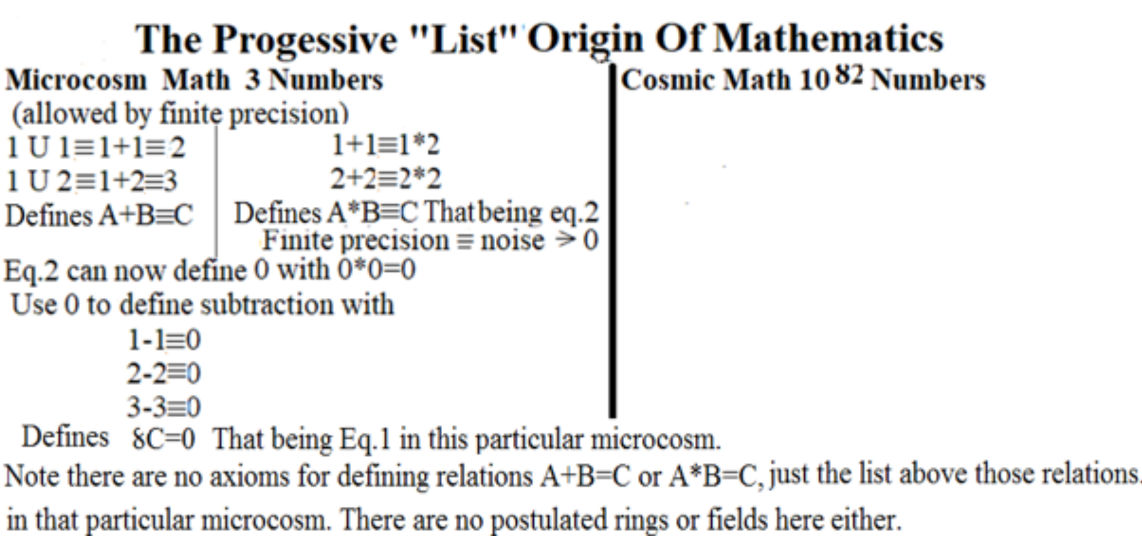


Fig.7

Note the implied z=zz+C iteration (required to prove postulate real 0 if z_o=z=0) numbers possibly are larger so don't have to be postulated. So we can merely *list* 1+1≡2, etc (*defined* to be a+b=c) with the symbolic rules defined (eg.,ring-field def. like a+b=b+a). with no new axioms.

We proceed into larger and larger microcosms(numbers). 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.

Set theory defined

For example 1∪C≡1+C (If A∩B=∅).with algebraic definition of 1 z=zz having both 1,0 as solutions so defining negation ~with 0=1-1 Thus we can define interesection∩ with ~((A∪B)~B~A)≡A∩B. So we have defined both union ∪ and intersection ∩ therefore we have derived set theory.

Completeness and choice

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

Note also our postulate of 1 defines the important mathematical concepts of "Completeness" (min(**z-zz**)>0) and "choice" (since the choice function is z=zz+C) which are then NOT postulates here.

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, δC=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 (Ch.2, 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. Here also 10^{82} is the *largest* number of (**observable**) electrons and so we have a *complete* definition of math. So in conclusion the postulate of real 1 negates Godel's incompleteness theorem. Nothing observable is bigger than r_H and no number of electrons is larger than 10^{82}., making Godel's incompleteness theorem wrong.Note we have no interest at all in any number or thing that is not observable. Godel was missing equation 11, the equation that defines an observable (operator).

.

Development (applications) of integers and real numbers as <u>definitions</u>, not axioms

That required iteration generates larger numbers (so bigger numbers (eigenvalues) don't have to be postulated. Note the only math rules are what is postulated here, the rest are defined. We can then define(name) 2 as the larger number 1+1,3 as 1+2 etc., with the respective d*efined* symbols a+b=c and rules eg., a+b=b+a (ring-field) and we got the rel# math as well with no new 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 √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

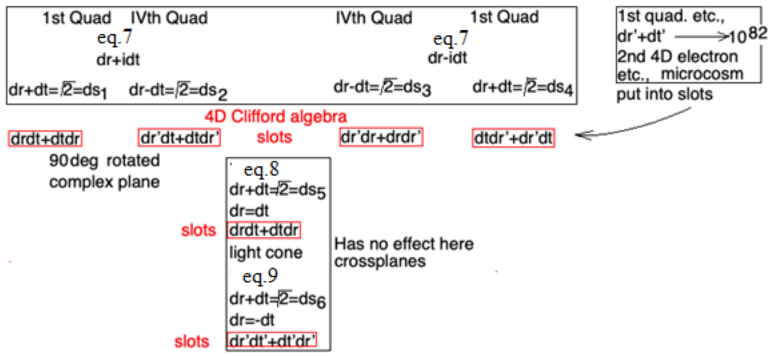


Fig.8 These added cross term eq.15 objects (eq.11) extend eigenvalue equation 11 from merely saying 1+1=2 all the way to the number10^{82}.

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 sect.3.2. 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∪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 $|\alpha>$ for which $a|\alpha>=(N-1)|\alpha>$. Also recall eigenvalue 1∪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).

(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.14 ,11) 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).

Binary (z=zz) 1,0 signal with white noise δC=0 in z'+C=z'z'.

Digital communication anology

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

7.12 Details of Fractalness

iteration Math

Recall from eq.7 that dr+dt=ds. So combining in quadrature eqs 7&11 SNR of δz=(dr/ds+dt/ds)δz =((dr+dt)/ds)δz=(1)δz (11c) and so having come *full circle* back to sect.1 postulate 0 as a real eigenvalue (0≡Newpde electron). So, having come *full circle* then: (**postulate 0⇔ Newpde**), back to our section 1. So we rewrite our title:
"The Ultimate Occam's razor theory (ie 0) is *the same as* the ultimate math-physics theory (ie Newpde)". 'One -' defines the other(observable circle 0) analogous to an ankh circle -0.

Our Limit Definition (eg., for 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 the Newpde and 10^{82} is the maximum such(observable) 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→0 we have limit x→Δ 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 ε>0 there exists a number δ>0 such that for all x in S satisfying

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

we have

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

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

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

Hausdorf (Fractal) s dimensional measure using ε, δ

Diameter of U is defined as

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

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

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

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

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

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

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

So if s implies a zero H or infinite H it is not the correct dimension. This rule is analogous to the definition of the (fractal) Mandelbrot set itself in which a C that gave infinity is rejected by the definition δC=0 we can model as a binary pulse (z=zz solution is binary z=1,0) with **zz=z (1) is the algebraic definition of 1 and can add real constant C** (so z'=z'z'-C, δC=0

7.12 We can isolate lemniscate Mandelbrot Set implied by the perfect circle (eq.11) observability if also 4X circles included.

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 $z_{N+1}=z_Nz_N+C$

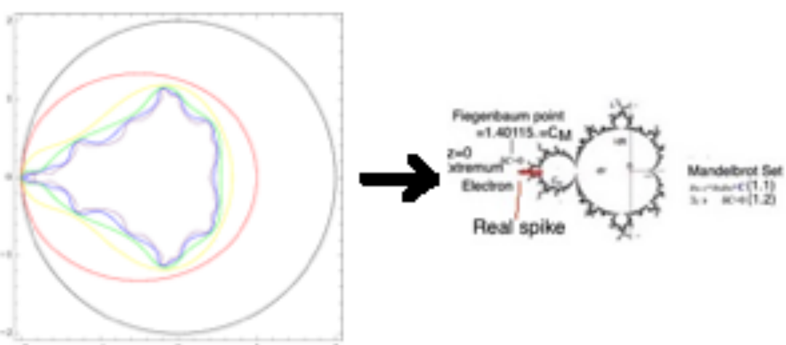


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fig7 Lemniscate sequence (Wolfram, Weisstein, Eric) $C_{N+1}=C_NC_N+C$. $C=C_1=dr^2+dt^2$, $C_0=0$.
After an infinite number of successive approximations $C''=C'C'+C =C_M^2$
Mandelbrot calls C_M the ER, Escape Radius (see Muency).
Note then *observability* thereby implies *only* the basic Mandelbrot set structure and so not all the other parts, the flourishes, of that zoom.

But the δC=0 extreme additionally imply states whose life times are long enough to be observable and those are at the δC=0 extreme of the (observably) 4X circles Fiegenbaum point, at C=– ¼ and 4 others at 45°,67° which are the "physical" pieces that can then (only) be pulled out of the zoom clutter. From the sect.1 these 4X Circles resulting in the 'observability' of eq.11 these z=0 lemniscates constructed from these circles give $\delta z=r_H=C_M10^{40N}/\xi_1=\Delta$ perturbations to C and so Δ perturbations to z=0 from eq.3. So z=0→z=0+Δ. (7.1)

7.13 There is an average of the Mandelbrot set length that must also be fractal

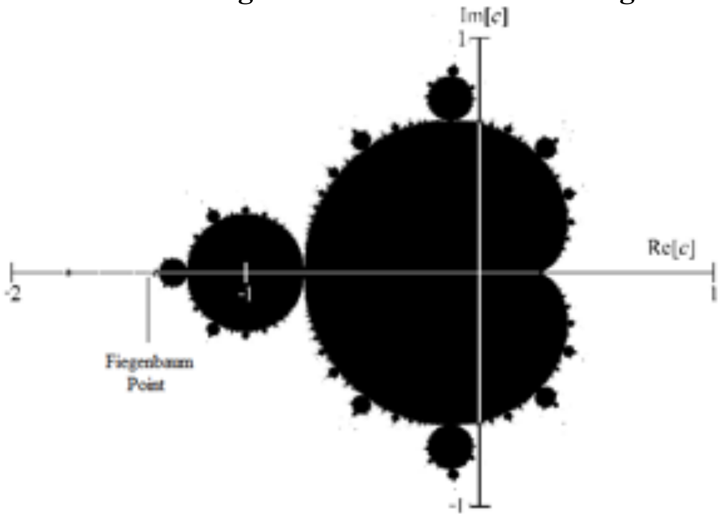


fig. 9

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 1 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.

7.14 As an alternative to just saying the real number neighborhoods are merely dense(7), here we have (these dense) Fractal neighborhoods also containing myriads of univereses!

Recall section 1 and the derivation of the fractal space time. So there is an organization to these real 2D (irrational and rational numbers) implied by fractal solutions to eq.1. For example there is also this underlying space-time fractal structure {neighborhood{C_M}∩{-r axis}} that contains even fewer elements (eq.5) than the rational numbers and which only "exists" when the "fog" (recall above C≈0) is not thick, i.e. when C goes to 0 so when the (eq.5) δδz gets big (ie.,high energy physics). It permeates all of space and yet has zero density. It is a very intriguing 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 extremum of the horizontal Mandelbrot set dr 4X circle axis (ie.,Fiegenbaum point) with this extremum given by the 4X circles given the underpinning of the lemniscate perfect circles fig.7. But from the perspective (scale) of this N=1 fractal scale observer one of the 10^{40}X smaller (N=0 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 the Newpde for N=0. Thus we also have the Riemann surfaces of fig.4 if we continue our rotations beyond 360°.Riemann surface lepton families. 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 N=0 fractal scale ($r>r_H$) as a noise object (C>0). So 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 of small C (sect.1.4).

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.

Simultaneous Equations 20 2D⊕2D Cartesian Product, Spherical Coordinates and $\sqrt{\kappa_{\mu\nu}}$

Note adding 2D eq.16 δz perturbation gives 4D $(dx_1+idx_2)+(dx_3+idx_4)\equiv dr+idt$ given (eqs5,7.2) $dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$ *if* $dr^2\equiv dx^2+dy^2+dz^2$ so that $\gamma^r dr\equiv\gamma^x dx+\gamma^y dy+\gamma^z dz$, $\gamma^j\gamma^i+\gamma^j\gamma^i=0$, $i\neq j$,$(\gamma^i)^2=1$ (B2), rewritten (with eq14) $(\gamma^x\sqrt{\kappa_{xx}}dx+\gamma^y\sqrt{\kappa_{yy}}dy+\gamma^z\sqrt{\kappa_{zz}}dz+\gamma^t\sqrt{\kappa_{tt}}idt)^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$. Multiply both sides by $1/ds^2$& $(\delta z/\sqrt{dV})^2\equiv\psi^2$ and using operator eq 11 inside the brackets( ) get **Newpde** $\gamma^{\mu}(\sqrt{\kappa_{\mu\mu}})\partial\psi/\partial x_{\mu}=(\omega/c)\psi$ for e,ν, $\kappa_{oo}=1-r_H/r=1/\kappa_{rr}$ $r_H=e^2X10^{40\mathbf{N}}/m$ (**N**=. -1,0,1.,) (20)
$=C_M/\xi_1$ (from* eq.13) C_M=Fiegenbaum point. So: **postulate1→Newpde.** syllogism
Note from eq.11 the (dr,dt;dr'dt') has two times in it so can be rewritten as $(dr,rd\theta,r\sin\theta\omega dt,cdt)\equiv(dr,rd\theta,r\sin\theta d\phi,cdt)$

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

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, $C \to 0$ 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 $E_n = \mathrm{Rel}(1/\sqrt{g_{oo}}) = \mathrm{Rel}(e^{i(2\varepsilon+\Delta\varepsilon)}) = 1-4\varepsilon^{2/}4+..$ $=1-2\varepsilon^2/2 \equiv 1-\frac{1}{2}\alpha$. Multiply both sides by $\hbar c/r$ (for 2 body S state $\lambda=r$, 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($r=\lambda/2$, 2 body S state)+E&M where we have then derived the fine structure constant α.

7.15 Alternative ways of adding 2the postulatw 1D+2D→4D

Recall from section 1 that adding the N=0 fractal scale 2D δz perturbation to N=1 eq.7 2D gives curved space 4D. So $(dx_1+idx_2)+(dx_3+idx_4) \equiv dr+idt$ given (eqs5,7a) $dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$ *if* $dr^2 \equiv dx^2+dy^2+dz^2$ (3D orthogonality) so that $\gamma^r dr \equiv \gamma^x dx+\gamma^y dy+\gamma^z dz$, $\gamma^j\gamma^i+\gamma^j\gamma^i=0$, $i\neq j$, $(\gamma^i)^2=1$, rewritten (with curved space $\kappa_{\mu\nu}$ eq.13-15)
$(\gamma^x \sqrt{\kappa_{xx}}dx+\gamma^y \sqrt{\kappa_{yy}}dy+\gamma^z \sqrt{\kappa_{zz}}dz+\gamma^t \sqrt{\kappa_{tt}}idt)^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2= ds^2$.

But there are alternaives to this 3D orthogonalization method. For example satisfying this 4D Clifford algebra and complex orthogonalization requirement is a special case of any 2 x_ix_j in eq.3 (directly from postulate1): Imposing orthogonality thereby creates 6 pairs of eqs.3&5. So each particle carries around it's own dr+idt complex coordinates with them on their world lines. Alternatively this 2D dr+idt is a 'hologram' 'illuminated' by a modulated $dr^2+dt^2=ds^2$ 'circle' wave (as 2nd derivative wave equation operators from eq.11 circle) since 4Degrees of freedom are imbedded on a 2D (dr,dt) surface here, with observed coherent superposition output as eq.16 solutions. A more direct way is to simply write the 4Degrees of freedom on the 2D surface as $dr+idt= (dr_1+idt_1)+(dr_2+idt_2) =(dr_1,\omega dt_2),(dr_2,idt_2)= (x,z,y,idt)=(x,y,z,idt)$, where $\omega dt \equiv dz$ is the z direction spin½ component ω (angular velocity) axial vector of the Newpde lepton (eqs.7-9); which we get anyway from lepton equation eq.16.

N=-1 and dimensionality

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

7.16 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 1 for $C\to 0$ δz=0,-1. So eq.3 implies 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 since at the end C≈0 (top of sect.1). So need boost so C_M/ξ_1=C is small so with ξ_1 big with ξ_o stable core (electron) mentioned above.. For z=1 in fig.6 ξ_1 is big so τ,μ,e can be free S states (since ξ_1=τ+μ+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

7.17 Observer-object alternative way (to iterating eq.1) to understand fractalness

Recall also that eq.7 has two solutions and associated two points one of which we define as the observer. In the new pde: $\sqrt{\kappa_{\mu\mu}}\gamma^\mu\partial\psi/\partial x_\mu=(\omega/c)\psi$ Newpde, (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.1 as we did at the outset. To show this note from equations 14 we have the Schwarzschild metric event horizon of radius R≡2Gm/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.

7.18 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.
Recall that we started out with: . Construct postulate 0 from

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

Also since Newpde 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 **postulate0→Newpde.**

Modern Philosophical Implications
Recall our fundamental idea is:
1)List 1≡1+0 and (*list*) **0≡**0X0,1≡1X1 *defined* as **z=zz**: the *simplest* algebraic definition of **0**. So we
2) **Postulate** *real* number **0** *if* **z'=0** and **z'=1** plugged into z'=z'z'+C (**eq.1**) results in *some* C=0 constant(ie δC=0)
Note 0 is what exists and we must define 1 to be able to define what 0 is. But Martin Heideger in "Nothingness" says nothingness is all that exists and we must define something to be able to define what nothingness is. So Martin Heideger had the same idea as our ulitmate Occams razor postulate of rel#0. But our postulate 0 is based on that Cauchy sequence limit being 0, his result in contrast is merely 'word games' and so has no merit whatsoever.

Conclusion: So by merely (plugging 0,1 into eq.1) **postulating 0**, out pops the universe, BOOM! easily the most important discovery ever made or that will ever be made again. We finally figured it out.
Getting it right also implies the promise of breakthrough physics from our new (postulate 0) model.

Appendix A Fractal δz oscillation inside r_H for observer

Comoving Coordinate System: What We Observe Of The Ambient Metric

Recall from Newpde (eq. 5.6): $E=\frac{1}{\sqrt{\kappa_{00}}}=\frac{1}{\sqrt{1-\frac{r_H}{r}}}$. 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)
$i\hbar\frac{\partial\psi}{\partial t}=\frac{\hbar c}{i}\left(\alpha_1\frac{\partial\psi}{\partial x^1}+\alpha_2\frac{\partial\psi}{\partial x^2}+\alpha_3\frac{\partial\psi}{\partial x^3}\right)+\beta mc^2\psi=H\psi$. (4.0) 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.): 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 $\delta z=\sqrt{\kappa_{oo}}dt=$ $e^{-i\varepsilon_r\frac{mc^2}{\hbar}t}\rightarrow e^{i(\varepsilon+\Delta\varepsilon)}$ (4.0)

Recall from the Mercuron equation (4.3a) that ε carries the time with it and τ is normalized ($\delta z=\psi=\tau+i(\varepsilon+\Delta\varepsilon)+..=1+i(\varepsilon+\Delta\varepsilon)+.=e^{i(\varepsilon+\Delta\varepsilon)})\equiv e^{-i\varepsilon_r\frac{mc^2}{\hbar}t}$)because it is a constant structure Mandelbulb (at 68.87°) in the Mandelbrot set (fig.6). So here N=1 fractal scale (6.9) fractal $e^{-i\varepsilon_r\frac{mc^2}{\hbar}t}\rightarrow e^{i(\varepsilon+\Delta\varepsilon)}$. $\delta z=e^{i(\varepsilon+\Delta\varepsilon)}$ (4.0)

so $\delta z=e^{\varepsilon}$ =source→sinhε. So $\delta z=e^{(i2Ht/\hbar)}$

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 ε+Δε on the right side of eq.3.2 and eq.6.9:

$R_{22}=½\Delta g_{22}=e^{i(\varepsilon+\Delta\varepsilon)}e^{i\pi/2}=\sin(\varepsilon+\Delta\varepsilon)+i\cos(\varepsilon+\Delta\varepsilon)$. (A1)

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

A1 N=2 observer sees that we see: Comoving Interior Frame

Recall N>0≡observer. Here we find what that N=2 fractal scale observer sees what we see if sinμ->sinhμ for $r>r_H$ going to $r<r_H$ in $E=1/\sqrt{\kappa_{oo}}=1/\sqrt{(1-r_H/r)}$ since the E in $\delta z=e^{iEt}\equiv e^{i\mu}$ and so μ then becomes imaginary. Recall limit R_{ij} as r→0 is the source, where gravity creates gravity in the Einstein equations which becomes the modulation of the DeSitter ball. (3.2).

$R_{22}=e^{-\lambda}[1+½\,r(\mu'-\nu')]-1$ with μ=ν (spherical symmetry) and μ'=-ν'. So as r→0 , ImR_{22}=.

$Im(e^{\mu}-1)=\mu+..=\sin\mu=\mu+..$for outside r_H imaginary μ for small r (at the source) so sinμ becomes a gravitational source (gravity itself can create gravity as a feedback mechanism). The N=2 observer then multiplies by i iR_{22}, -sinμ and μ to get $R_{22}=-\sinh\mu$ to see what the N=2 observer sees that we see inside r_H so:

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

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

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

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

This can be rewritten as: $e^{\mu}d\mu/(1-\cosh\mu)=dr/r$ (A2)

The integration is from $\xi_1=\mu=\varepsilon=1$ to the present day mass of the muon= .06 (X tauon mass). Integrating equation A1 from ε=1 to the present ε value we then get:

$\ln(r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-\ln[e^{\mu}-1]]2$ (A3)

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.

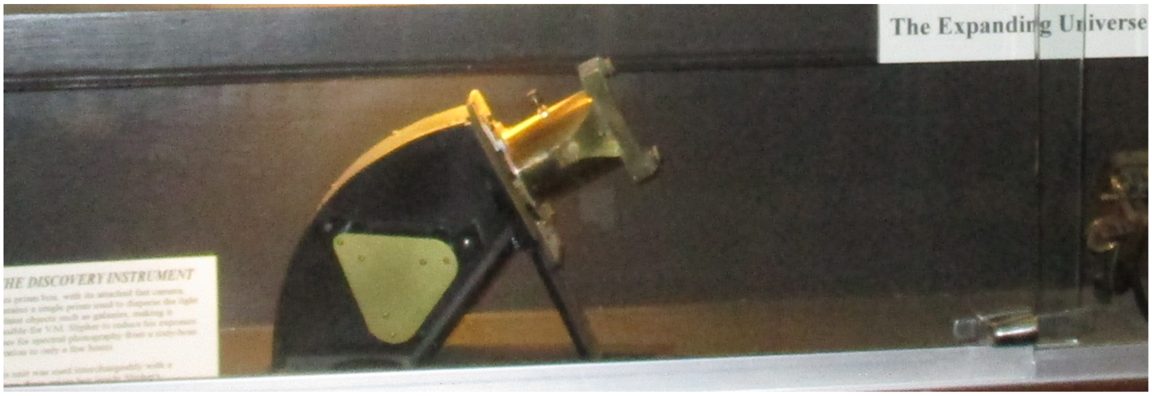
The radial component $r = r_{M+1}$ in A3 is still a function of that r_{bb} mercuron radius
Also the $\kappa_{oo}=1-r^2/r_H^2$ in A3 (instead of the external observer $\kappa_{oo}=1-r_H/r$) in $E=1/\sqrt{\kappa_{oo}}$ in looking outward (internal observer) at the cosmological oscillation from the inside ($r<r_H$) 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.A3 derivation. Since the metric is inside $r<r_H$ it is also a source as we see in later section 5.4

A2 N=-1, with N=1 zitterbewegung $r<r_H\, e^{\omega t}$ -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

$$(\partial x_{oN})/\partial x_{oN+1})\ (\partial x_{oN})/\partial x_{oN+1})T_{ooN}-T_{ooN}=T_{ooN-1} \qquad \text{(A5)}$$

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.

A3 Derivation of The Terms in Equation A4
For free falling frame no coordinate transformation is needed of source T_{oo}. For non free falling comoving frame with N+1fractal eq.A4 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 A3.: 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.

A4 Dyadic Coordinate Transformation Of T_{ij} In Eq. A5 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 $T_{oo}\rightarrow T_{oo}'=T_{oo}+dT_{oo}.\equiv T_{oo}+G_{oo}$ (eq. A5).

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 $Z_{oo}\rightarrow Z_{oo}+z_{oo}$ (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 $S_{½}$ state of Newpde $\varepsilon=.06006=m_\mu+m_e$ From equation 4.2 and $e^{i\omega t}$ oscillation in equation 4.2. $\omega=2c/\lambda$ so that one half of λ equals the actual Compton wavelength in the exponent of Ch2. Divide the Compton wavelength $2\pi r_M$ by 2π to get the radius r_M so that $r_M=\lambda_M/(2(2\pi))= h/(2m_ec2\pi)=$ $6.626X10^{-34}/(9.1094X10^{-31}X2.9979X10^{8}X4\pi)=1.9308X10^{-13}$

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 $1.036/\pi=1/3.0334$ (A6)

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.A1 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 4.2 the ambient metric expansion component Δr is:

$$\text{eq.4.2 } \Delta r=r_A(e^{\omega t}-1) \quad . \qquad \text{(A7)}$$

To find the physical effects of the equation 11.4 expansion *we must* do a dyadic radial coordinate transformation (equation A1) 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 $Z_{oo} \rightarrow Z'_{oo} \equiv Z_{oo}+z_{oo}$ (A8)

After doing this Z'_{oo} calculation the resulting (small) z_{oo} is set equal to the Einstein tensor gravity source ansatz $G_{oo}=8\pi G m_e/c^2$ 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 discussion of the equivalence principle. Note Lorentz transformation similarities in eq.5 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 A5 and therefore A5 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 A5 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 A5 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 A5 to A7 and A8 and the resulting equation 4.7.1 into equation A8 we have in $S_{1/2}$ state in equation A8:

$$\frac{8\pi e^2}{2(1+\varepsilon)m_p c^2}\delta(r) = Z_{00} = R_{00} - \frac{1}{2}g_{00}R,\ \frac{\partial x^0}{\partial X^\alpha}\frac{\partial x^0}{\partial X^\beta}Z_{\alpha\beta} = Z'_{00} = Z_{00}+z_{oo} \approx \quad \text{(A9)}$$

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

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

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

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

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

$$= 2\left(\frac{e^2}{2(1+\varepsilon)m_p}\right)\left(\frac{r_M}{cm_e 3.03(1+\varepsilon)}\right)\left(\frac{[e^{\omega t}-1]\delta(r_0)}{[e^{\omega t}-1]H_t}\right) = G\delta(r_0)$$

Make the cancellations and get:

$2(.065048)[(1.9308\text{X}10^{-13}/(3\text{X}10^8\text{X}9.11\text{X}10^{-31}\text{X}3.0334(1+.0654))] (2.306\text{X}10^{-18}) =$
$=2(.065048)(2.2\text{X}10^8)(2.306\text{X}10^{-18}) = 6.674\text{X}10^{-11}\ \text{Nm}^2/\text{kg}^2 \equiv G$ (A10)

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 A1o 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.
Note the 10^{40N} applies to Gm^2 *not* just to G
Also note that what was calculated is the *mass of the electron times G i*n that derivation. But electron mass is most certainly dependent on the object A zitterbewegung (and so the Hubble constant) as I have it in the calculation.
So if $Gm^2=e^2(10^{-40})$ then $Gm=(e^2)10^{-40})/m$ with m a function of the present Hubble constant. So it appears that 10^{40N}, N=-1 and this calculation are consistent.

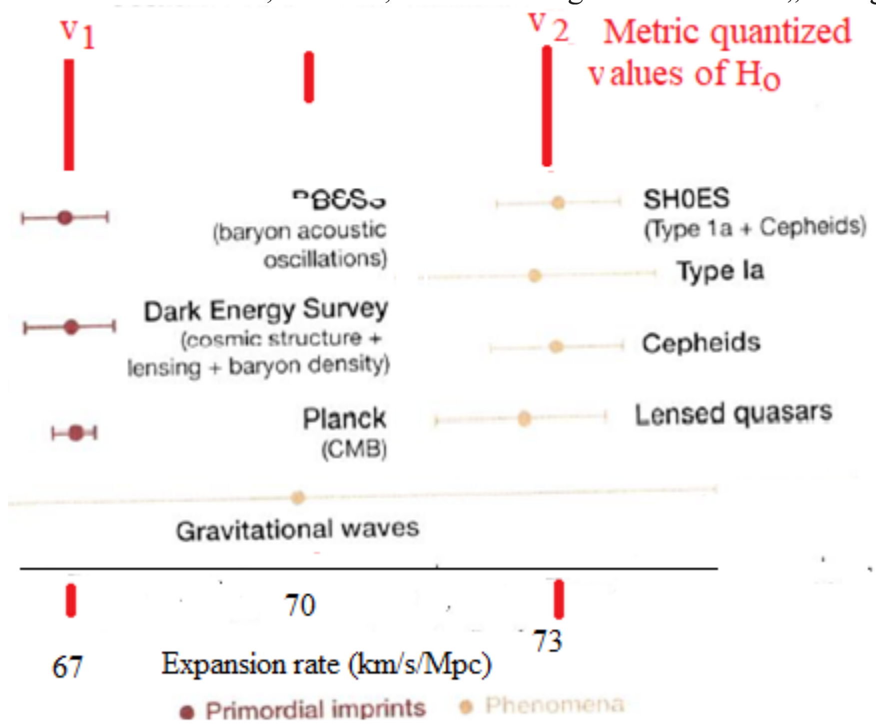
To summarize we have then just done a coordinate transformation to the moving frame to find the contributing fields associated with the moving frame. Analogously one does a coordinate transformation to the charge comoving frame to show that current carrying wires have a magnetic field, also a 'new' force, around them. Also note that in the second derivative of eq.4.2 $\mathbf{d^2r/dt^2=r_o\omega^2e^{\omega t}}$**= radial acceleration.** Thus in equations A9 and A10 (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 $t=13.8X10^9$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 $13.8X10^9/3.26=4.264X10^9$ parsecs= $4.264X10^3$ megaparsecs assuming speed c the whole time. So $3X10^5$km/sec/$4.264X10^3$ megaparsecs = 70.3km/sec/megaparsec= Hubble's constant for this theory.

A5 Metric Quantized Hubble Constant

Metric quantization 5.6 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**

A6 Cosmological Constant In This Formulation

In equation 17 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 4.2 $a=a_o(e^{\omega t}-1)$ 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 ω=1.99X10^{-18} with 1 year=3.15576X10^{7} seconds, also c=3X10^{8} m/s. So:
Λ= 3(ω^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 Λ=1.658X10^{-35}/s^2 contribution.

References

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

A7

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 $\mu\approx 1$ 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 4.2 harmonic coordinates from the new pde in the sine wave bottom.

A8 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:

$$\int\psi^* p_x \psi dV \equiv \langle p_x\rangle = \langle p,t|p_x|p,t\rangle \text{ of } p_x. \qquad \text{(A9)}$$

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: $\quad r=r(o)+c^2p/H+(\hbar c/2iH)[e^{(i2Ht/\hbar)}-1](\alpha(0)-cp/H)$. (A10)

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

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) $\quad i\hbar\frac{\partial\psi}{\partial t}=\frac{\hbar c}{i}\left(\alpha_1\frac{\partial\psi}{\partial x^1}+\alpha_2\frac{\partial\psi}{\partial x^2}+\alpha_3\frac{\partial\psi}{\partial x^3}\right)+\beta mc^2\psi=H\psi$. 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 $\delta z=\sqrt{\kappa_{oo}}dt=$ $e^{-i\varepsilon_r\frac{mc^2}{\hbar}t}\rightarrow e^{i(\varepsilon+\Delta\varepsilon)}$ (4.2) so $\delta z=e^{\varepsilon}=$source$\rightarrow\sinh\varepsilon$. 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.

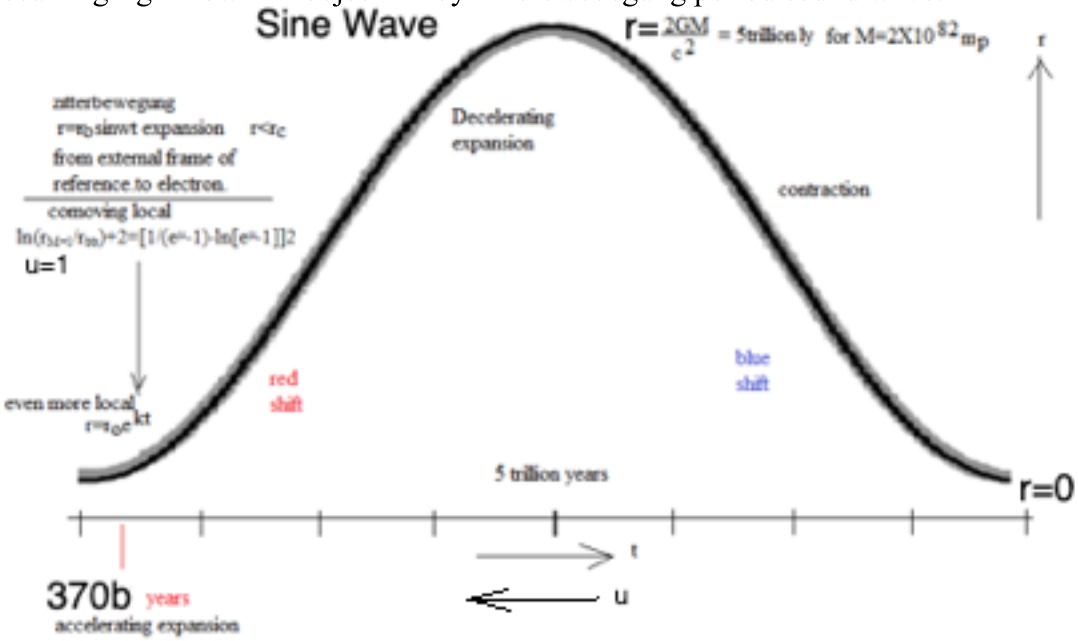


fig.10

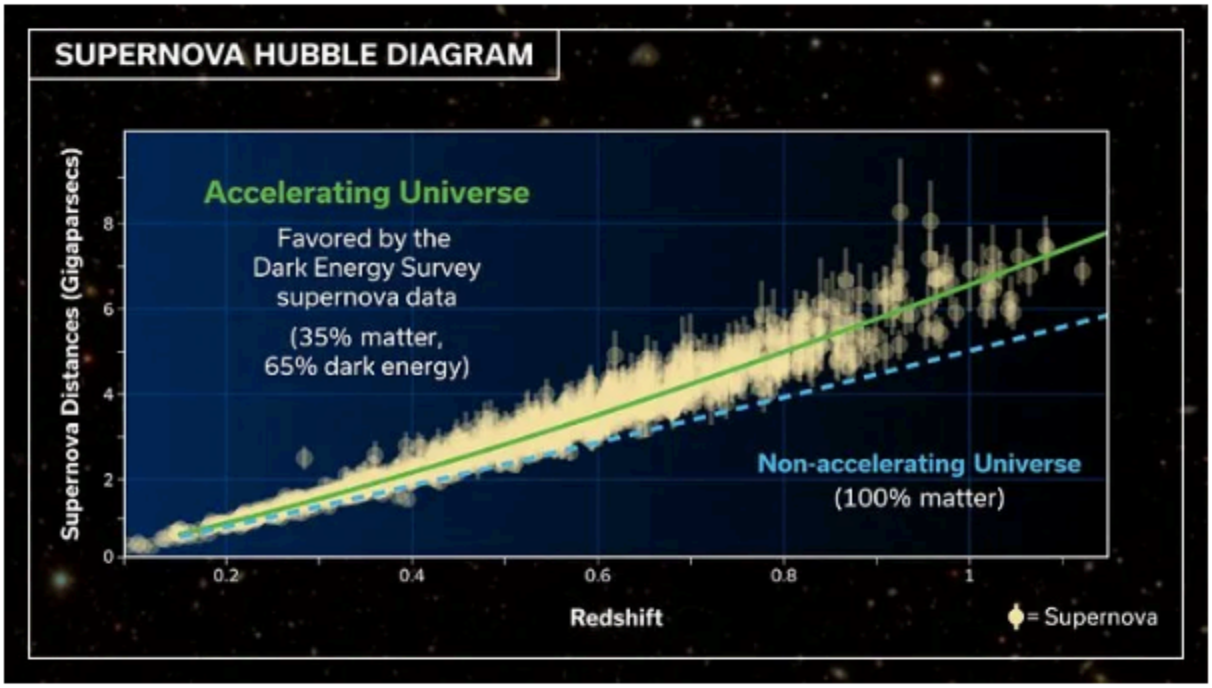
Sine Wave

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

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