Postulate 1

Problem: We want to understand but
Many Assumptions means a lack of fundamental understanding.

Solution

Cantor-Cauchy sequence z_n of rational numbers defines the real numbers, eg.,1
Fundamental insight: sequences $\mathbf{z_n}$ Cantor-Cauchy = iteration sequences $\mathbf{z_n}$ Mandelbrot so

One simple assumption **Postulate** 1 (real set) ->Mandelbrot set -> eigenfunctions z.
means ultimate understanding.
Problem solved

Appendix Algebraic steps:
Definition of Mandelbrot set: $z_{N+1}=z_N z_N+\mathbf{C}$ (1a) & $\delta C=0$ (1b). Big C is the whole set.
Small C: (i.e.,$C\rightarrow 0$) So $z_1=z_\infty\equiv z$ in eq.1a has as the only noniterative result: $z=zz+C$ (eq.1)
From eq.,1,1b solve for z eigenfunctions (the reason for the small C analysis)
Big C rotates z 80°±80° to keep z a eigenfunction (thus observables) giving leptons and Bosons.

Summary of algebra: Solve eq.1,eq.1b for z and rotate that solution.
Postulate 1 is the *simplest assumption* imaginable.

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Details of algebraic steps of small C and big C analysis: Summary of Ch.1
Mandelbrot set definition:
$z_{N+1}=z_N z_N+\mathbf{C}$ (1a)
$\exists_C \ni$ $\delta C=0$ (1b)

Small C: (i.e.,$C\rightarrow\Delta$) So $z_1=z_\infty\equiv z$ in eq.1a (if $\Delta\approx 0$) has as the only noniterative result:
$z=zz+C$ (eq.1). (note binary 1,0 real#math result)
From 1,1b Solve For z (nontrivial on the Mandelbulb edge where $\Delta\approx 0$ and $\delta\delta z=0$).
Use ansatz $z\equiv 1+\delta z$.
Rewrite eq.1. Turns eq.1 into quadratic equation $-\delta z=\delta z\delta z+C$. (1c)
with general solution complex $\delta z=dr+idt$

Then plug eq.1c into eq.1b. Get $\delta(\delta z\delta z)=0$ (eq.2) with
Real part eq.2 is eq.2A: $ds^2=dr^2-dt^2$. (→SR)
Imaginary part of eq.2 is eq.2B: extreme $drdt+dtdr=0$ (→Clifford algebra).
Factoring eq.2A gets us $dr+dt=ds$, $dr-dt=ds$, 2AI (→degenerate ±e)
$dr+dt=ds$, $dr=-dt$, 2AIIA (→light cone *ν*)

dr-dt=ds,   dr=dt,   2AIIB.   "   "

Implying 2AIA eigenfunctions **z** (so observables given 2B) at 45°.

Equation 1c gives for small fractal baseline drdr<<dr≈±C and so θ=C/ds=Fg/ds=±80°

Big C. ds^2 invariance requirement for observables (at Fiegenbaum point Fg=1.4..where δC=0)

So use (dr-C)+(dt+C)=ds at 45°.

→θ=80°±80°+Δ rotation of z gives Bosons and leptons.

Details of Big C results   (Big C whole set. Summary of section 4)

Given above ds^2 invariance large C then implies that two successive 80°+80°-Δ >Fg z rotations are iterations that give Laplacian operators characteristic of Bosons, eq.4.2b.

Rotate z	**80°+80-Δ°**	**or**	**80°-80°-Δ**
	Bosons		Leptons

For Bosons we then must rotate by 80°+80°-Δ this (small C) δz through 2 quadrants: (so S=½±½=integer) from the 4 different axis' max extreme (of 2AIA and 2AI) branch cuts and so get the 4 results: the Z, +-*W, photon* Bosons of the Standard Model (We have derived it!) with correct field equations (eg.,A6). Also this rotates SR into GR (So we have derived GR too!!) and for 80°-80°=Δ, 2AI and 2AII become eq.9. This same rotation also breaks those two 2D degeneracies of eq.2AI (by Δ) creating our **4D** at the Fiegenbaum point. Three eq.9 2AI components in its $2P_{3/2}$ at $r \approx r_H$ state give the baryons (PartII) and the tauon and muon are $S_{1/2}$ excited states of eq.9. That 10^{40}X fractal electron scale difference of the r_H (so next smaller r_H gravity from our SR rotation, cosmology) in the (eq.2AI) eq.9 is at the Fiegenbaum point (Fg) where δC=0 (i.e., ground state) even for 4D. Large fractal baseline (mixed and pure lepton) metric quantization states are in partIII. Mond is a special case.

So for big C we have merely rotated local z by 80°±80° to become eigenfunctions z.

Why It is Important

So we derived both physics and math, the most rational thing we could be doing. That **4D** implies we got not more and not less than the physical universe. Also given the fractalness, astronomers are observing from the inside of what particle physicists are studying from the outside, that ONE thing (eq.9) we postulated. Try looking up at a starry night sky and contemplating that some time. This illustrates the infinite simplicity of this idea. So by knowing essentially nothing (i.e., ONE) you know everything! We finally do understand, just postulate 1

References

(1)Cantor: Ueber die Ausdehnung eines Satzes aus der Theorie der trigonometrischen Reihen,

"Ueber eine elementare Frage der Mannigfaltigkeitslehre" Jahresbericht der Deutschen Mathematiker-Vereinigung

(2) Penrose in a utube videa implied that the Mandelbrot set might contain physics. Here we merely showed how.

FOREWORD (Referencing eq.9)

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. 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

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 eq.9)

"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.9 pde $\gamma^r\sqrt{(\kappa_{rr})}\partial\psi/\partial r=(\omega/c)$ (2AI) 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!

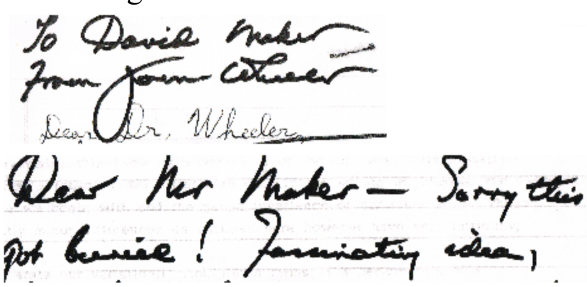
Reinhart Engelmann, Oct 2009

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

Universe As A Particle In A Fractal Space-Time

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.

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Chapter 1

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Section2 Factor Result to get z
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Section4 Large C. (Many small C). **Rotate z**
N+1 Fractal Scale (e,-e and *ν,*anti*ν* CCW rotation) μ,τ
Ambient metric contributes to object B $(a/r)^2$ Kerr metric. Filters.
Nth Fractal Scale
Many Bodied
3 (2AI) fill in rest of CCW rotations Z_o,+W,-W, at $r=r_H$

Introduction

So just **postulate 1** (Everyone knows 1 is a real number.).
Then use Gaussian elimination on eq.1 and 1b to solve for z and C.
The mundane context for this 1 in the postulate1 is that of an averaged *observed* signal (eg.,electron,eq.2AI) X in X±ΔX, ΔX=Standard Deviation= SD≡√variance. So observation (sensor defined noise) plays a math role here, were X is a function of {observer∪signal} with random error ΔX. Then normalize X/X±ΔX/X≡1±(Δ1)' ≡1±(δ1)' ≡Generic Signal(GS)≡z'.

So then how do you easily remember this entire theory? Just Postulate 1. That's the whole theory! Ah, you say, that can't be all there is to it since "ONE" has *algebraic* properties too (eg.,1=1*1+0). My response to that statement is that this merely means you then have an equation for *algebraic* properties, equation 1.
Note this still means "Postulate 1".

Fundamental Insight

Recall if we can narrow down the number of our postulates to just one simple postulate (which we did here) we have *ultimate understanding*, a worthy goal indeed. Our one simple **postulate is** 1, nothing abstract about that, *the simplest theory imaginable*. Recall, we got this result through our fundamental insight:
*The fundamental insight is that Cantor's Real Number **1** requirement of that Cauchy sequence (**$z_1,z_2,..z_N,..$**) of rational numbers(1) is provided by the Mandelbrot set iteration formula ($z_{N+1}=z_Nz_N+$**C**) eq.1a (&1b) sequence (**$z_1,z_2,..z_N,...$**).*

So the **postulate of** 1 (real set) gives us the Mandelbrot set ($z_{N+1}=z_Nz_N+$**C**) with small **C** and big **C** applications. And there is not much math in these applications: The Small **C** application for example is merely factoring of z components and Big **C** simply rotates the resulting z by C.

Definitions

Definitions Of Cantor's Cauchy Sequence And The Mandelbrot Set

Note that Cantor's Cauchy sequence is generated by iteration 1a**:**

So for any initial rational finite z_1 between 1 and -1 in iteration formula 1a gives rational finite odd $z_{2n+1}\equiv 1-\delta z_{2n+1}$, even $z_{2N}\equiv 1+\delta z_{2N}$ both of which together make our Cauchy sequence Z_N with limit 1 that we required.

Note also that the Mandelbrot Set is derived uniquely from 1 {real set}

In that regard eq.1a is iteration $z_{N+1}=z_N z_N+$**C** and eq.1b says that for some C that δ**C**=0 ($\exists_C \ni \delta C=0$). Note we solve 1a for noise **C** in δ**C**=0 and get $\delta C=\delta(z_{N+1}-z_N z_N)$ =0 implying z_{N+1} is finite since $\infty-\infty$ cannot equal 0. So this "some C" in 1a,1b thereby defines the Mandelbrot set $\{C_M\}$ since then z_∞ cannot be infinity. Note also for limit 1,0 finite z_N central limit $k\delta z\equiv C\rightarrow 0$(i.e.,small C) in eq.1a then we have for the only noniterative equation that $z_1=z_\infty\equiv$ $z=zz+C$ (eq.1).

Equation 1 implies(1,0) corresponding to the dichotomy 'set1 always with subset $\varnothing$': so {set1,$\varnothing$}$\rightarrow$(1,0) given $\varnothing\cup\varnothing=\varnothing\rightarrow 0\cup 0=0\equiv 0+0$ in our whole number algebra. That makes this choice of *1a,1b the only one possible* since it implies both the Cauchy seq, and the set 1,0.is

Note from eq.1 that 1 is not an element of the Mandelbrot set. It is the z when the noise C is zero.

Definition Of C As The Noise On The 1 in Eq.1

We define C from the δz uncertainty (in $z=1+\delta z$) as $C\equiv k\delta z$ if k in general is arbitrary real. So $z^*z=1$ must be a highest (extremum) probability "density" since real δz is assumed to be 0 then. So in the small fractal baseline eq.1.1 if k is exactly a constant and/or k is small (i.e., $k<<\delta z$) then dr and dt in δz are trivially constant. So (in $\delta C=\delta(k\delta z)=\delta k\delta z+k\delta\delta z=0$ so $k=k_1\delta z+k_2$) δk must be small but not zero here. Indeed δz is order 1 deep inside the Mandelbrot set limacon lobe so $\delta k=0$ inside. But δz is constrained to be small (Δ) on the edge (between the tiny Mandelbulbs) therefore allowing for a small varying k on the edge of any particular Mandelbrot set lobe (in $\delta k\delta z\approx 0$, eg.,fig.1 eq.2AIA diagonal eq.2AI edge contributions, called Mandelbulbs here). Also large k gives nontrivial results as well and so then $\delta\delta z\approx 0$ is very small. The Fiegenbaum point is defined to be the limit (given it's the r_H horizon, sect.4) of C on the [large (cosmological) and] here small baseline fractal scale in our definition of eq.1. So above subatomic limit really *near* 0 if noise **C small**$\equiv\Delta$.

Section 1 Small C limit: Rewrite equation 1 in z=1+δz form (at a Mandelbulb edge)

(Define $z\equiv z'+\delta z$, $z'\equiv 1$, $k\delta z\equiv C$) So first rewrite eq.1:

$$z'+\delta z=(z'+\delta z)(z'+\delta z)+C,$$

So $1+\delta z=(1+\delta z)(1+\delta z)+C$ and rearranging

$1+\delta z=1+2\delta z+\delta z\delta z+C$ and canceling

$$\delta z\delta z+\delta z+C=0 \qquad (1.1)$$

From eq.1.1 we see that the only nontrivial applications (i.e., where δz is not a constant) are where δk is not quite 0 and so $\delta\delta z$ is very close to zero since in general k can be large (in fig.1).

Equation 1.1 is a quadratic equation with in-general complex 2D solution (eg., if large noise C)

$$\delta z=dr+idt \qquad (1.2)$$

or $\delta z=dr-idt$ for all orthogonal (90°, ⊥) dr and dt and so arbitrary dx⊥dy (eg., $\delta z=dx+idy$) (1.3)

with speed coefficient c in cdt≡dt explicitly a constant here given variation only over t (1.4)

Equation 1.2 from 1.1 constitutes the derivation of space and time (in the context of eq. 2A).

Section 2 Small C. Solve for z

Solve eq.1 for C, plug into eq.1b and factor the result to **solve for z.** By plugging the small C in equation 1 back into δC=0 (eq.1b) we get $0=\delta C=\delta(-\delta z-\delta z\delta z)$ and we have

$$\delta(\delta z\delta z)=\delta[(dr+idt)(dr+idt)]=0 \qquad (2)$$

small C limit. Note to 'solve for z (=1+δz) we must solve for the (linear dr±dt) factors. Note from Ch.2, section 2.2 that $\delta z\delta z=ds^2=1$.

2.1 Factoring Eq. 2 'solves for z'

$$\delta(\delta z\delta z)=\delta[(dr+idt)(dr+idt)]=\delta(dr^2+i(drdt+dtdr)-dt^2)=0 \qquad (2)$$

The Imaginary part of eq.2 is from the (eq.2) generic $\delta(drdt+dtdr)=0$ *(2B)*

If the dr,dt are +integers (see sect.4.2) then $drdt+dtdr=ds_3=0$ is a minimum. Alternatively if dr is negative then drdt+dtdr=0 is again a maximum instead for dr-dt solutions. So all dr,dt cases imply invariant extreme: $drdt+dtdr=0$ (2B1)

Note in general if dr≠dt then 2B1 holds. Next **factor** the real part of eq.2 to get

$$\delta(dr^2-dt^2)=\delta[(dr+dt)(dr-dt)]=\delta(ds^2)=[[\delta(dr+dt)](dr-dt))]+[(dr+dt)[\delta(dr-dt)]]=0. \qquad (2A)$$

dt and dr are the variables here so the natural unit coefficient 1=c in $dr^2-(1)^2dt^2=ds^2$ is not a variable and so is invariant along with the ds^2 from eq.2A. So we have derived the two postulates of special relativity, the invariance of ds and constancy of c in the Minkowski metric. (The later sect.4 large C_M just rotates $dr\to dr'\equiv dr-C_M$, $dt\to dt'\equiv dt+C_M$ making the form of 2A unchanged and giving GR). So after **factoring** eq.2A then eq.2A is satisfied by:

2AI $\delta(dr+dt)=0$; $\delta(dr-dt)=0$. +e,-e two simultaneous objects, 2D⊕2D, 1∪1, eq.9

2A11A $\delta(dr+dt)=0$, $dr+dt=0$ pinned to the $dr^2=dt^2$ light cone. ν

2AIIB $\delta(dr-dt)=0$, $dr-dt=0$ " " (note also dichotomic with 2AI) anti ν

2AIII dr-dt=0, dr+dt=0 so dt=0,dr=0, no ds so eigenvalues=0, vacuum: the default **C_M=0 solution**

So if the variation(dx+dy)=0 i.e., δ(dx+dy)=0, then dx+dy=ds=invariant. So for invariant ds:

2AIIA dr+dt=ds, dr+dt=0

2AIIB dr-dt=ds, dr-dt =0

2AI **dr+dt=ds, dr-dt=ds**; So there are *two* simultaneous 2AIs for every eq.1.1 for 2AI. So we must write eq.1.1 as an average in the case of eq.2AI. For our positive dr&dt need

1^{st} and 4^{th} quadrants (given 2AIA;45°) so $dr \approx dr_1 \approx dr_2$, $dt \approx dt_1 \approx -dt_2$. So for average eq.1.1 $\delta z = dr + idt \approx (dr_1+dr_2)/2 + i(dt_1-(-dt_2))/2 \equiv (dx_1+dx_2)_{2AI} + i(dx_3+dx_4)_{2AI}) \equiv ds_{rt} + ids_{tr}$. So given eqs.1.2 and 2AI we have then the **2D *un*broken** degeneracy

$\delta z = dr' + dt' = ds_{rt} + ds_{tr} \equiv (dx_1+dx_2+dx_3+dx_4) = ds$.   (2C)

and the **dr+dt** solutions for δz and so **z** See dr and dt colocality condition in sect.7.3.

2AIA $dr^2+dt^2 = ds_1^2$; Recall eq.2AI ds=dr+dt. So $ds^2 = (dr+dt)(dr+dt) = dr^2+drdt+dt^2+dtdr = [dr^2+dt^2] + (drdt+dtdr) = ds_1^2+ds_3 = ds^2$. Since ds_3 (from 2B, is max or min) and ds^2 (from 2AI) are invariant so is $ds_1^2 = dr^2+dt^2 = ds^2-ds_3$ at 45° for max ds_3. So $\delta z = dse^{i\theta}$ is a circle. See sect.3.

Note these 2AIA circles (i.e.,invariance of the ds term) have to be on the regions of δk small mentioned in the introduction for nontrivial results which occurs on the edges of the Mandelbulbs (right side of fig.1 and Ch.2). Next we take a dr (or dt) derivative of $\delta z = dse^{i\theta}$ and find the resulting coefficients are Hermitian operator "observables".

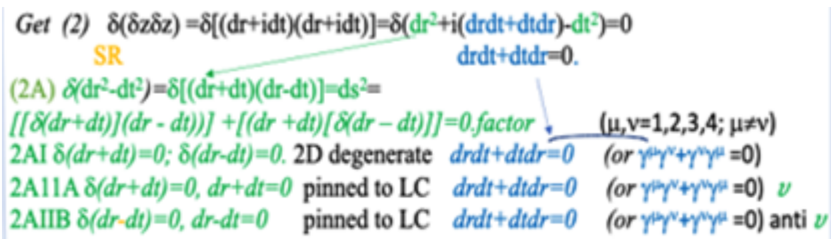


Fig.2 Summary of Eq.2 factoring.

Section 3 Derivative of eq.2A1A ($dse^{i\theta}=\delta z$)

Counting (origin of math) eigenvalues

Given 2AIA at ≈45°, $\delta z = dse^{i\theta} = dse^{i(\Delta\theta+\theta_o)} = dse^{i((\cos\theta dr+\sin\theta dt)/(ds)+\theta_o)} \equiv dse^{i(kr+\omega t+\theta_o)}$, $\theta_o=45°$, So $\theta=f(t)$ where we define $k \equiv \xi dr/ds$, $\omega \equiv \xi dt/ds$, $k'\sin\theta \equiv r$, $k'\cos\theta \equiv t$. $dse^{i45} = ds' = ds$. Then eq.2AIA becomes

$$dz = dse^{i(\Delta\theta)} = dse^{i\left(\frac{\sin\theta dr}{ds}+\frac{\sin\theta dt}{ds}\right)} \equiv z"$$

$$dz = dse^{i\left(\frac{rdr}{k\prime ds}+\frac{tdt}{k\prime ds}\right)} \equiv z"$$

$$\frac{\partial z"}{\partial r} = \frac{\partial\left(dse^{i\left(\frac{rdr}{k\prime ds}+\frac{tdt}{k\prime ds}\right)}\right)}{\partial r} = \frac{i}{k\prime}\frac{dr}{ds}z". \text{ or}$$

$$\frac{dr}{ds}z" = -ik'\frac{\partial z"}{\partial r}$$

From part 4 below for C_M rotation define $C_M = dr = \xi dr'$ ($\xi \equiv m$, $k'/m \equiv \hbar$, $dr'/ds = v_r$, $mv_r \equiv p_r$, $z" \equiv \psi$, eq.6.6.1)

$$\frac{dr}{ds}z" = -ik'\frac{\partial z"}{\partial r} \quad \text{or}$$

$p_r\psi = -i\hbar\frac{\partial\psi}{\partial r}$ Observables condition gotten from eq.2AIA circle.   (3.1)

Note these operators are Hermitian 'observables' with the associated eq.9 ψs forming a Hilbert space.

Observability (is also counting)

$-i\partial(\delta z)/\partial r=k\delta z\equiv p_r\delta z$ (3.2)

Set$\sqrt{\kappa_{rr}}=1$ and $\sqrt{\kappa_{tt}}=1$ for now (see big C sect.4). So dr+dt defines our 'operator' dr±dt and is the reason for factoring in sect.1 and the reason eq.1a,1b are the only choices for creating that Cauchy sequence. Note also that the Mandelbrot set sequence and the Cauchy sequence define only real numbers 1,0, not the the entire real numbers line. But 1,0 can define the binary system and so the rest of the real numbers through the union of eq.2AI. (See appendix D). So for simultaneous (i.e., union∪) 2AI+2AI we define the (observable) number 2 from **operator** dr±dt since ds∝dr+dt can make (dr+dt)/ds a integer:

2δz≡ (1∪1)δz≡(2AI+2AI)δz≡((dr+dt)+(dr-dt))/(k'ds)))δz≡-i2(ds/ds)∂(δz)/∂r≡-i2∂(δz)/∂r (3.2)

=(integer)k)δz. So from eq.3.2 we obtain the eigenvalues of: δ**z=0,1.** (3.3)

and 1+1. So eq.3.2 defines the finite +integer *list*(i.e.,1∪1≡1+1≡2)--*define*(i.e.,A+B=C) math *required for* the algebraic rules underpinning eq.**1***without* any added postulates (axioms). See appendix C. So we are counting electrons (2AI (e)), so our postulated 'one' thing is an electron and we have come full circle back to our postulate of 1. Note a self contained (circular) derivation does not require any outside postulates so we really did just postulate 1 real set (i.e.,**postulate 1**).

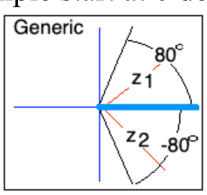
Note in this small C limit we cannot count 2AII (*v*) because 2AII is light cone pinned(ds=0) and 0/0 is undefined.

That Clifford algebra cross term generation (with $C_M<0$, fig.6) requires we define larger numbers than 2 with this math and also implies a 160° dichotomic rotation, sect.4.3).

Other Consequences Of Eq.2AIA

Recall all observable z satisfy 2AIA so that $z\propto e^{i\theta}$. Rotate by C_M and then $-C_M$ using eq.3.2, 4.1b

For example start at 0 deg and rotate through +80=CM across the electron dr+dt=ds and



get z_1.

+80°, [dr+dt)/2ds]z=$z_{1,r}+z_{1,t}$. Do $z_{1,r}$ and $z_{1,t}$ separately. So just for $z_{1,r}$: $z_{1,r}$=-idz/dr (partial derivatives). Then do the $-C_M$ rotation:

-80°, $(dr/ds)z_{1,r}=z_{2,r}$, So $-idz_{1,r}/dr=z_{2,r}=-i[(d/dr)(-id/dr)z=(d^2/dr^2)z$. Do both and get $(d^2/dr^2)z+(d^2/dt^2)z$ (3.4)

implying second derivative Laplacian operator type equations as well as the first derivative 2AI and 2AII (appendix A). Recall $k\equiv\sqrt{\kappa_{rr}}dr'/(k'ds)=2\pi/\lambda$ so $k'2\pi/\lambda=\xi dr/ds=mv=\hbar 2\pi/\lambda=h/\lambda$ so λ=h/p=DeBroglie wavelength. Also $\omega=\sqrt{\kappa_{oo}}$ mdt/(k'ds) so $(k'/m)\omega=(dt/ds)\sqrt{\kappa_{oo}}\equiv E$ in the new pde. So E=hω. So from eq.3.4 also $H\psi=-i\hbar\partial(\delta z)/\partial t\equiv E\delta z=\hbar\omega\delta z$. From eq.3.2 we have integer numbers (at least up to 2) of these ħω observables (Mandelbulbs, appendix B) that thereby subdivide all of physical reality into: $E_{universe}=\Sigma_i\hbar\omega_i$.

Also 2AI 45° diagonal (large noise C so 'wide slit') is a *particle* eg.,2AI and 2B. On dr axis (small C, so 'narrow slit') the 2AIA *wave* equations dominate implying wave-particle duality. So given **eigenvalue generators** eq.2AIA, the circle, or equivalently eq.3.2 operator formalism and eq.9, we have derived quantum mechanics from first principles.

Section 4. Large C .

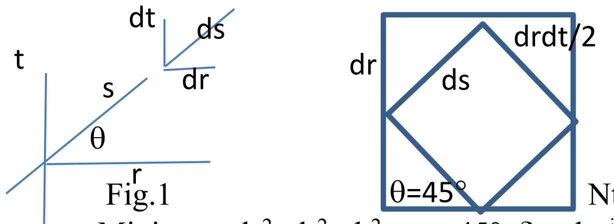


Fig.1 Nth scale

Minimum $ds^2=dr^2+dt^2$ so at 45°: $\delta z=dse^{i\theta}$ (**2AIA diagonal**)

Introduction Nth scale is 10^{-40}X small baseline

Recall that Eq. 1 (with its small C) gave us eq.2AIA at min ds at 45°, for our observables (eigenvalues). Also eq.1.1 gives $-dr=drdr+C_M$ so define mass ξ from dr distance and C_M so that $\mathbf{C_M}=<z>+<zz>\equiv\boldsymbol{\xi}\mathbf{dr}=\xi(dr_{local}+dr_{Mandelbrot})=\xi(dr_{local}+(dr_N+dr_{N+1}))=\xi(dr_1+dr_2)=\xi dr_1+\xi dr_2$ given the squred $\xi\xi$ term in $C_M=<z>+<zz>=\xi dr_1+\xi\xi dr_2$. On the big (cosmological) fractal eq.9 baseline dr_2 is a large constant r_H since zz>>z so we can define ε from $\varepsilon=\xi\xi dr_2$. So $\varepsilon/\xi=\xi dr_2$ with $\varepsilon=\varepsilon_N+\varepsilon_{N+1}$. $C=\xi dr+\varepsilon/\xi\equiv\varepsilon_1$. So:
$\varepsilon=\varepsilon_N+\varepsilon_{N+1}$. In $dr-\varepsilon_1\equiv dr-(\varepsilon/\xi+\xi dr)\equiv dr'$ (4.1)

Also on the big cosmological eq.9 object B&A fractal baseline (as sect.6.6 implies) vibrational m_τ and rotational m_μ modes so $\xi\equiv m_L=m_\tau+m_\mu+m_e$. At $r=r_{HN+1}$ then $1-\xi+r_{HN}/r+r_{HN+1}/r=\xi-r_{HN}/r=$ $1-(m_\mu+m_e)-r_{HN}/r$ and $(a/r)^2\rightarrow m_\mu$ and m_μ is the rotational eigenvalue as it must be in the Kerr metric 6.1.1. So from object A&B relative motion $\xi=m_\tau+m_\mu+m_e$. m_e is the ground state.κ_{00}=. $1-\xi-(\varepsilon/\xi)/r\equiv 1-\xi-r_H/r$, So $\xi=m_\tau+m_\mu+m_e=m_L$ is clamped in with the Kerr metric at $r=r_H$ (4.1a)
$\Delta+m_e$ with m_e the ground state and $r_H=\varepsilon/m_L\equiv 2e^2/(m_Lc^2)$ in eq.4.1 below. But a large noise perturbation to the Kerr leaves KE=Δ high energy and $\xi=m_e$. Also in the object B Kerr metric also $(a/r)^2\equiv(\xi rdr/ds)/r)^2=(\xi dr/ds)^2=C_M\equiv\xi r_H$ from 4.1a for the small fractal baseline. So $\xi(dr/ds)=C_M ds/dr\equiv h/\lambda=mv$ (eg., 6.1.3).
Also $r_H=\varepsilon/m_L\equiv 2e^2/(m_Lc^2)$ in eq.4.1 below. $2P_{3/2}$ B flux quantization modifies this (in the Kerr metric) to $r_H=\varepsilon/m_e$ large . See Ch.2, figure 4.

ds Invariance

The invariance of ds in 2AIA in the little C application and on a Mandelbulb (since they are round) guarantees the invariance of (define: $\varepsilon=C_M$)

$$\sqrt{2}ds=(dr-\varepsilon)+(dt+\varepsilon)\equiv dr'+dt' \quad (4.1)$$

(or $(dr+\varepsilon)+(dt-\varepsilon)$). Note the Mandelbrot set does not go beyond the Fiegenbaum point so $\pm C_M=\varepsilon=\pm1.40115..$ is in fig.1 so from $+C_M$ to $-C_M$ or for a total rotation angle $=|C_M+C_M|=2C_M=2X1.40115rad=2X80.3deg=$

$$=160.6° \text{ (Appendix A)} \quad (4.1b)$$

from a axis (extremum, fig2). For 2AI we can define $\varepsilon = \xi dr_C$ from the $(a/r)^2 = C_M/dr \equiv \varepsilon/dr = \xi dr/dr = \xi$ in the Kerr metric since 45° with $dr_C \equiv |dr|-|dt| \neq 0$. ξ is defined as the mass, ε the charge[2] and so rotates dr,dt. See appendix C. For 2AII $dr_C=0$ since $|dr|=|dt|$ so charge=0.

This $\pm C_M$ rotation is through 2 leptons and so results in composite Bosons(appendixA).

4.2 Rotation of δz by C_M Creates Curved Space Two Body Eigenvalue Physics

So from 2AIA at 45° and 2AI and eq.3.6 $\sqrt{2}ds=(dr-\varepsilon/2)+(dt+\varepsilon/2)\equiv dr'+dt'$ (4.1)

θ can then change by $\Delta\theta=(\varepsilon/2)/ds=(\xi dr)/(2ds) \equiv C_M/ds$ at $\theta=45°$.

Note also putting C_M into eq.2AI dr+dt at 45° here 80°-80°+Δ **breaks those equation 2C** 2D **degeneracies** giving us our **4D**.

Define $r \equiv dr$, $r_H=\varepsilon$ and

$\kappa_{rr} \equiv (dr/dr')^2=(dr/(dr-\varepsilon/2))^2 =1/(1-r_H/r)^2=A_1/(1-r_H/r)+A_2/(1-r_H/r)^2$ (4.2)

Or from 4.1d we have $(dr-(\varepsilon/\xi+\xi dr) \equiv dr'$ and so $\kappa_{rr} \approx 1/[1-\xi-\varepsilon/(\xi r))]$ (4.3)

Given object B's vibrational and rotational energy levels $\xi=m_L$ 1+ε+$\Delta\varepsilon$ with 1,εexcited states of $\Delta\varepsilon$ which is the ground state (sect.4). So a large enough perturbation (eg.,strong B field or sudden large voltage change) could leave $\xi=\Delta\varepsilon$+KE instead (see partII). From partial fractions where N+1th scale $A_1/(1-r_H/r)$ and Nth=$A_2/(1-r_H/r)^2$ with A_2 small here. Putting the $\kappa_{\mu\nu}$s in eq.2A1A we obtain for both of these spherical symmetry κ_{rr} metric coefficients: $ds^2= \kappa_{rr}dr'^2 +\kappa_{oo}dt'^2$ (4.3)

Note from 2AIA drdt is invariant (at 45°) and so $dr'dt'=\sqrt{\kappa_{rr}}dr\sqrt{\kappa_{oo}}dt=drdt$ so $\kappa_{rr}=1/\kappa_{oo}$ (4.4) i.e., the old Schwarzschild-rn result outside r_H. Use tensor dyadics to derive the other GR metrics. The AI term in eq.4.2 can be split off from RN as in classic GR

So we derived General Relativity *by* (the $C_M=\varepsilon$) **rotation** *of special relativity* (eqs 2A, 2AI). Note the rotation in the appendix A is equivalent also through the two neutrinos giving Maxwell's equations.

Also from 2AIA and eq.4.1: $ds^2=dr'^2+dt'^2=dr^2+dt^2+dr\varepsilon/2-dt\varepsilon/2-\varepsilon^2/4$ (4.5)

2AII: From eq.2AII and equation 3.1 the neutrino is defined as the particle for which $-dr'=dt$ (so can now be in 2nd quadrant dr', dt' can be negative) so $dr\varepsilon/2-dt\varepsilon/2$ has to be zero and so ε has to be zero therefore $\varepsilon^2/4$ is 0 and so is pinned as in eq.2AII (*neutrino*).$\delta z \equiv \psi$. So on the light cone $C_M=\varepsilon=mdr=0$ *and so the neutrino Is uncharged and also massless in this flat space.*

2A1: Recall eq.2AI electron is defined as the particle for which $dr \approx dt$ so $dr\varepsilon/2-dt\varepsilon/2$ cancels so ε ($=C_M$) in eq.4.5 can be small but nonzero so that the $\delta(dr+dt)=0$. Thus dr,dt in eq. 2AI are automatically both positive and so can be in the *first quadrant as positive integers*. 2A1 is *not* pinned to the diagonal so $\varepsilon^2/4$ (and so C_M) in eq.4.5 is not necessarily 0. So *the electronischarged*

If that $\pm C_M$ rotation covers 2AI or 2AII the charge on these objects (eg., charge on 2AII is 0) becomes the charge on the composite. This added intermediate white noise is not charged.

Condition for Same dr<ds and dt <ds of 2AI and 2AII

Recall equation 2AI and 2AII (i.e.,electron and neutrino) are derived from first principles, from eq.2 small C. They can coexist in this same local complex plane (eg.,dr,dt<ds) when $r=r_H$ $[dr'^2=\kappa_{rr}dr^2=(1/(1-r_H/r))dr^2]$ so dr' large allowing large

uncertainty principle dr' for small nonrelativistic mass m_e in $(dr'm_ec)>h/2$). This occurs for small externally observed dr and m_ec in the $2P_{1/2}$ state and $1S_{1/2}$ state at $r=r_H$. But these are decay states (PartII Sect.7.3). So when these states decay the 2AI and 2AII are observed together as what is commonly denoted as "weak interaction decay".

4.3 Eq.2AI Eigenvalues in equation 3.6 incorporating C_M

To remain within the set of eq.1 solutions set (allowing infinitesimal rotation within the noise) we note that the *2D **degeneracy** of eq.2C is **broken** by the solution2 **rotation** (eq.4.1)* were we use ansatz $dx_\mu \rightarrow \gamma^\mu dx_\mu$ where γ^μ may be a 4X4 matrix and commutative ansatz $dx_\mu dx_\nu = dx_\nu dx_\mu$ so that $\gamma^\mu\gamma^\nu dx_\mu dx_\nu + \gamma^\nu\gamma^\mu dx_\nu dx_\mu = (\gamma^\mu\gamma^\nu + \gamma^\nu\gamma^\mu) dx_\mu dx_\nu$ ($\mu,\nu=1,2,3,4$; $\mu\neq\nu$). So from eq.2AI and resulting eq.(2C) then $ds^2 = (\gamma^1 dx_1+\gamma^2 dx_2+\gamma^3 dx_3+\gamma^4 dx_4)^2$ $=(\gamma^1)^2 dx_1^2+(\gamma^2)^2 dx_2^2+(\gamma^3)^2 dx_3^2+(\gamma^4)^2 dx_4^2+ \Sigma_{\mu\nu}(\gamma^\mu\gamma^\nu dx_\mu dx_\nu+\gamma^\nu\gamma^\mu dx_\nu dx_\mu)$. But $\gamma^\mu\gamma^\nu dx_\mu dx_\nu+\gamma^\nu\gamma^\mu dx_\nu dx_\mu = (\gamma^\mu\gamma^\nu+\gamma^\nu\gamma^\mu) dx_\mu dx_\nu$ implying $\boldsymbol{\gamma^\mu\gamma^\nu+\gamma^\nu\gamma^\mu=0}$ **from 2B1** and also $(\gamma^\mu)^2=1$ from 2AIA. So the two 2AI results and 2B1 *imply the defining relation for a 4D* Clifford algebra: we have derived our 4Dimensons) with the time component defined to be $\gamma^4 dx_4$. So with $\kappa_{\mu\nu}$ in eq.3.2 we have

$$ds=(\gamma^1\sqrt{\kappa_{11}}dx_1+\gamma^2\sqrt{\kappa_{22}}dx_2+\gamma^3\sqrt{\kappa_{33}}dx_3+\gamma^4\sqrt{\kappa_{44}}dx_4) \quad (4.6)$$

Eq.4.6 also implies we can convert the 2AI (dr+dt)z" and the 2AIA (dr^2+dt^2)z" to first and second derivatives of z" terms (z"≡ψ). For example using 4.6:

$$\text{Eq.2AI} \rightarrow ds=(\gamma^1\sqrt{\kappa_{11}}dx_1+\gamma^2\sqrt{\kappa_{22}}dx_2+\gamma^3\sqrt{\kappa_{33}}dx_3+\gamma^4\sqrt{\kappa_{44}}dx_4)z'' \rightarrow \gamma^\mu\sqrt{(\kappa_{\mu\mu})}\partial\psi/\partial x_\mu=(\omega/c)\psi \quad (9)$$

(eq.9) which is our new pde, adds the C_M to equation 3.1 (electron observables). It also becomes 2AII (ν pinned to the light cone where $C_M=r_H=\varepsilon=0$ (sect.4.1)). The 6 Clifford algebra cross term requirements imply many multiple lepton contributions giving us Boson fields around them. The two required simultaneous 2D eq.2AI in 4D eq.9 imply observer plus observed objects needed to have the 4D wavefunction ψ. So the wave function "collapses" to the observed one when it is observed (Copenhagen interpretation).
Hamiltonian and its Energy E Eigenvalues: The Hamiltonian is associated with the time derivative in eq.3.2 as it is in the old Dirac equation. So to find energy eigenvalues and the Hamiltonian we compare the old Dirac equation E with the new one, eq.9. From 104.10, 105.9, Sokolnikov, Tensor Analysis, 2nd Ed. Wiley we have $dt/ds=1/\kappa_{oo}$ with $\kappa_{oo}=1-r_H/r$. Also from the first term in equation 8.1 we can compare the location of the energy E term (and so Hamiltonian) in the ordinary Dirac equation with the new one equation 8.1 and find that $\mathbf{E}=(dt/ds)\sqrt{\kappa_{oo}}=(1/\kappa_{oo})\sqrt{\kappa_{oo}}=\mathbf{1/\sqrt{\kappa_{oo}}}$

4.4 Eq. 2A1A Boson Eigenvalues From These eq.4.1b, 160° rotations

Start by plugging eq.1 into eq.1b. Get 2AI,2AII. Include the C_M of eq.1b. To preserve the ds invariance then $\sqrt{2}ds=(dr-C_M)+(dt+C_M)\equiv dr'+dt'$ in eq.4.1. Here $C\rightarrow\pm C_M$ (dichotomic 2X80= 160° rotation) in 4.1b. Recall $C_M\equiv\varepsilon\equiv\xi dr$.
So the *large* **C** z rotation application from the 4 different axis' max extremum (of 2AIA) 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. So we have large C_M dichotomic 160° rotation to the next Reimann surface of 2AIA (dr^2+dt^2)z'' from some initial angle θ. Eq.1a solutions imply complex 2D plane Stern Gerlach dichotomic rotations using noise z"∝C (4.2) using Pauli matrices σ_i algebra, which maps one-to-one to the quaternionA algebra. From sect.4.2, eq.4.11 we start at some initial angle θ and

rotate by 160° the noise rotations are: $C=z''=[e_L,\nu_L]^T \equiv z'(\uparrow)+z'(\downarrow) \equiv \psi(\uparrow)+\psi(\downarrow)$ has a eq.4.5 infinitesimal unitary generator $z''\equiv U=1-(i/2)\varepsilon n^*\sigma)$, $n\equiv\theta/\varepsilon$ in $ds^2=U^tU$. But in the limit $n\to\infty$ we find, using elementary calculus, the result $\exp(-(i/2)\theta^*\sigma)=z''$.
$(dr+dt)z''$in eq.3.2 can then be replaced by eq.3.4 $(dr^2+dt^2+..)z''$
$=(dr^2+dt^2+..)e^{quaternionA}$Bosons because of eq.2AIA. Then use eq. 4.1b to R\rotate: z'':
2AB: 2A1IA+2AIIB Dichotomic variables→Pauli matrix rotations→z'$=e^{quaternion\ A}$
→Maxwell γ
=Noise C blob. See Appendix A for the derivation of the eq.2AIA 2nd derivatives of $e^{quaternion\ A}$.
2AC: 2AI+2AI Dichotomic variables→Pauli matrix rotations→z''$=e^{quaternion\ A}$→KG Mesons.
2AD: 2A1+2A1+2A1at $r=r_H\equiv C_M$ (also stable but at high energy, including Z,W.)
2AE: 2AI+2A1+2AII Dichotomic variables→Pauli matrix rotations→z''$=e^{quaternionA}$, Proca Z,W
Ch.8,9 on baryon strong force with Nth fractal scale $r_H=2e^2/m_ec^2$. $\pm C_M$ rotation.
Equation 2AE is a current loop implying that the Paschen Back effect with B flux quantization $\Phi=Nh/2e$ gives very high particle mass-energy eigenvalues. So we solved the hierarchy problem. Frobenius series solution from eq.9 gave lower hadron energies. All are singlet or triplet noise C blobs(2). See davidmaker.com, part II.
We have thereby found the **eq.2A1A Boson eigenvalue solutions**.

Summary: Solved eq.1 for z. Then we found the eigenvalues of z (eg., 2AI)
Note in equation 9 the $\kappa_{oo}=1-r_H/r$. Given the $10^{40}XC_M$ fractalness in the $C_M=r_H$ of equation 9 "Astronomers are observing from the inside of what particle physicists are studying from the outside, **ONE** object, the new pde (2AI) electron", the same 'ONE' we postulated. Think about that as you look up at the star filled sky some night! Also postulating 1 gives 4D for eq.9, no more and no less than the physical world. That makes this theory remarkably comprehensive (all of theoretical physics and rel# math) and the origin of this theory remarkably simple: "one".
So given the fractal self-similarity, by essentially knowing nothing (i.e., ONE) *you know everything!* We finally do understand.

References
1)E.Schrodinger, Sitzber.Preuss.Akad.Wiss.Physik-Math.,24,418 (1930) At>Compton wavelength there is no zitterbewegung, just a probability density blob. So instead of deriving Schrodinger's blob from the Dirac equation we derive the Dirac equation (and the rest of physics) from the most general stable blob, our averaged data and $SD\equiv\Delta z=\delta z$ region (section 2).
2) Konstantin Batygin. Monthly Notices of the Royal Astronomical Society, Volume 475, Issue 4, 21 April 2018. He found that cosmological Schrodinger equation metric quantization actually exists in the (observational) data.
(3) DavidMaker.com

Appendix A 2AB $(dr^2+dt^2+..)e^{quaternion\ A}$ =rotated through C_M in eq.3.4. example C_M in eq.4.1 is a 160° CCW rotation from 90°Through *v* and anti*v*

A is the 4 potential. From eq.4.4 we find after taking logs of both sides that $A_o=1/A_r$ (A1) Pretending we have a only two i,j quaternions but still use the quaternion rules we first do the r derivative: From eq. 3.2 $dr^2\delta z=(\partial^2/\partial r^2)(\exp(iA_r+jA_o))=(\partial/\partial r[(i\partial A_r\partial r+\partial A_o/\partial r)(\exp(iA_r+jA_o)]$
$=\partial/\partial r[(\partial/\partial r)iA_r+(\partial/\partial r)jA_o)(\exp(iA_r+jA_o)+[i\partial A_r/\partial r+j\partial A_o/\partial r]\partial/\partial r(iA_r+jA_o)(\exp(iA_r+jA_o)+$
$(i\partial^2 Ar/\partial r^2+j\partial^2 A_o/\partial r^2)(\exp(iA_r+jA_o)+[i\partial A_r/\partial r+j\partial A_o/\partial r][i\partial A_r/\partial r+j\partial/\partial r(A_o)]\exp(iA_r+jA_o)$
(A2)
Then do the time derivative second derivative $\partial^2/\partial t^2(\exp(iA_r+jA_o)=(\partial/\partial t[(i\partial A_r\partial t+\partial A_o/\partial t)$
$(\exp(iA_r+jA_o)]=\partial/\partial t[(\partial/\partial t)iA_r+(\partial/\partial t)jA_o)(\exp(iA_r+jA_o)+$
$[i\partial A_r/\partial r+j\partial A_o/\partial t]\partial/\partial r(iA_r+jA_o)(\exp(iA_r+jA_o)+(i\partial^2 A_r/\partial t^2+j\partial^2 A_o/\partial t^2)(\exp(iA_r+jA_o)$
$+[i\partial A_r/\partial t+j\partial A_o/\partial t][i\partial A_r/\partial t+j\partial/\partial t(A_o)]\exp(iA_r+jA_o)$ (A3)
Adding eq. A2 to eq. A3 to obtain the total D'Alambertian A2+A3=
$[i\partial^2 A_r/\partial r^2+i\partial^2 A_r/\partial t^2]+[j\partial^2 A_o/\partial r^2+j\partial^2 A_o/\partial t^2]+ii(\partial Ar/\partial r)^2+ij(\partial A_r/\partial r)(\partial A_o/\partial r)$
$+ji(\partial A_o/\partial r)(\partial A_r/\partial r)+jj(\partial A_o/\partial r)^2$
$++ii(\partial Ar/\partial t)^2+ij(\partial A_r/\partial t)(\partial A_o/\partial t)+ji(\partial A_o/\partial t)(\partial A_r/\partial t)+jj(\partial A_o/\partial t)^2$. Since ii=-1, jj=-1, ij=-ji the middle terms cancel leaving $[i\partial^2 Ar/\partial r^2+i\partial^2 Ar/\partial t^2]+$
$[j\partial^2 A_o/\partial r^2+j\partial^2 A_o/\partial t^2]+ii(\partial Ar/\partial r)^2+jj(\partial A_o/\partial r)^2+ii(\partial Ar/\partial t)^2+jj(\partial A_o/\partial t)^2$
Plugging in A1 and A3 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: $\partial A_r/\partial r+\partial A_o/\partial t=0$ (A4) $i[\partial^2 A_r/\partial r^2+i\partial^2 A_r/\partial t^2]=0$, $j[\partial^2 A_o/\partial r^2+i\partial^2 A_o/\partial t^2]=0$ or
$\partial^2 A_\mu/\partial r^2+\partial^2 A_\mu/\partial t^2+..=1$ (A5)
A4 and A5 are Maxwell's equations (Lorentz gauge formulation) in free space, if μ=1,2,3,4.

$$\Box^2 A_\mu=1,\ \Box\bullet A_\mu=0$$

(A6)

Small Baseline 4.1b

$(dr-C_M)+(dt+C_M)=ds$ or $(dr+C_M)+(dt-C_M)=ds$. Max $ds^2-dr^2+dt^2$ extremum at dr,dt,-dr,-dt axis. Rotation $=C_M\rightarrow\circ 1.411\rightarrow 80°$ so $2C_M=160.6°$. Get Bosons. Min $ds^2=dr^2+dt^2$ extreme diagonals only yield same, but noisy, leptons.

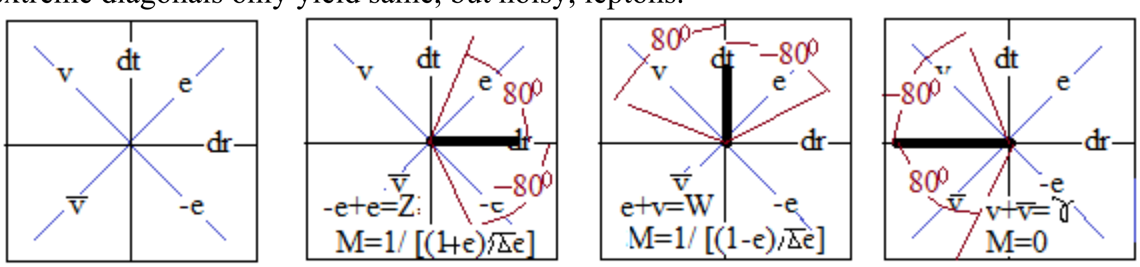


Figure 2

We are left with 3 empty slots in the small baseline (appendixB)

For $\kappa_{oo}=1-\Delta\varepsilon-r_H/r$ if $r=r_H$ then we will have subtracted off a source and so rotated the above branch cut by 90° and then get the W and Z rotations. In the part II we see that in the $2P_{1/2}$ orbital at $r=r_H$ this is what happens.

For $\delta z=-1$(middle of Mandelbrot set) adding noise C causes a counterclockwise rotation as we see from the $\delta z=\frac{-1\pm\sqrt{1-4C}}{2}$ .solution to eq.1. Analogously from **2AC** we get with the eq.4.1 doublet ε±ε the Proca equ (3*) neutrino and electron Δ ε* at $r=r_H=2.8X10^{-15}$m extremum in E. As in sect.6.13 in κ_{00} we normalize out the muon ε. So we are left with the electron Δε: $\kappa_{00}=1-[\Delta\varepsilon/(1\pm2\varepsilon)]+[r_H(1+((\varepsilon\pm\varepsilon)/2))/r]=1-[\Delta\varepsilon/(1\pm2\varepsilon)]+[r_{He}/r]=1-[\Delta\varepsilon/(1\pm2\varepsilon)]-1]=[\Delta\varepsilon/(1\pm2\varepsilon)]$ at $r=r_{He}$ from the two above rightmost (Proca) diagrams. So extremum in E SourceXm_L = $E_{ZW}=\frac{1}{\sqrt{\kappa_{00}}}=\frac{1}{\sqrt{1-\frac{\Delta\varepsilon}{1\pm2\varepsilon}-\frac{r_{He}}{r}(1+(\varepsilon\mp\varepsilon)/2)}}\approx\frac{1}{(1\pm\varepsilon)\sqrt{\Delta\varepsilon}}$. m_L is 1 here. At $r=r_{He}$ the +is for Z and the – is for W. So W (right fig.) is a single electron Δε+ν perturbation at $r=r_H=\lambda$ (Since two body m_e.): So $H=H_o+m_ec^2$ inside V_w. $E_w=2hf=2hc/\lambda$, $(4\pi/3)\lambda^3=V_w$. For the two leptons $\frac{1}{V^{1/2}}=\psi_e=\psi_3,\frac{1}{V^{1/2}}=\psi_\nu=\psi_4$. Fermi 4pt= $2G\iiint_0^{r_W}\psi_1\psi_2\psi_3\psi_4\,dV=2G\iiint_0^{r_W}\psi_1\psi_2\frac{1}{V^{1/2}}\frac{1}{V^{1/2}}V=2\iiint_0^{r_W}\psi_1\psi_2G\equiv\iiint_0^{V_W}\psi_1\psi_2(2m_ec^2)dV_w=\iiint_0^{V_W}\psi_1(2m_ec^2)\psi_2dV_w$. (A3)

What is Fermi G? $2m_ec^2(V_W)=.9X10^{-4}$Mev-$F^3=G_F$ **the strength of the weak interaction**.

Derivation of the Standard Model But With No Free Parameters

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

Appendix B Mathematical Considerations

1st type of Fractalness $(10^{40})^N$ Mandelbrot Set Repeat Of The Universe

Go to the Utube HTTP with the 275 in the title to explore the Mandelbrot set. 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 r_H in eq.9. So for each larger electron there are **10^{82} constituent electrons**. At the bifurcation point, which is also the Fiegenbaum point, the curve is a straight line and so $\delta C_M=0$. Also the scale difference between Mandelbrot sets as seen in the zoom is about **10^{40}, the scale change** between the classical electron radius and 10^{11}ly giving us our fractal universe.

So that $\delta z=\frac{-1\pm\sqrt{1-4C}}{2}$. is real for noise C<¼ (B1)

creating our noise on the N+1 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). The universe doesn't look like the Mandelbrot set but is a solution to equation 9 for $r<r_C$: electron. Recall that $C_M=\varepsilon=\xi dz=\xi r_H$ so $C_M/r_H=\xi$ =rest mass if r_H is maximum so rest mass is a function of C_M. Recall if Δk is not quite 0 the dr,dt in eq.2AI is just inside the

local small C Mandelbulb boundary and also just off the light cone so with *nonzero rest* mass for that eq.2AIA (S=½) diagonal (for observables) on the Nth fractal scale.

We must use eq. B1 to apply small C to big C through $½+Σ(¼)^N$=1.416.. with the overlap Mandelbulb at the Fiegenbaum point 1.40115.. the only physical Mandelbulb. Each such Mandelbulb has to contain the 2AI and 2AII electron and neutrino for each lepton (muon and tauon) as Reimann surfaces since the scale changes from one surface to another.

Summary

Notice here we found from the Mandelbrot set (eq.1a,1b) the

size of the universe 10^{40}Xclassical electron radius, **fractal universe**.

Number of particles in the universe 10^{82}

The **temperature of the universe**. 20MK (interior of stars)

SmallC: we get eq.2AI,2AII eq.9 **particle physics**(sect.1-4) including **the Lepton masses** &families. Eq.2AIA yields the operator formalism of QM. **LargeC**: gets local small C.

and SM. From fractal eq.9 the **oscillation of the universe**, cosmology.

Relativity (eq. 2A rotated by C_M).

Note that eq.1a,1b came out of the **postulate of** 1 (sect.1).

Appendix C Origin Of Mathematics

Single Postulate Of 1

Note also that the Mandelbrot set sequence and the Cauchy sequence define only real numbers 1,0, not the the entire real numbers line. But 1,0 can define the binary system and so the rest of the real numbers through the union of eq.2AI. (See appendix D). eq.3.2 defines the finite +integer *list*(i.e.,1∪1≡1+1≡2)--*define*(i.e.,A+B=C) math *required for* the algebraic rules underpinning eq.**1** ***without*** **any added postulates** (axioms). Also *list* 2*1=2, 1*1=1 *defines* A*B=C. Division and **rational numbers** defined from B=C/A. We repeat with the list 3*1=3, etc., with the Clifford algebra terms satisfaction keeping this going all the way up to 10^{82} and start over given the above fractal result given the r_H horizons of eq.4.2.

Note the noise C guarantees limited precision so we can multiply any number in our list with the above integer 10^{82} to obtain the integers in eq.3.2 which gives us quantization of the Boson fields.

Cantor also used that binary number diagonal to prove the uncountability of the real numbers further illustrating the importance of the binary numbers in the development of the real numbers.

Real Numbers Defined from Our Rational Numbers

Real numbers are the core of mathematics (Try balancing your checkbook or measuring a length without them!) and physics. 1 is a real number. The key thing is that we are postulating 1real set, not 1 and a bunch of other stuff.

There are several equivalent ways of defining the real numbers.

One way is through Dedekind cuts. Another method is to define a number as a "real" number by defining a *Cauchy sequence of rational numbers* (Cantor's method) for which it is a limit.

For example it is easy to define π as a real number. You can use the Cauchy sequence $4(-1)^N/(2N+1)$ resulting in $4-4/3+4/5-..=\pi$. This is a sequence of *rational* numbers with limit π which is an irrational number. The union of the set of irrational and rational numbers is the "real " numbers by the way. Note this real number definition *required* that Cauchy sequence of rational numbers.
In contrast the rational number sequence defined by the iteration
$z_{N+1}=z_Nz_N+C$ (eq.1a); for some C then $\delta C=0$ (eq.1b); $N\rightarrow\infty$, noise $C\rightarrow 0$ defines 1 (and not π) as a real number for $Z_N=1-z_N$ for $z_1=.9$ or in general $1>z_1>-1$ Solve for C in eq.1a and plug that into eq.1b and get $\delta C=\delta(z_{N+1}-z_Nz_N)=0$. Note the variation of $\infty-\infty$ cannot be zero so z_{N+1} has to be a *finite* number making eq.1a, 1b the definition of the Mandelbrot set. So the resulting series has to be summable. Thus given $C\rightarrow 0$ and $N\rightarrow\infty$ we *cannot* start the sequence with a number that ends up with a divergent sequence.
So we start with a C in $C\rightarrow 0$ with z_o between -1 and 1 and with C extremely small the δz_{N+1} is always a whole number and so rational. So the first number in the sequence is very slightly smaller $\delta z_{N+1}\approx 1$ but is still finite decimal (up to 10^{82}. See above.) and so rational (eg.,1234/1000=1.234). Plug δz_{N+1} back in for δz_N ($\delta z_{N+1}=\delta z_N\delta z_N+C$) and repeat until finally $\delta z_\infty=0$. During each such iteration define $z_N=|1-\delta z_N|$ which is the z_N th term in our Cauchy sequence of rational numbers whose limit is 1. Note also that the Mandelbrot set iteration therefore indexes the associated Cauchy sequence. We have thereby found that the eq.1a, eq.1b Mandelbrot set can be used to define the real number 1!).
In the limit $C\rightarrow 0$ (and Mandelbrot set z_N) also define $z_\infty\equiv z=zz+C$ eq.1. (Since 1=1X1+0, 0=0X0+0).

Set Theory

We postulate a single real set so that the null set $\varnothing$ is also a subset. Note we have also *defined set theory* and also arithmetic in operator equation 3.2 with simultaneous eq.(2AI+2AI) and its $1\cup 1\equiv 1+1$ eigenvalues.

Null Set $\varnothing$

In the context of set theory the null set $\varnothing$ is the subset of every set.
So here you postulate {One real set} which automatically has the null set as a subset. Note we earlier developed the whole numbers from $1\cup 1\equiv 1+1$, in the context of set theory. But $\varnothing\cup\varnothing=\varnothing$ is the only property of the null set $\varnothing$ we use and of course it is isomorphic to $0\cup 0\equiv 0+0=0$ the *only* property of 0 we need in the development of the whole numbers. Note also the null set is the lack of anything and so is 0.
Note the $z_1=z_\infty$ at $C\rightarrow 0$ gives z=zz+C which does correspond with the 1 set (1=1X1) and null set dichotomy of set theory given also that 0=0X0. Also the Mandelbrot set sequence gives the Cauchy sequence of the real set.
So this {one real set} starting point maps (uniquely) directly to the **Mandelbrot set eq.1a,1b.**

Appendix D Alternative $\xi dr=\varepsilon$ Ansatz In 4.5 On Nth Fractal Scale: ξ=mass Definition

Bra-ket Notation

Note $e^{i(45°+\Delta\theta)}$ went from δz over to z" in eq. 3.1 (see eq.3.2) so equation 2A1A also implies $\int z"^*z"dV=1$ with $1/s'^2$ normalization. So from eq.3.6 $\int z"^*\delta z_M z"dV=\langle\delta z_M\rangle$

$=<\delta z_M>\int z''^*z''dV=<\delta z_M>$ equivalent to bra-ket $<a|\delta z_M|a>$ with 'a' the eigenstates of eq.9,eg., half integer spherical harmonics (given 2AI is the only solution).

Uniqueness Of These Operator Solutions: Note the invariant operator √2=ds here. So the eq.2AIA operator invariant ds^2 and eq. 2AI, 2AII $\sqrt{2}ds\equiv\delta z_M$ =dr±dt is the **operator** (eq.3.2) solution δz_M (so *not* others such as ds^3 ,ds^4, etc.,which would then imply higher derivatives, hence a functionally different operator.).

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

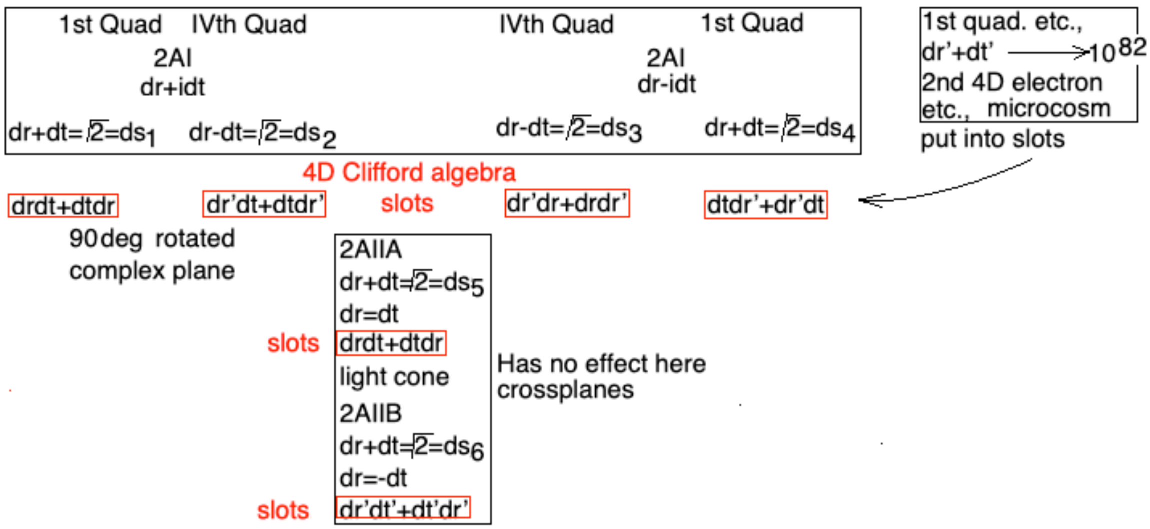


Fig.3 These added cross term eq.9 objects (2AI) extend eigenvalue equation 3.2 from merely saying 1+1=2 all the way to the number10^{82}.

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.2a 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!** But in this process we thereby create other 2AI terms for other electrons and so build other 4D electrons and so a sequence of electrons. We thereby generate the universe! Thus we have derived the below progressive generation of list- define microcosms in eq.3.2. We then plug that into eq.9 as sequence of electrons. This allows us to use eq.9 to go beyond 1U1, beyond 2 to 3 let's say. So we can then define 1∪1 from equation eq.9 δz_M just like postulate 1 was defined from eq.1 and eq.2. So consistent with eq.9 and eq.1b we can then develop +integer mathematics from 1U1 beyond 2 because of these repeated substitutions into eq.1b 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 preicion) by 10^{82} and it becomes an integer implying all integers here. Given the ψs of equation 9 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 3.6. Note 10^{82} limit from section 6.1. Any larger and it's back to one again.

The Progessive "List" Origin Of Mathematics

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

1 U 1≡1+1≡2 | 1+1≡1*2

1 U 2≡1+2≡3 | 2+2≡2*2

Defines A+B≡C | Defines A*B≡C That being eq.2

Finite precision ≡ noise > 0

Eq.2 can now define 0 with 0*0=0

Use 0 to define subtraction with

1-1≡0

2-2≡0

3-3≡0

Defines δC=0 That being Eq.1 in this particular microcosm.

Note there are no axioms for defining relations A+B=C or A*B=C, just the list above those relations. in that particular microcosm. There are no postulated rings or fields here either.

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.4.1).

Thermodynamics

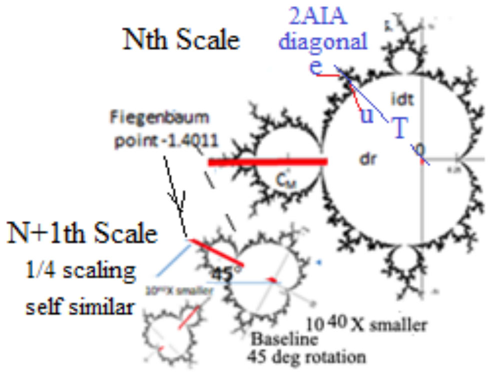
Note that a "single state per particle" comes out of 1 particle per z state per solution in sect.4. So the number of ways of filling g_i single states with n_i particles is $g_i!/(n_k!(g_i-n_i)!$. You take a Log of both sides and use Stirling's approximation and you get the Fermi Dirac distribution for example.

Ch.2 Details Of The Fractalness

2.1 The Mandelbrot Set eq.1a,1b.

Review

Recall small C gives 2AIA 45° diagonals (observables). Also the smallC Δk small occurs on the edge of a typical Mandelbulb so where nontrivial solutions to 2AI exist. Also δz=δzδz+C_M implies for the next smaller fractal scale δz>>δzδz so δz≈C_M in (dr-C_M)+(dt+C_M)=ds and so ξdr=ε≡C_M defines mass ξ if dr=r_H constant. So a measure of mass in the new pde eq.2AI are the C_M intervals from regions of nonzero Δk at the edges of the Mandelbulbs along the 45° line:

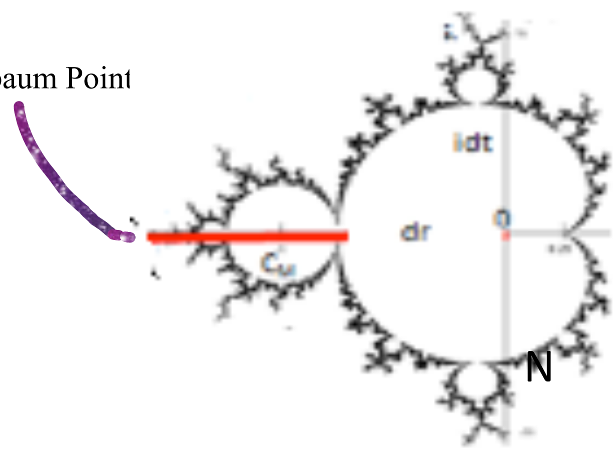


Note at the Fiegenbaum point the Mandelbrot set is 10^{40}X fractal with a 45° between successive Mandelbrot sets. See youtube
http://www.youtube.com/watch?v=0jGaio87u3A

Observed Selfsimilarity of Mandelbrot Sets On Next Larger (N+1) And Next Smaller (N) Fractal Scales(we live in between these two scales)z

Recall figure 1 and the eq.2AIA diagonal with intersections defined where Δk is small. We got the T,u,e values in eq.2AI (eq.9) that way. But the Nth and N+1 th fractal scales are selfsimilar and 45° apart. Note the many small C s (needed to specify regions observability.) are given by (¼ -2Σ(¼)^N) with real noise scaling C=¼ and so $\delta z = \frac{-1\pm\sqrt{1-4C}}{2} = \frac{1}{2}$ which also models the N+1 scale Mandelbulbs (so the limacon cusp point is the center of the first Mandelbulb with all sucn circle radii are scaled ½smaller) on the N+1th scale. The C_M e,u,T maps as shown to the 45° N+1fractal scale with $e=(1/64)^2$necessarily at the Fiegenbaum point and T=.849. (Note $.849/(1/64)^2$ =1777/.511=T/e) forming Reimann surface stair step lepton families given eq.2AII.

Fiegenbaum Point



$$\left(\frac{1}{4} - \sum_{N=0}^{\infty}\left(\frac{1}{4}\right)^N\right)\left(\frac{1}{2}\right)$$

Fig.4

Define mass ξ from: C_M≡ε≡ξdr≡ξr_H. So C_M/r_H=ε/r_H=ξ≡m_L. So from figure 4 right side N+1 2AIA diagonal with δk small we have tip to tail $1+m_\mu+m_e = C_M \equiv m_L$. So $S_{½}$ state r_H=ε/m_L ≡$2e^2/(m_Lc^2)$ in eq.4.1 below. ($2P_{3/2}$ B flux quantization modifies this radius so that r_H=ε/m_e, sect.6.11).

Recall 2AIA dr±dt=ds√2, $ds^2=dr^2+dt^2$, $\delta(ds^2)=0$, applies only where δk=small, so near Mandelbulb edges. Solving eq. 1.1 as a quadratic equation gives: δz=[-1±√(1-4C)]/2. To keep eq.1 real under a scale (deformation) change from small C, so to keep the 2AIA observability math, then ¼≥C and so δz=½ so the Mandelbrot set is scaled down by ½ at

45° for N+1. This allows us to create a [¼-Σ(¼)^M]½ model of the observability smallC components of the Big C Mandelbrot set on the N+1 scale at 45° from the small circle observability math eq.2AIA with ½ scale. From the origin (0,0) the limacon in the neighborhood of 45° is a circle for the Nth scale so 2AIA $dz=ds_\tau e^{i\theta}$ is satisfied (since ds constant there given a small rotation, so 2AIA is separable so that $ds=ds_{\varepsilon+\Delta\varepsilon}ds_\tau$ for the Nth scale. For the N+1th fractal scale at 45° the Δε at the Fiegenbaum pt. is separable. So $C_M=1+\varepsilon+\Delta\varepsilon$ in $r_H=e/m=e/_{(1+\varepsilon+\Delta\varepsilon)}$ in $S_{½}$ states. $r_H=e/m=e/_{\Delta\varepsilon}$ in flux quantized $2P_{3/2}$ states

Note that $r_{BB}=0$. x/4096=.511/1777, x=1.177. 1.177/1.40115-x/3.8, x=3.185cm on graph below

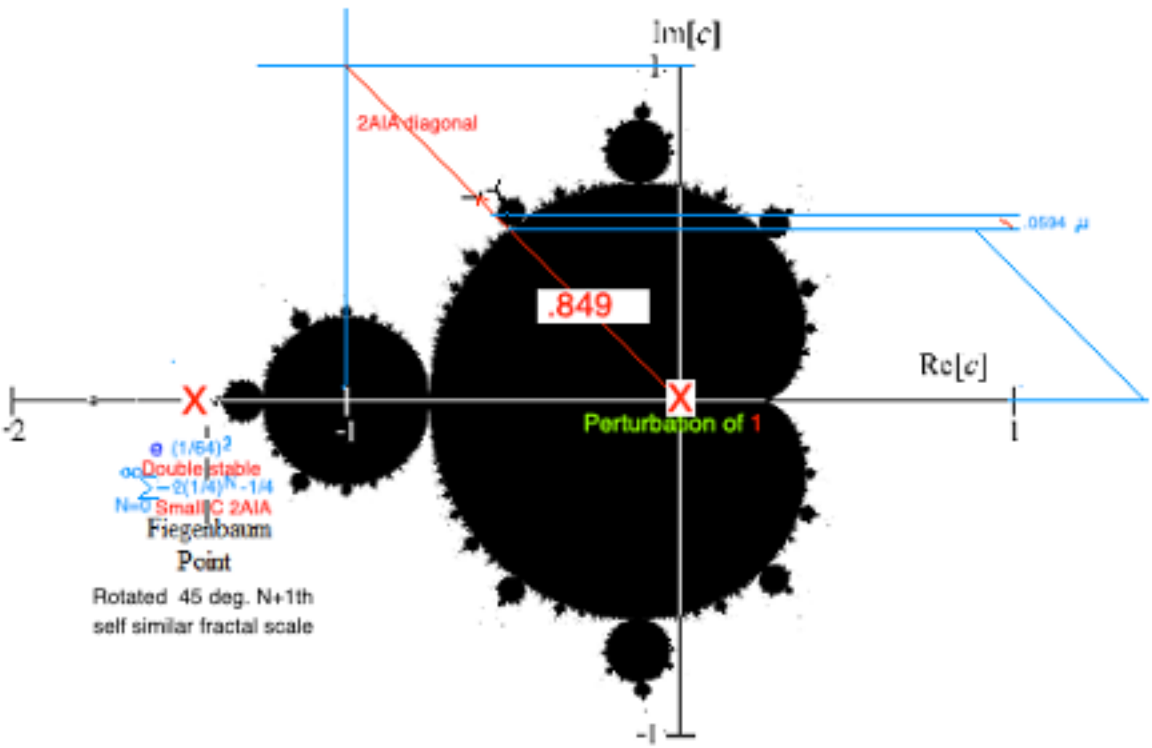


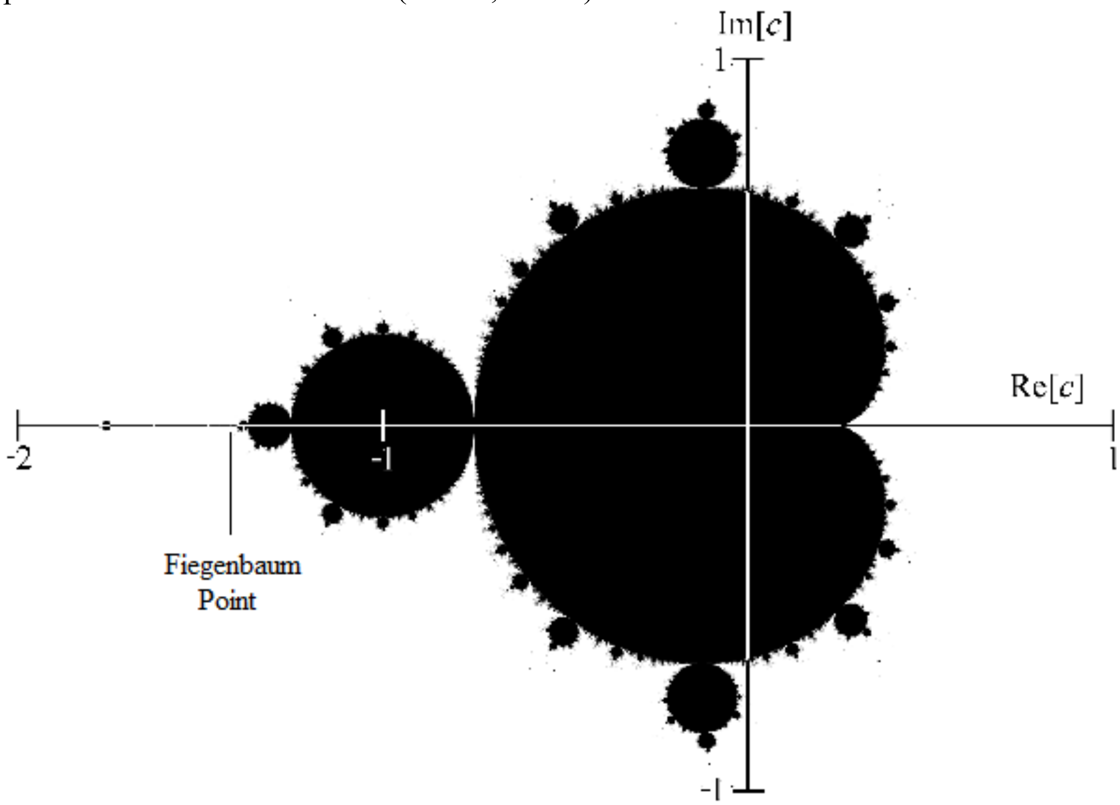
Fig.5

2.2 Fractal Invariants

Speed of light c is a fractal invariant, stays the same in going from one fractal scale to another since dr and dt (in c=dr/dt) change the same as you go through r_H branch cut . Note nontrivial (eq.3.2) eignefunction is δz =-1 for C→0 so given z=1+δz then δzδz=(-1)(-1) =drdr= ds^2=1 in the large N+1 fractal baseline C→0 limit so since ds^2 is invariant for all angles then ds=1 from selfsimilarity of the small Nth and large N+1 th fractal baselines so ds in eq.2 is also a fractal invariant. With c and ds both invariants in eq.2AIA we have 2AIA giving us the Hermitian operators with associated eq,9 eigenfunction Hilbert space.

2.3 C_M Fractal Consequences

Recall our two sect.I.1 equation i.e.,(eq.1) and two unknowns derivation of second unknown C_M, our Mandelbrot set along the –dr axis branch cut horizon. Note also measurements are confined inside time-like geodesics inside r_H event horizon boundaries in eq.9 so the measured $\delta\delta 1=0$ can then be postulated all over again, given branch cut horizon r_H, for $r<r_H$. So on the next higher fractal scale (Ch.2) a second ε can then be rewritten as a 10^{40} X larger source. Recall the ξdr mass term in section 4. Also for the (sect.2.4 just below) fractal $\Delta r=10^{40}$X scale jump in $\varepsilon\Delta r^2=(k/\Delta r)\Delta r^2=k\Delta r$ (recall $\varepsilon\equiv 2e^2/m_ec^2$) implying a new mass term $k\Delta r$ (instead of ξdr). So ε goes up by $\Delta r^2 =(10^{40})^2=10^{80}$. Δr^2 becomes the contravariant tensor dyadic Z multiplier in sect 7.4. Note GM then is invariant (constant) as well since ε is. It is well known that information is stored as horizon r_H surface area$=4\pi r_H{}^2=4\pi(10^{40})^2 \approx 10^{81}$ thus giving us our appendix A counting limit. So for single source $((2GM/c^2)/10^{81}) =(10^{40}/10^{81})\varepsilon\approx(1/10^{40})\varepsilon$ is an added source term of inverse square law force on each electron(2), hence the gravity in fig.3. Ch.7. So the radial rate of change of electric field on our own fractal (expanding) scale is the gravity on the next larger fractal scale (fig.3), *one unified* field! Note also we derived the standard model (eq.2AI) gets the strong force section 2A1+2AI+2AI of Ch.9). See note reference 4 below for the underlying theory. The fractal metric quantization (due to object B) also gives a nonzero $\varepsilon,\Delta\varepsilon$ (fractal) metric quantization mixed states that replaces the need of dark matter (PartIII, Ch.11).



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

Recall section 1.2 and the derivation of the fractal space time. So there is more to these 2D complex number solutions to eq.2a than just irrational and rational numbers, there is also this underlying space-time fractal structure {neighborhood{C_M}∩{-r axis}} that contains even fewer elements than the rational numbers and which only "exists" when the "fog" is not thick, i.e. when C goes to 0. It permeates all of space and yet has zero density. It is a very mysterious subset of the complex plane indeed.

Note to be a part of what is postulated (eq.1) $C\rightarrow 0$ we must be in the neighborhood of the horizontal Mandelbrot set dr axis. But from the perspective (scale) of this N+1 th scale observer one of the 10^{40}X smaller (Nth fractal scale) 45° rotated Mandelbrot sets (fig5) is still near his own dr axis putting it within the ε, δ limit neighborhoods of $C\rightarrow 0$ of eq.2. Thus in this narrow context we are allowed the 45° rotations to the extremum directions of the solutions of equation 2. Our C increases (eg., $C\rightarrow 0$) discussed later sections are also all in this Nth fractal scale context. For example eq. 2AI is then reachable on the Nth fractal scale ($r>r_H$) as a noise object ($C>0$).
So 2AII at 135° must then also result from noise ($C>0$) introduction and so from that first fractal jump rotation in the 2D plane. Later we even note a limit on C (sect.4.3.1).

2.4 Fourier Series Interpretation Of C_M Solution
Recall from equation 2 that on the diagonals we have particles (and waves) and on the dr axis where C=0 only waves, see 2AIA. Recall 2AC solution dr=dt, dr=-dt gives 0 as a solution and so C=0. But in equation 2 for $C\rightarrow 0$ $\delta z=0,-1$. So 2AC implies the two points $\delta z=0,-1$. 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.2AI these are solutions to the Dirac equation and so represent fractalness, smaller wave lengths inside smaller wavelengths. So it is fractal.
2.5 Observer < r_H Interpretation Of C_M Solution
Since equation 9 is essentially all there is there is then also anthropomorphic (i.e., observer) based derivation of that fractalness using equation 9 there is even a powerful ethics lesson that comes out of this result in partV). Recall that eq.2AI has two solution planes and associated two points one of which we define as the observer. In the new pde: $\sqrt{\kappa_{\mu\mu}}\gamma^{\mu}\partial\psi/\partial x_{\mu}=(\omega/c)\psi$ 2AI, (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. In that regard the new pde metric
Note from equations 3.4 we have the Schwarzschild metric event horizon of radius $R\equiv 2Gm/c^2$ 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) (3.3) 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). 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 1.1). H_{M+1} and H_M
But we are still entitled to say that we are made of only ONE "observable" source i.e., H_M of equation 9 (which we can also view from the inside (cosmology) and 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". See end of PART III (of davidmaker.com) for the powerful ethics implication of that result (eg.,negation of solipsism since *two* "observers" are implied by the eq.4AI two simultaneous solutions).

Illustration Of The fractalness: Recall our mantra implied by this fractal space time that "Astronomers are observing from the inside of what particle physicsts are studying from the outside, ONE thing: the new pde (rotated 2AI = eq.9) electron."; Think about that as you gaze up into a star filled sky some evening!
Below is an illustration:

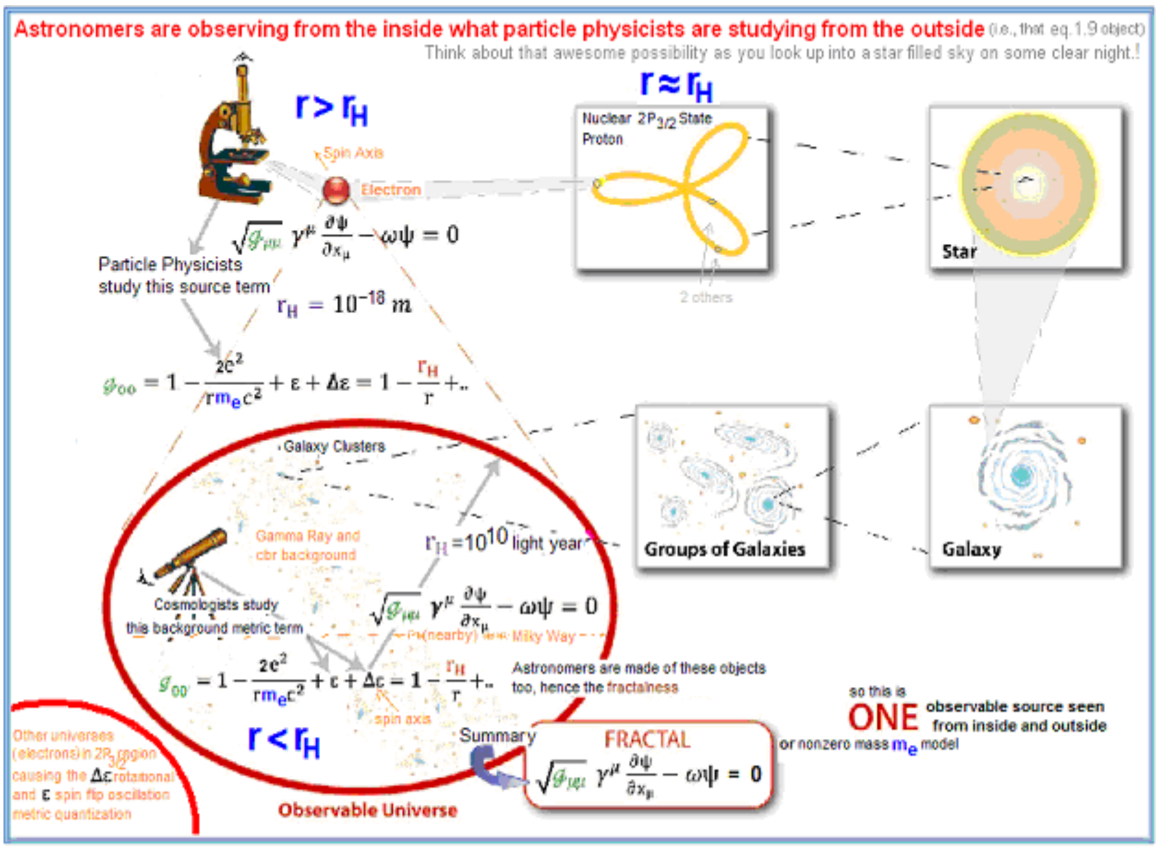


Fig.6

Ch.3 Equation 1b, **2D** Isotropic and Homogenous Space-Time vs A NONhomogeneous and NONisotropic Space-Time

From equation 1a solution 1b we note that this theory is fundamentally 2D. So what consequences does a 2D theory have?
We break the 2D degeneracy of eq. 2AI at the end by rotating by C_M (3.5) and get a 4D Clifford algebra.
Recall 2AI and 2AII are dichotomic variables with the noise rotation C going from 2AI at 45° to 2AII at 135°.

Recall eq.2AI implies simultaneous eq.2AI+2AI are 2D⊕2D=4D. But single 2AI plus single 2AII 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 341.
In that regard for 2D for a homogenous and isotropic g_{ij} we have identically $R_{\mu\mu}$-½$g_{\mu\mu}$R= 0 ≡ source =G_{oo} since in 2D $R_{\mu\mu}$=½$g_{\mu\mu}$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 tranverse wave 2D object (eg., the $2P_{1/2}$ electron in the neutron). In a isotropic homogenous space time Goo=0. Also from sect.2 2AI and 2AII occupy the same complex 2D plane. So 2A1+2AII 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.
Casimir Effect
Also for this complex space 2D $0=G_{oo}=E_e+\sigma\bullet p_r$ for two nearby conducting plates the low energy neutrinos can leave (since their cross–section is so low) but the E&M (E_e standing waves) has to remain with some modes (from the *ν* and anti *ν*), not existing due to not satisfying boundary conditions, because of outside Δε ground state oscillations implying less energy between the plates and so a attractive force between them (We have thereby derived the Casimir effect).

Thus the zero energy vacuum and left handedness of the neutrino in the weak interaction are only possible in this 2D equation 1.2 Z plane. If the space-time is not isotropic and homogenous the neutrino must then gain mass m_o (see section 3.3 for what happens to this mass) and it becomes an electron at the horizon r_H if it had enough kinetic energy to begin with. It changes to an electron by scattering off a neutron with at W- and e- resulting along with a proton. So the neutrino transformed into an electron with other decay products. Recall that the electron 2AI and the neutrino 2AII are dichotomic variables (one can transform into the other,sect.2) and can share the same spinor as we assumed in section 4.3. The neutrino in this situation is left handed. γ^5 is the parity operator part of the Cabibbo angle calculation.

3.2 Helicity Implications 2D Isotropic And Homogenous State
From eq.3.2 $p_x\psi = -ih\partial\psi/\partial x$. We multiply equation $p_x\psi = -ih\partial\psi/\partial x$ in section 3 by normalized ψ* and integrate over the volume to *define* the expectation value of operator p_x for this *observer representation*:

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

(implies Hilbert space if ψ is normalizable). Or for any given operator 'A' we write in general as a definition of the expectation value: $< A > = < a,t \mid A \mid a,t >$ (3.2.1)
The time development of equation 9 is given by the Heisenberg equations of motion (for equation 9. We can even define the expectation value of the (charge) chirality in terms of a generalization of eq.9 for ψ_e spin ½ particle creation ψ_e from a spin 0 vacuum χ_e. In that regard let χ_e be the spin0 Klein Gordon vacuum state in zero ambient field and so ½ $\left(1 \pm \gamma^5\right)\psi_e = \chi_e$. Thus the overlap integral of a spin ½ and spin zero field is:

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

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 3.1 Alternatively, in a second quantization context, equation 3.3.2 is the equivalent to the helicity coming out of the spin 0 vacuum χ_e and becoming spin½ source charge with $½(1\pm\gamma^5)\equiv a^t$ being the charge helicity creation operator.

The expectation value of γ^5 is also the velocity. Also γ^i (i=x,y,z) is the charge conjugation operator. 3.1.3 Note from section 3.1.1 the field and the wavefunction of the entangled state are related through $e^{ifield}=\psi$=wavefunction. $\gamma^r\sqrt{(\kappa_{rr})}\partial/\partial r(\gamma^r\sqrt{(\kappa_{rr})}\partial\chi/\partial r = 0$ where $\psi = (\gamma^r\sqrt{(\kappa_{rr})}\partial\chi/\partial r$ and $½(1\pm\gamma^5)\psi=\chi$. $<\gamma^5> = v = <c/2> = c/4$ 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.

Review

Vacuum

Recall eq.2AIII gives us a vacuum solution as well. Also recall eq.1abis 2D. Recall the $\kappa_{\mu\nu}$, $g_{\mu\nu}$ metrics (and so R_{ij} and R) were generated in above section 1.2.5. In that regard for 2D for a homogenous and isotropic g_{ij} we have identically $R_{\mu\mu}-½g_{\mu\mu}R = 0 \equiv$ source $=G_{oo}$ since in 2D $R_{\mu\mu}=½g_{\mu\mu}R$ identically (Weinberg, pp.394) with μ=0,... Note the 0 ($G_{oo}=E_{total}$ the energy density source) and we have thereby proven the existence of a net zero energy density eq.2AIII vacuum. Thus our 2D theory implies the **vacuum is really a vacuum.**

Left handedness

From sect.1 2AI and 2AIIA and 2AIIB are combined. Note also from section 4.3 C rotation in a homogenous isotropic space-time. So 2A1+2AII = $G_{oo}=E_e+\sigma\bullet p_r=0$ so $E_e=-\sigma\bullet p_r$. So given a positive E_e (AppendixB) and the negative sign in the above relation implies the neutrino chirality $\sigma\bullet p$ is negative and therefore is left handed.

3.3 Nonhomogenous NonIsotropic Mass Increase For 2AII

But a free falling coordinate system in a large scale gravity field is equivalent to a isotropic and homogenous space-time and so even in a spatially large scale field the neutrino has negligible mass if it is free falling.

To examine the effect of all three ambient metric states 1, ε, $\Delta\varepsilon$ we again start out with a set of initial condition lines on our figure 4. In this case recall that in the presence of a nonisotropic non homogenous space time we can raise the neutrino energy to the ε and repeat and get the muon neutrino with mass $m_{o\nu}$=(3km/1AU)m_e=.01eV (for solar metric inhomogeneity. See Ch.3 section on homogenous isotropic space time). So start with eq. 2AII singlet filled 135° state $1S_{½}$. In that well known case $E=\sqrt{(p^2c^2+m_o^2c^4)}=E=E(1+(m_o^2c^4/2E'))$. $E'\approx E\approx pc >> m_oc^2$; $\psi=e^{i(\omega t-kx)}$ with k=p/h=E/(hc).

Set ħ=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,section 6.7) as we move into a stronger and stronger metric gradient. (strong gravitational field) =ψ electron neutrinos can then transform into muon neutrinos. Starting with a isotropic homogenous space time in the ground state we then we go into steeper metric gradients in a inertial frame as seen from at constant metric gradient and higher energies thereby the rest of the states fill consecutively. We apply this result to the derivation of the 2AI+2AI+2AI proton in section 8.1, starting out with infinitismal 2AII+2AII+2AII 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 2AII.

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

4.1 2D⊕2D formulation of 2AI+2AI

To stay within the solutions 1 we note that the *2D degeneracy of eq.2C is* ***broken*** *by the* C_M 2 rotation (eq.3.1) were we use ansatz $dx_\mu \rightarrow \gamma^\mu dx_\mu$ where γ^μ may be a 4X4 matrix and commutative ansatz $dx_\mu dx_\nu = dx_\nu dx_\mu$ so that $\gamma^\mu\gamma^\nu dx_\mu dx_\nu+\gamma^\nu\gamma^\mu dx_\nu dx_\mu = (\gamma^\mu\gamma^\nu+\gamma^\nu\gamma^\mu)dx_\mu dx_\nu$ (μ,ν=1,2,3,4; $\mu\neq\nu$). So from eq.(2C) $ds^2 = (\gamma^1 dx_1+\gamma^2 dx_2+\gamma^3 dx_3+\gamma^4 dx_4)^2=(\gamma^1)^2dx_1^2+(\gamma^2)^2dx_2^2+(\gamma^3)^2dx_3^2+(\gamma^4)^2dx_4^2+\Sigma_{\mu\nu}(\gamma^\mu\gamma^\nu dx_\mu dx_\nu+\gamma^\nu\gamma^\mu dx_\nu dx_\mu)$. But $\gamma^\mu\gamma^\nu dx_\mu dx_\nu+\gamma^\nu\gamma^\mu dx_\nu dx_\mu = (\gamma^\mu\gamma^\nu+\gamma^\nu\gamma^\mu)dx_\mu dx_\nu$ implying $\boldsymbol{\gamma^\mu\gamma^\nu+\gamma^\nu\gamma^\mu=0}$ **from 2B1** and also $(\gamma^\mu)^2=1$ from 2AIA. So the two 2AI results and 2B1 imply the defining rolation for a 4D Clifford algebra.

So the solution 2 rotation by C_M at 45° (eq.2AIA) causes the two simultaneous 2AI electron terms to have different dr,dt.since the random C can be different in each case. These 2new degrees of freedom for the only particle with nonzero proper mass in this theory are what create the 4D we observe.

The two 2D plane simultaneous solutions of eq.2AI then imply 2D+2D=4D thereby allowing for a imbedded 3D spherical symmetry. So we can without loss of generality use the Cartesian product (dr,dt)X(dr',dt')=(dr,dt)X(dϕ,dθ) to replace rsinθdϕ with dy, rdθ with dz, cdt with dt"as in $ds^2=-dr^2-r^2\sin^2\theta d^2\phi-r^2d^2\theta+c^2dt^2\equiv-dx^2-dy^2-dz^2+dt''^2$. Note the two r,t and θ,ϕ, sets of coordinates are written self consistently as a Cartesian product (AXB)= (r,t,ϕ,θ) space.where r,t∈A and ϕ,θ∈B. Note the orthogonal space of θ,ϕ with the ϕ=ωt' carrying the second time dependence (note there are two time dependent parameters in (dr,dt)X(dr',dt')). Given the intrinsic 2D applied twice in the Cartesian product the covariant derivative is equal to the ordinary derivative in the operator formalism. Thus here $[\sqrt{(\kappa_{rr})}dr]\psi=-i[\sqrt{(\kappa_{rr})}(d\psi/dr)]$ replaces the old operator formalism result $(dr)\psi=-id\psi/dr$ in the old Dirac equation allowing us to then multiply by the same γ in $\gamma^r[\sqrt{(\kappa_{rr})}dr]\psi=-i\gamma^r[\sqrt{(\kappa_{rr})}(d\psi/dr)]$. So using this substitution we can use the same Dirac $\gamma^x,\gamma^y,\gamma^z,\gamma^t$ s that are in the old Dirac equation.

4.2 $ds^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2+\kappa_{tt}dt^2$ For spherical Symmetry From Eq.4.1

Pedagogical method of deriving new pde

Here we easily show that our new pde(eq.9) is generally covariant since it comes out of this 4D Pythagorean Theorem equation 83.3

$\kappa_{xx}=\kappa_{yy}=\kappa_{zz}=-1,\kappa_{tt}=1$ in Minkowski flat space, Next divide by ds^2, define $p_x\equiv dx/ds$, so get

$$\kappa_{xx}p'_x{}^2+\kappa_{yy}p'_y{}^2+\kappa_{zz}p'_z{}^2+\kappa_{tt}p'_t{}^2=1$$

To get eq.2.1.3 we can then linearize like Dirac did (however we leave the κ_{ij} in. He dropped it). So:

$$(\gamma^x\sqrt{\kappa_{xx}}p_x+\gamma^y\sqrt{\kappa_{yy}}p_y+\gamma^z\sqrt{\kappa_{zz}}p_z+i\gamma^t\sqrt{\kappa_{tt}}p_t)^2=\kappa_{xx}p_x{}^2+\kappa_{yy}p_y{}^2+\kappa_{zz}p_z{}^2+\kappa_{tt}p_t{}^2 \quad (4.2.1)$$

So just pull the term out of between the two ( ) lines in equation 2.1.3 and set it equal to 1 (given 1*1=1 in eq.1) to get eq.9 in 4D and divide by ds

$$\gamma^x\sqrt{\kappa_{xx}}p_x+\gamma^y\sqrt{\kappa_{yy}}p_y+\gamma^z\sqrt{\kappa_{zz}}p_z+i\gamma^t\sqrt{\kappa_{tt}}p_t=1$$

and multiply both sides of that result by the ψ and write this linear form of equation 1.1.3 as its own equation: $\gamma^x\sqrt{\kappa_{xx}}p_x\psi+\gamma^y\sqrt{\kappa_{yy}}p_y\psi+\gamma^z\sqrt{\kappa_{zz}}p_z\psi+i\gamma^t\sqrt{\kappa_{tt}}p_t\psi=\psi$

Then use eq.4.6. This proves that the new pde (eq.9) is covariant since it comes out of the Minkowski metric for the case of $r\rightarrow\infty$.

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

Note from eq.2AI the (dr,dt;dr'dt') has two times in it so can be rewritten as (dr,rdθ,rsinθωdt,cdt)≡ (dr,rdθ,rsinθdϕ,cdt)

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

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

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

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

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

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

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

and so we can then derive the same Clifford algebra (of the γ s) as for the old Dirac equation with the terms in the square brackets (eg.,$[\sqrt{(\kappa_{xx})}dx]\equiv p'_x$) replacing the old dx in that derivation.

Also here there is a spherical symmetry so there is no loss in generality in picking the x direction to be r at any given time since there is no θ or ϕ dependence on the metrics like there is for r.

If the two body equation 9 is solved at $r\approx r_H$ (i.e.,our –dr axis, $C\rightarrow0$ of eq.1) 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 $E_n=Rel(1/\sqrt{g_{oo}})=Rel(e^{i(2\varepsilon+\Delta\varepsilon)})=1-4\varepsilon^{2/}4+..=1-2\varepsilon^2/2\equiv1-\frac{1}{2}\alpha$. 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.

4.4 Single 3AI Source Implies Equivalence Principle And So Allows You To Use Metric $\kappa_{\mu\nu}$ Formalism

Recall that the electrostatic force Eq=F=ma so E(q/m)=a. Thus there are different accelerations 'a' for different charges 'q' in an ambient electrostatic field 'E'. In contrast with gravity there is a single acceleration for two different masses as Galileo discovered

in his tower of Pisa experiment. Thus gravity (mass) obeys the equivalence principle and so (in the standard result) the metric formalism $g_{ij\ (eq.7)}$ can apply to gravity.
Note that E&M can also obey the equivalence principle but in only one case: if there is a *single e* and Dirac particle m_e in Eq=ma and therefore (to get the correct geodesics,): Given an equivalence principle we can the write E&M metrics such as rewriting 3.2:

$$\kappa_{oo} = \ g_{oo}=1-2e^2/rm_ec^2 =1-r_H/r \qquad (4.4.1)$$

(with $\kappa_{rr}=1/\kappa_{oo}$, in section 1.2.5) and so then trivially all charges will have the same acceleration in the same E field. This then allows us to insert this metric g_{ij} formalism into the standard Dirac equation derivation instead of the usual Minkowski flat space-time g_{ij} s (below). Thus by noting E&M obeys the equivalence principle you force it to have ONE nonzero mass with charge. Thus you force a unified field theory on theoretical physics! But eq.9 only applies when you have a equivalence principle. So a metric does not exist for eq.9 for three or more eq.9 objects unless ultrarelativistic motion makes the plates not intersect and so there is the "approximation" of two objects as in section II 2AI+2AI+2AI.

4.5 Implications of g_{oo} =1-2e²/rm$_e$c² =1-eA$_o$/mc²v^o) In The Low Temperature Limit Of Small Noise C

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.1a,1b. Solution to eq.1 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 2AI. Note 2AI 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 section 4.1 We plug this A_i into the geodesics

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

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

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

$A'_0 \equiv e\phi/m_\tau c^2$, $g_{00} \equiv 1-\frac{e\phi(x,t)}{m_\tau c^2} = 1-A_0^{'}$, and define $g'_{\alpha\alpha} \equiv 1-A'_\alpha/v_\alpha$, ($\alpha \neq 0$) and

$g''_{\alpha\alpha} \equiv g^{'}_{\alpha\alpha}/2$ for large and near constant v,,see eq. 4.2 also . In the weak field $g^{ii} \approx 1$.
Note e=0 for the photon so it is not deflected by these geodesics whereas a gravity field does deflect them. The photon moves in a straight line through a electric or magnetic

field. Also use the total differential $\frac{\partial g_{11}}{\partial x^{\alpha}}dx^{\alpha}=dg_{11}$ so that using the chain rule gives us:

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

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

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

Thus we have the *Lorentz force equation* form $\left(-\left(\frac{e}{m_\tau c^2}\right)\left(\vec{\nabla}\phi+\vec{v}X\left(\vec{\nabla}X\vec{A}\right)\right)\right)_x$ plus the derivatives of 1/v which are of the form**:** $\mathbf{A_i(dv/dr)_{av}/v^2}$.This new term $A(1/v^2)dv/dr$ is the pairing interaction (4.5.3). This approximation holds well for nonrelativistic and nearly constant velocities and low B fields but fails at extremely low velocities so it works when v>>(dv/dA)A. This constraint also applies to this ansatz if it is put into our Maxwell equations in the next section. Recall at the beginning of the BCS paper abstract the authors say that superconductivity results if the phonon attraction interaction is larger than the electrical repulsion interaction
Given a stiff crystal lattice structure (so dv/dr is large also implying that lattice harmonic oscillation isotope effect in which the period varies with the (isotopic) mass.) this makes the pairing interaction force $A_i(dv/dr)_{av}/v^2$. The relative velocity "v" will then be small in the denominator in some of the above perturbative spatial derivatives of the metric $g_{\alpha\alpha}$ (e.g., the 1/v derivative of H2 $(A/v^2)(dv/dr)_{av}$. This fact is highly suggestive for the velocity component "v" because it implies that at cryogenic temperatures (extremely low relative velocities in normal mode antisymmetric motion) new forces (pairing interactions?) arise from the above general relativity and its spin 0 (BCS) and spin 2 states[i] (D states for CuO_4 structure). For example the mass of 4 oxygens (4X16=64) is nearly the same as the mass of a Cu (64) so that the SHM dynamics symmetric mode (at the same or commensurate frequencies) would allow the conduction electrons to oscillate in neighboring lattices at a relative velocity of near zero (e.g.,v ≈0 in $(A/v^2)(dv/dr)_{av}$ making a large contribution to the force), thus creating a large BCS (or D state) type pairing interaction using the above mechanism. Note from the dv/dt

there must be accelerated motion (here centripetal acceleration in BCS or linear SHM as in the D states) as in pair rotation but it must be of very high frequency for $(dv/dr)_{av}$ (lattice vibration) to be large in the numerator also so that v, the velocity, remain small in the denominator with the phase of "A" such that $A(dv/dr)_{av}$ remain the same sign so the polarity giving the A is changing rapidly as well. This explains the requirement of the high frequency lattice vibrations (and also the sensitivity to valence values giving the polarity) in creating that pairing interaction force. Note there should be very few surrounding CuO_4 complexes, just the ones forming a line of such complexes since their own motion will disrupt a given CuO_4 resonance, these waves come in at a filamentary isolated sequence of CuO_4 complexes passing the electrons from one complex to another would be most efficient. Chern Simons developed a similar looking formula to $A_i(dv/dr)_{av}/v^2$ by trial and error. This pairing interaction force $A(dv/dt)/v^2$ drops the flat horizontal energy band (with very tiny variation in energy) saddle point (normally at high energy) associated with a particular layer down to the Fermi level making these energies (band gaps) large and so allowing superconducitivity to occur.

Twisted Graphene

Monolayer graphene is not a superconductor by the way.

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

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

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

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

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

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

This is the true source of superconductivity.

4.6 Summary of Consequences of the Uncertainty In Distance (separation) C In $-\delta z=\delta z\delta z+C$ eq.1

1) C as width of a slit determines uncertainty in photon location and resulting wave particle duality (see above section 4.3.8).

2) C is uncertainty in separation of particles which is large at high temperatures. Note degeneracy repulsion (two spin ½ can't be in a single state) is not necessarily time dependent and is zero only for bosons. Also given the already extremely small Brillioun zone bosonization separation (see equation 4.3 for pairing interaction source) then C is small so not much more is needed for C to drop below ¼ to the r axis for Bosons. Thus time axis $\Delta t=0$ so $\Delta v=a\Delta t=0$. (note relative v is big here. Therefore there is no Δv and so no force (F=ma) associated with the time dependent acceleration 'a' for this Boson flowing through a wire with the stationary atoms in the wire. So there is no electrical resistance to the flow of the Bosons in this circuit and we have therefore derived superconductivity from first principles. But there is a force between electrons in a pairing

interaction (that creates the Boson) because v between them is so small. Use pairing interaction force mv^2/r between leptons from sect.4.8: $F_{pair} = A(dv/dt)/v^2$. is large. Recall that a superfluid has no viscosity. But doesn't viscosity constitute a force F as well (F/m=a in dv=adt) and isn't helium 4 already a boson so that when C drops below ¼ then dt drops to zero as well? So superfluidity for helium 4 is also a natural outcome of a small C.

3) C is separation between particle-antiparticle pair (pair creation). For C<1/4 we leave the 135° and 45° diagonals jump to the r axis and simple ds^2 wave equation dependence (Ch1,section 2). Thus we have derived pair creation and annihilation. The dt is zero giving no time dependence thus stable states. On the superconductivity we derived the pairing interaction (eq.4.5.3) and superfluidity (sect.4.6). So for two paired leptons (via the pairing interaction) the Hamiltonian of each one is then a function of both wavefuctions: $\hbar\partial\psi_1\partial/t=u_1\psi_1\ v_2\psi_2$ and $\hbar\partial\psi_2/\partial t=u_2\psi_1+v_2\psi_2$ which gives the superconducitivity. See Feynman lectures on superconductivity.

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

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

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

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

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

Thus we can either set the positive energy v(p,s) or the negative energy u(p,s) equal to zero and so we no longer have a $e^{2ix\theta p\theta/\hbar}$ zitterbewegung contribution to J_u, the zitterbewegung no longer can be seen. Thus we have derived the mainstream idea that the zitterbewegung does not exist.

But if we continue on with this derivation we can also show that the zitterbewegung does exist if the electron is in a confined space of about a Compton wavelength in width, so that a nearby confining wall exists then.

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

Derivation Of Eq.9 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 9.(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 postulated $\delta\delta 1=0$). But that is the same thing as Schrodinger's zitterbewegung blob mentioned above. So we postulated the electron and derived the electron rotated 2AI (i.e.,eq.9) from that postulate. We therefore have created a mere trivial tautology.

4.13 The Most General Uncertainty C In Eq.1 Contains Markov Chains

This final variation wiggling around inside dr= error region near the Fiegenbaum point also implies a dz that is the sum of the total number of all possible individual dz as in a *Markov chain* (In that regard recall that the Schrodinger equation free particle Green's function propagator mathematically resembles Brownian motion, Bjorken and Drell) where we in general let dt and dr be either positive or negative allowing several δz to even coexist at the same time (as in Everett's theory and all possible paths integration path integral theories below). Recall dt can get both a $\sqrt{(1-v^2/c^2)}$ Lorentz boost (with the nonrelativistic limit being $1-v^2/2c^2+\ldots$) and a $1-r_H/r=\kappa_{oo}$ contraction time dilation effects here. In section 2.2.6 we note that for a flat space Dirac equation Hamiltonian the potentials are infinite implying below an unconstrained Markov chain and so unconstrained phase in the action So $dt\rightarrow dt\sqrt{(1-v^2/c^2)}\sqrt{\kappa_{oo}}$. $r_H=2e^2/(m_ec^2)$. We also note the alternative (doing all the physics at the point ds at 45°) of allowing $C>C_1$ to wiggle around instead between ds limits mentioned above results in a Markov chain. $dZ=\psi\equiv\int dz=\int e^{id\theta}dc=\int e^{idt/so}dc=\int e^{idt/\sqrt{(1-v^2/c^2)}\sqrt{\kappa oo/so}}ds'ds$.. In the nonrelativistic limit this result thereby equals $\int e^k e^{ikdt(v^2-k/r)}=\int e^{i\int k\int(T-V)dt}ds'ds\ldots=\int e^{iS}ds'ds\equiv dz_1+dz_2+..\equiv\psi_1+\psi_2+$. (4.13.1)many more ψs (note S is the classical action) and so integration over all possible paths ds not only **deriving the Feynman path integral but also Everett's *alternative*** (to Copenhagen) many worlds (i.e., those above many Markov chain $\delta z_i=\psi s$ in $\int dz=\psi s\equiv\psi_1+\psi_2+$.) interpretation of quantum mechanics where the possibility of –dt allows a pileup of δzs at a given time just as in Everett's many worlds hypothesis. But note equation 9 curved space Dirac equation does not require infinite energies and so unconstrained Markov chains making the need for the path integral and Everett's many worlds mute.: We don't need them anymore. Thus we have derived both the Many Worlds (Everett 1957) and Copenhagen interpretations (Just below) of quantum mechanics (why they both work) and also have derived the Feynman path integral.

In regard to the Copenhagen interpretation if we stop our J.S.Bell analysis of the EPR correlations at the quantum mechanical -cosθ polarization result we will not get the nonlocality (But if instead we continue on and (ad hoc and wrong) try to incorporate hidden variable theory (eg.,Bohm's) we get the nonlocality, have transitioned to classical physics two different ways. We then have built a straw man for nothing. Just stick with the $h\rightarrow 0$, 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.

4.14 2D⊕2D

Also with eq.2AI first 2D solution there is no new pde and so no wave function. The other solution to 2AI adds the other 2D (observer) and so we get the eq.9 new pde and thereby its wave function. So we needed the observer to "collapse" the wave function. This is the proof of the core part of the Copenhagen interpretation. Eq.42IA gives the probability density $\delta z^*\delta z$ (another component of the Copenhagen interpretation so we have a complete proof of the Copenhagen interpretation of quantum mechanics here.

4.15 Mixed State 2AI+2AI 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 ψ(+) and ψ(-) are separate but (Hermitian) orthogonal eigenstates and so <ψ(+)|ψ(-)>=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 2AI 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/√(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 ψ(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→dr' here) by the±ε term in the associated $\kappa_{\mu\nu}$ So the ψ(+)and ψ(-) in the Dirac equation column matrix will have different (x,y,z,t) values for the ψ(+) than for the ψ(-). 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 2AI states are not collocated for a given solutions to a single Dirac equation (other positrons from *other* Dirac equation solutions can always wonder in from the outside in the usual positron-electron pair annihilation calculation case but that is not the same thing). Thus the Dirac sea does not have to exist to explain why the electron does not decay into negative energy.

4.16 No Need for a Running Coupling Constant

If the Coulomb V= α/r is used for the coupling instead of α/(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 (-Kα/r)=α/(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 (-Kα/r)= α/(r_H-r) =α/(r(1/20)-r))= -α/(r(19/20))=(20/19)α/r =1.05α/r so K=1.05 which corresponds to a 1/Kα≡1/α'≈130 also found by QED (renormalization group) calculations of (Halzen, Quarks). Therefore we can dispense with the running coupling constants, higher order diagrams, the renormalization group, adding infinities to get finite quantities; all we need is the correct potential incorporating $\sqrt{\kappa_{oo}}$.

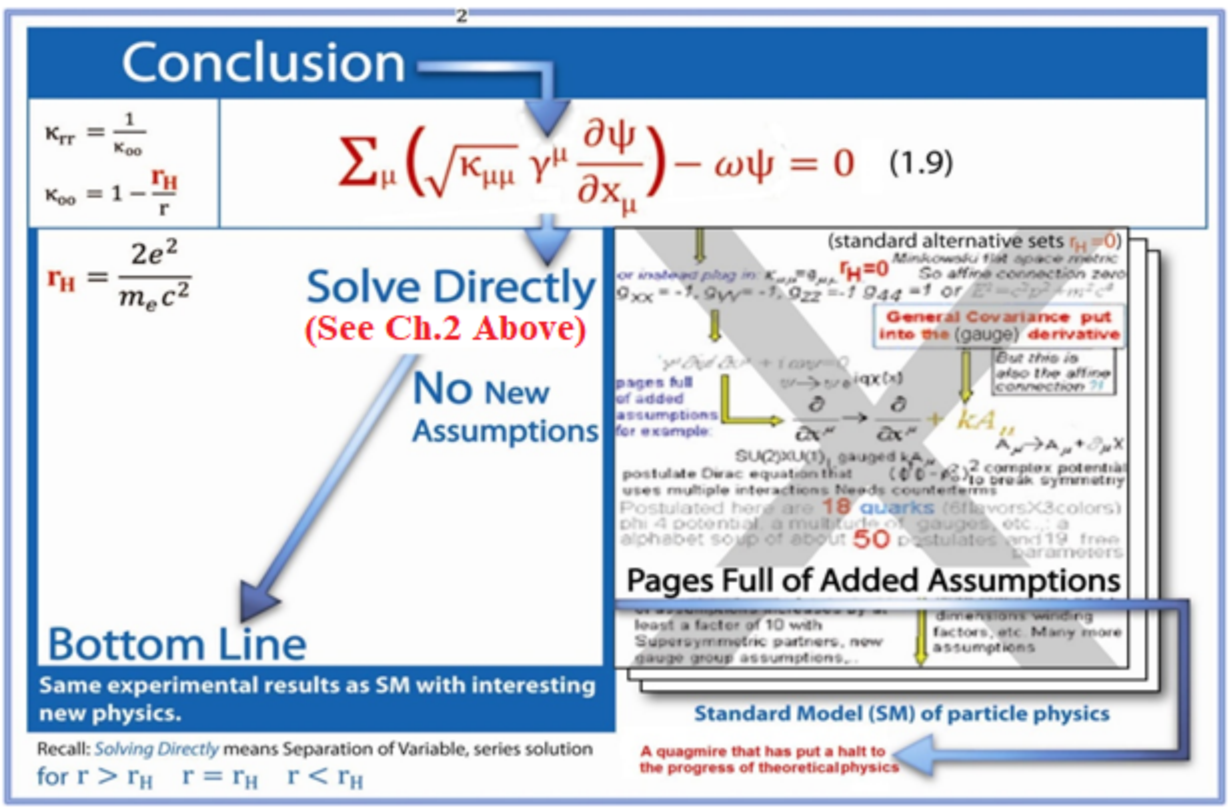
Note that the α'=α/(1-[α/3π(lnχ)] running coupling constant formula (Faddeev, 1981)] doesn't work near the singularity (i.e., $\chi\approx e^{3\pi/\alpha}$) because the constant is assumed small over all scales (therefore there really *is no formula to compare* α/(r-r_H) to over all scales) but this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

4.17 Rotated 4AI Implies $\kappa_{00}=1-r_H/r\approx1/\kappa_{rr}$ So No Klein Paradox As Is In The Original 1928 Dirac Equation

Recall that κrr=1/(1-r_H/r) in the new pde eq.2AI. 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 2AI+2AI mixed state new pde so $p_r=(\sqrt{\kappa_{rr}})p=(1/\sqrt{(1-r_H/r)})p$ and so $p_r\to\infty$ so $\kappa\to\infty$ the huge values of the rest of the numerator and denominator cancel out with some left over finite number. Therefore for the actual abrupt potential rise at $r=r_H$ we find that p_r goes to infinity so $R_s=1$ and $T_s=0$.as expected. Thus nothing makes it through the huge barrier at r_H thereby resolving the Klein paradox: there is no paradox anymore with the new pde. No potentials that have infinite slope. Therefore the new pde applies to the region inside the Compton wavelength just as much as anywhere else. *So* if you drop the $\sqrt{\kappa_{rr}}$ in the new pde all kinds of problems occur inside the Compton wavelength such as more particles moving to the right of the barrier than as were coming in from the left, hence the Klein paradox(4).

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

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



4.18 Mixed State 2AI+2AI C>1/4 and C<1/4 Implications For Pair Creation And Annihilation

Note that if C<1/4 in equation 1 ($dz=(-B\pm\sqrt{(B^2-4AC)})/2A$, A=1, B=1) the two points are close together and time disappears since dz is then real for the neighborhood of the origin where opposite charges can exist along the 135° line. So we are off the 45° diagonal and therefore the equation 2 extrema does *not* apply. So the eq.2AII fermions disappear and we have only that original second boson derivative $\delta ds^2=0$ circle ($\Box^2A_\mu=0$, $\Box\bullet A=0$)

Maxwell equations. So when two fundamental fermions are too near the origin and so get too close together (ie., dr=dr', dt=dt') you only have a boson and the fermions disappear. So we have explained particle-antiparticle annihilation from first principles. In contrast two fermions of equal charge require energies on the order of 100GeV to get this close together in which case they also generate bosons in the same way and again the fermions do disappear from existence. You then generate the W and the Z bosons (since above sect.4.11 nonweak field $k^{\nu}k_{\nu}\kappa_{\mu\mu}$=Proca equation term) .

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

Note we are within the Compton wavelength of the next higher fractal scale new pde (we are inside of r_H). Also our new pde does not exhibit the Klein paradox within the Compton wavelength (because of the κ_{ij} s) or anywhere else so our new pde is valid there also. Note for $r<r_H$ then $E=\hbar\omega=E=1/\sqrt{\kappa_{oo}}=1/\sqrt{(1-r_H/r)}$ and therefore this square root is imaginary and so $i\omega\rightarrow\omega$ in the Heisenberg equations of motion. Therefore $r=r_oe^{i\omega t}$ becomes instead $r=r_oe^{\omega t}$ (that accelerating cosmological expansion) which is observable zitterbewegung motion since ωt does not cancel out in $\psi^*\psi$ in that case and again we are within the Compton wavelength and so even according to the Bjorken&Drell PP.39 criteria the zitterbewegung therefore exists.
Also note in the above $\kappa_{rr}=1/\kappa_{tt}$ eq.4.4we have derived GR from our theory.

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

Recall section 4 implies General relativity (recall eq.4.2 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.2A flat background metric. and so equation 1 and observables. Note also in section 3.2 above we defined the quantum mechanical $[A,H]|a,t\rangle=(\partial A/\partial t)|a,t\rangle$ Heisenberg equations of motion in section 3.2 with $|a,t\rangle$ a eq.9 (4AI) eigenstate. Note the commutation relation and so second derivatives (H relativistic eq.9 (4AI) 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 $r=r_oe^{wt'}$ $H]|a,t\rangle=(\partial A/\partial t)|a,t\rangle=(\partial/\partial t)(\partial/\partial x)-(\partial/\partial x)(\partial/\partial t)$=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.1.5) in a curved space time we can generalize the Heisenberg equations of motion to curved space *non*perturbatively with: $(A_{i,jk}-A_{i,kj})|a,t\rangle=(R^m{}_{ijk}A_m)|a,t\rangle$ where $R^a{}_{bcd}$ is the Riemann Christofell Tensor of the Second Kind and $\kappa_{ab}\rightarrow g_{ab}$. Note all we have done here is to identify A_k as a quantum vector operator here, which it should be. Note again the second derivatives are taken twice and subtracted looking a lot like a generalization of the above Heisenberg equations of motion commutation relations. Note also $R^m{}_{ijk}$ could even be taken as an eigenvalue of pdot since it is zero when the space is flat, where force is zero. These generalized Heisenberg equations of motion reduce to the above QM form in the limit $\omega\rightarrow 0$, outside the region where angular velocity is very high in the expansion (now it is only one part in 10^5).

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

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

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

6.2 r<r_H Observational Evidence For Object B

Recall there are two metrics in section 3.1 and outside Schwarzschild and inside De Sitter. But because of eq.2AI (and so eq.9 modified Dirac equation) we are in a rapidly rotating object, the electron rotating at rate c (in the fractal theory at least. It is the solution to the Dirac equation eq.9). But because of inertial frame dragging in object A observed spin is extremely small except for a small contribution to reducing inertial frame dragging of object B (section 4.1.2). So the geodesics are parallel (flat space holonomy) just like the cylinder. Inertial frame dragging should not destroy the holonomy, just rotate the cylinder but it stays a cylinder. We can realize that for a spherical metric by maintaining the parallel transport which means the expansion is needed to maintain the cylinder. From our perspective we see a sphere with a flat space. Recall the mainstream guy also said this space is in fact that of a 3D cylinder, which it is. This 'seeing ourselves' is also predicted by the mainstream stuff too given the observations of the flat space and the requirement of the cylinder topology. But seeing ourselves is so weird to the mainstream that they have postulated a pretzel space instead at large distances.

So the universe is fractal with the (Dirac spinor) the Kerr metric high angular momentum local cylinder near r_H dominates and creates the flat space time associated with a cylinder so that two parallel lines do remain parallel within the time like interval at least. When we look out at the edge of the universe in some specific direction, beyond that space like interval (that we cannot see beyond) we are very nearly (just over the space- like edge) looking at ourselves as we were over 12by years ago. We are looking back in time at ourselves! (in this fractal model).

The hydra-centaurus supercluster of galaxies is about 150MLY away. We would find it by looking in the opposite direction of the sky from where we see it now, it would be a smudge at submillimeter wave lengths.

So create a map of the giant galaxy clusters within 2By of the Milky Way galaxy and invert each object by 180° to find the map of the oldest redshift galaxy clusters

Given 2D piece of paper, you can connect the ends a few different ways by folding it. Connect one of the dimensions normally and you have a cylinder. Flip one edge over >before connecting and you've made a Mobius strip. Connect two dimensions, the top to the bottom and one side to the other, and you have a torus (aka a donut). In our 3D universe, there are lots of options — 18 known ones, to be precise. Mobius strips, Klein bottles and Hantzsche-Wendt space manifolds are all non-trivial topologies that share something in common: if you travel far enough in one direction, you come back to where you started. Bg gravimagnetic dipole from the new pde provides the spherical torus shape for this.
In this fractal universe we do this. In fact there is only one way to do it: in the r_H cylinder region of the Kerr metric near c rotation rate, so the topology is a given.

6.3 The Distance Of Object B From Object A Determines Particle Mass
Introduction Nth scale is 10^{-40}X small baseline
Recall that Eq. 1 (with its small C) gave us eq.2AIA at min ds at 45°, for our observables (eigenvalues). Also eq.1.1 gives $-dr=drdr+C_M$ so define mass ξ from dr distance and C_M so that $\mathbf{C_M}=<z>+<zz>\equiv\boldsymbol{\xi}\mathbf{dr}=\xi(dr_{local}+dr_{Mandelbrot})=\xi(dr_{local}+(dr_N+dr_{N+1}))=\xi(dr_1+dr_2)=\xi dr_1+\xi dr_2$ given the squred $\xi\xi$ term in $C_M=<z>+<zz>=\xi dr_1+\xi\xi dr_2$. On the big (cosmological) fractal eq.9 baseline dr_2 is a large constant r_H since zz>>z so we can define ε from $\varepsilon=\xi\xi dr_2$. So $\varepsilon/\xi=\xi dr_2$ with $\varepsilon=\varepsilon_N+\varepsilon_{N+1}$. $C=\xi dr+\varepsilon/\xi\equiv\varepsilon_1$. So:
$\varepsilon=\varepsilon_N+\varepsilon_{N+1}$. In $dr-\varepsilon_1\equiv dr-(\varepsilon/\xi+\xi dr)\equiv dr'$ (4.1)
Also on the big cosmological eq.9 object B&A fractal baseline (as sect.6.6 implies) vibrational m_τ and rotational m_μ modes so $\xi\equiv m_L=m_\tau+m_\mu+m_e$. At $r=r_{HN+1}$ then $1-\xi+r_{HN}/r+r_{HN+1}/r=\xi-r_{HN}/r=$ $1-(m_\mu+m_e)-r_{HN}/r$ and $(a/r)^2\rightarrow m_\mu$ and m_μ is the rotational eigenvalue as it must be in the Kerr metric 6.1.1. So from object A&B relative motion $\xi=m_\tau+m_\mu+m_e$. m_e is the ground state.κ_{00}=. $1-\xi-(\varepsilon/\xi)/r\equiv 1-\xi-r_H/r$, So $\xi=m_\tau+m_\mu+m_e=m_L$ is clamped in with the Kerr metric at $r=r_H$ (4.1a)
$\Delta+m_e$ with m_e the ground state and $r_H=\varepsilon/m_L\equiv 2e^2/(m_Lc^2)$ in eq.4.1 below. But a large noise perturbation to the Kerr leaves KE=Δ high energy and $\xi=m_e$. Also in the object B Kerr metric also $(a/r)^2\equiv(\xi rdr/ds)/r)^2=(\xi dr/ds)^2=C_M\equiv\xi r_H$ from 4.1a for the small fractal baseline. So $\xi(dr/ds)=C_Mds/dr\equiv h/\lambda=mv$ (eg., 6.1.3).
Also $r_H=\varepsilon/m_L\equiv 2e^2/(m_Lc^2)$ in eq.4.1 below. $2P_{3/2}$ B flux quantization modifies this (in the Kerr metric) to $r_H=\varepsilon/m_e$ large . See Ch.2, figure 4.

Also on the big cosmological eq.9 object B&A fractal baseline (in sect.6.3 implies) vibrational m_τ and rotational m_μ modes so $\xi\equiv m_L=m_\tau+m_\mu+m_e=\Delta+m_e$ with m_e the ground state and $r_H=\varepsilon/m_L\equiv 2e^2/(m_Lc^2)$ in eq.4.1 below. So a large noise perturbation just leaves KE=Δ high energy and $\xi=m_e$. So $r_H=\varepsilon/m_L\equiv 2e^2/(m_Lc^2)$ in eq.4.1 below. $2P_{3/2}$ B flux quantization modifies this (in the Kerr metric) to $r_H=\varepsilon/m_e$ large . See Ch.2, figure 4.
For 2AI we can define $\varepsilon=\xi dr_C$ is the C_M contribution for large C. Thus $(a/r)^2=\xi$ in the Kerr metric because of $\kappa_{oo}=1+\xi dr_C/dr_C-r_H/r=1+\xi-r_H/r$ showing the mass is ξ in $\varepsilon=\xi dr$. is generated form object decrease in inertial frame dragging. Recall appendix B and the derivation of the 10^{81} X electron mass there. That implies that our universe is not the only object on the N+1 fractal scale. Since we are at the Fiegenbaum point the fractalness is exact so that there is a 75% chance our object A is one of three such "electrons" inside a

proton. Note in sect.2.1 the equilibrium established after the initial slow expansion so that energy density is uniform so that $k(4/3)\pi r^3$**.** We are located in a huge (rotating) electron Kerr metric object. But if there was no nearby object there would be complete inertial frame dragging. But recalling the large rotating shell approximation of GR (Mach's principle implication) we see that a nearby large object B will reduce the inertial frame dragging and so make the metric a Kerr metric:
Section 3.1 implies a Schwarzschild metric for the outside observer $r>r_H$ for an isolated object (eg., no object B nearby) since that was the assumption made in the derivation. But equation 2A1 (solution to equation 4) leads to equation 9 and the new pde. In that equation the object 2A1 electron has spin S, is rotating and can be seen as such if there is a object B nearby (see below). Thus for no nearby object we have the Schwarzschild metric but in general with a nearby object the internal $r>r_H$ sees a rotational (Kerr) metric (so from section 4.1.2 assumed to be a quantum operator) which is given by:

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

where $\rho^2(r,\theta)\equiv r^2+a^2\cos^2\theta; \quad \Delta(r)\equiv r^2-2mr+a^2$, Note the oblation term $a^2\cos^2\theta$.
To find the perturbative contribution of Eq.3.2 in sect.3.1 to the Schwarzschild metric we note that for near zero rotational speed we can take $d\theta/ds=0$, or just $d\theta=0$. Also for $\theta=90°$ then $\cos 90°=0$, $\rho^2=r^2$. So the above equation becomes

$ds^2= dr^2/(1-2m/r+(a/r)^2)+r^2d\theta^2+(r^2+a^2)\sin^2\theta(vdt/r^2)^2+ 2a\sin^2\theta d\theta cdt+(2m/r-1)dt^2$

$ds^2= dr^2/(1-2m/r+(a/r)^2)+r^2d\theta^2+(r^2+a^2)\sin^2\theta d\phi^2+ 2a\sin^2\theta d\theta cdt+(2m/r-1)dt^2$

$\approx ds^2= dr^2/(1-2m/r+(a/r)^2) +(2m/r-1)dt^2$ (6.1.1)

The $(a/r)^2$ is the energy ε angular momentum term which also turns out to be the muon mass. The fractal ground state $\Delta\varepsilon$ (is part of the background mass) is added to this.
That r_H in the old GR metric is $r_H=2GM/c^2$ (the fractal M+1) scale r_H. The Mth scale r_H is that $2e^2/m_ec^2=r_H$ and gives those QED results without the renormalization.

$dr^2/(1-2m/r+(a/r)^2) - c^2dt^2(1-2m/r)$ (6.1.2)

with $(a/r)^2$ =being the ambient metric of section 6.4. Thus the ambient metric is caused by the reduced inertial dragging associated with a nearby object B.

On the large factal baseline $dr^2=C_M$. So in the Kerr metric eq.6.1.1
$(a/r)^2\equiv(\xi r dr/ds)/r)^2=(\xi dr/ds)^2=C_M\equiv\xi r_H$ from 4.1a for the small fractal baseline. So
$\xi(dr/ds)=C_M ds/dr \equiv h/\lambda=mv$ (6.1.3)
Note in equation 7 we are again subtracting ε but this time possibly in the form of $\xi r_H\equiv(a/r)^2$ where $\xi\equiv\varepsilon/dr$. This ξ is the mass energy term of equation 3.2, sect.1.1.5. The $(a/r)^2$ in eq.6.1.1 is the energy ε angular momentum term (and also $\Delta\varepsilon$), which turns out to be the muon mass.

6.4 This Added Object B $(a/r)^2$ term Is Then The Source Of The Ambient Metric And Mass

Tensor Geometry Consequences of C^2
Recall section 4 implies General relativity (recall eq.4.2and the Schwarzschild metric derivation there). . But the context is that of keeping equation 1 C^2 and so that local MandelbulbLepton model.eq.2A flat space ambient metric manifold. In that regard given a (observable) vector operator A that explicitly operates on the ψ of equation 9) we can

then construct the Riemann Christofell Tensor of the Second Kind R^a_{bcd} (from section 4. we can assume it is a quantum operator) from the $\kappa_{ab}\equiv g_{ab}$ using the C^2 of A given by $(A_{i,jk}-A_{i,kj})|a,t\rangle = (R^m_{ijk}A_m)|a,t\rangle$. We can then contract this $R^m_{ijk}A_m|a,t\rangle$= tensor to get the Ricci tensor R_{ij} (here $R_{ij} \equiv R^m_{ijm}$).
Note here A is the Quantum Operator and the coefficient $R_{\mu\nu}$ is a (geometry) tensor.
Define the scalar $R = \kappa^{\mu\nu}R_{\mu\nu}$ We then define conserved quantity $Z_{\mu\nu}$ from

$$R_{\mu\nu}-\tfrac{1}{2}\kappa_{\mu\nu}R\equiv Z_{\mu\nu} \qquad (6.4.3)$$

after substituting in equations 3.2, 4.1 we see for example that $Z_{oo}=4\pi r_H$ (6.4.4)
where from equation 4.4.3 we have $r_H = 2e^2/m_ec^2$.
In free space we can see from equation 4.2 that: $R_{\mu\nu}A_\nu|a,t\rangle = 0$
From section 1.5 solving the geometry components $R_{22}=0$ and $R_{11}=0$ using 3.2-3.5 for spherical symmetry gives us respectively $1/\kappa_{rr}=1-r_H/r$, and $\kappa_{rr}=1/\kappa_{oo}$ (6.4.5)
showing that equation 6.4.2 is equivalent to equations 3.2 and 3.3 if there is no nontrivial background metric contribution (i.e.,ε=0). The $(a/r)^2$ in eq.6.1.1 is the energy ε contribution of the energy angular momentum term, which turns out to be the muon mass in:

$$1/\sqrt{\kappa_{oo}}=(1\pm\varepsilon\pm\Delta\varepsilon/2)\varepsilon/\Delta\varepsilon \qquad (6.4.6)$$

Use metric a ansatz: $ds^2=-e^\lambda(dr)^2-r^2d\theta^2-r^2\sin\theta d\phi^2+e^\mu dt^2$ so that $g_{oo}=e^\mu$, $g_{rr}=e^\lambda$. From equation 6.4.3 for spherical symmetry in free space

$$R_{11}= \tfrac{1}{2}\mu''- \tfrac{1}{4}\lambda'\mu'+ \tfrac{1}{4}(\mu')^2-\lambda'/r =0 \qquad (6.4.7)$$

$$R_{22}=e^{-\lambda}[1+\tfrac{1}{2} r(\mu'-\lambda')]-1=0 \qquad (6.4.8)$$

$$R_{33}=\sin^2\theta\{e^{-\lambda}[1+\tfrac{1}{2}r(\mu'-\lambda')]-1\}=0 \qquad (6.4.9)$$

$$R_{oo}=e^{\mu-\lambda}[-\tfrac{1}{2}\mu''+\tfrac{1}{4} \lambda'\mu'-\tfrac{1}{4}(\mu')^2- \mu'/r]= 0 \qquad (6.4.10)$$

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

(eq. 6.4.7 -6.4.10 from pp.303 Sokolnikof): Equation 6.4.8 is a mere repetition of equation 6.4.7. We thus have only three equations on λ and μ to consider. From equations 6.4.7; 6.4.10 we deduce that
$\lambda'=-\mu'$ so that radial $\lambda=-\mu$+constant $=-\mu+C$ for our nonzero free space metric of section 4.4 normalizing to one real dimension as in the postulate. So $e^{-\mu+C}=e^\lambda$. Note C can be imaginary or real. Then 6.4.8 can be written as:

$$e^{-C}e^\mu (1+r\mu')=1 \qquad (6.4.11)$$

Set $e^\mu=\gamma$. So $e^{-\lambda} =\gamma e^{-C}$ and so integrating this first order equation (equation.4.4.9) we get:

$$\gamma=-2m/r +e^C \equiv e^\mu \text{ and } e^{-\lambda}=(-2m/r +e^C)e^{-C} \qquad (6.4.12)$$

From equation 6.4.3 we can identify radial $e^C\approx 1+2\varepsilon$ with also rotational oblateness perturbation $\Delta\varepsilon$ already a component here (section 6.4).
In general write the resulting asymmetry in $1/\kappa_{rr}$ and κ_{oo} by resetting the proper time (squared) clock ds^2 (details in section 6.4.13) by multiplying by the pure radial $e^C\approx 1+2\varepsilon$ coefficient allowing here for both (relative) positive and negative ε in the background metric:

$$ds^2 = (1\pm\varepsilon)\left[(1\pm\varepsilon+\Delta\varepsilon)dt^2 - \frac{1}{(1\pm\varepsilon+\Delta\varepsilon)}dr^2\right] \qquad (6.4.13)$$

Note for the 1+ε choice in equation 4.1.2 we have $g_{oo}=1+2\varepsilon+\Delta\varepsilon$, $g_{22}=1/(1+\Delta\varepsilon)$ (used below in equation 8.3 for real metric coefficient case) or for imaginary C as above

$$g_{oo}= e^{i(2\varepsilon+\Delta\varepsilon)} \qquad (6.4.14)$$

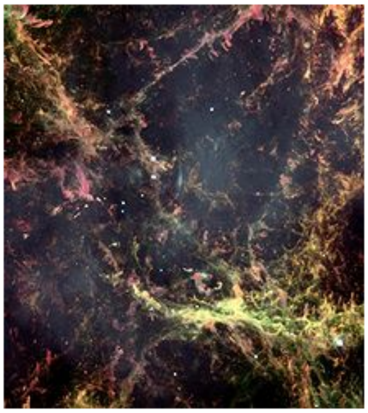
used in 4.4.16 for background metric case. ε=.060406.

Note the $(a/r)^2$ in 6.4.2 is then the ε+Δε in the denominator on the right side of eq.6.4.13, the main reason we went to so much trouble to derive 6.4.13. Thus we have shown how a nearby object B creates mass in object A.
Note(r,t)X(ϕ,θ) is a Cartesian product of two 2D spaces here.
Thus the $(a/r)^2$ term in Eq.6.4.13 thus provides a background metric and this ambient metric then provides the mass of the fundamental leptons. Tauon (1), muon(ε) and electron€. Object B and object A area two body object on the next fractal scale (with $w_B=w_A$ at the r_H boundary due to causality) effect of causing a drop in inertial frame dragging and a increase in the mass of the particles through the mass degeneracy provided by quantum mechanical vibrational τ tauon and rotational ε muon and ground state Δε electron metric quantization eigenstates of object A and B together. In

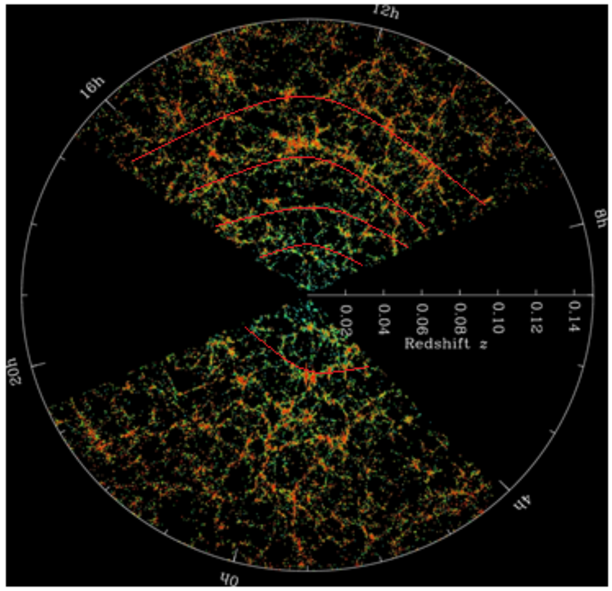
$$\kappa_{00}=1+\varepsilon+\Delta\varepsilon-r_H/r. \quad (6.4.1)$$

6.5 Sum Of All These Effects: Stair Step Metric Expansion

Given the inertial frame dragging reduction effects of nearby object B (sect.6.4.3) the ε (muon) and Δε (electron) have their own zitterbewegung frequencies from the new pde. It is at $r<r_C$ so it exists (sect.4.1). Also from the object A new pde locally $r=r_oe^{kt}$ for expansion. Also the underlying object A space-time is Minkowski, flat space-time as we see in equation 5.1.1 since the time spent in the later parts of the expansion the eq 4 Gauss's law Gaussian Pillbox is nearly empty since most of the material is most of the time next to the horizon r_H So classicaly the interior of r_H has no gravitational force associated with it and thus is a flat Minkowski metric. These two object A criteria are not perturbations (6.11.1). Recall the outside observer sees a zitterbewegung independent of location inside: it all happens at once. So for the $r=r_oe^{kt}$ expansion to work simultaneously with the Minkowski metric it all must happen simultaneously within r_H. The whole thing rises at once from the outside observer's point of view. The two object A and two object B criteria are satisfied everywhere if we have a stair step Minkowski space time, where the space-time is Minkowski at the flat part of the steps with the vertical part being infinitesimal in both time and space. So over the entire interior of object Awe have the step function $g_{oo}=\Sigma_n\sin((2n+1)\omega t)/(2n+1)$ with ω being both separately the ε and Δε omegas giving a square wave which is (locally) flat if the sum is to $n=\infty$. The separate sums also exhibit the required perturbation frequencies ε and Δε. Both ε and Δε are smaller than $1/k=r_c$ so they can be actual oscillations (sect.6.11). So the jumps in the larger ε square wave function $\Sigma_n(\sin((2n+1)\omega t)/(2n+1))$ functions must be to the envelope of the exterior observer $r=r_oe^{kt}$ *non*pertutbative function turning the notional space-time rubber sheet into a stair step function. The whole thing still rises at once. But the ε and Δε object B transmissions are local and so get dispersive frequency cut-offs at galaxy scattering cut-offs at 1/100kLY so have 100kLy wide Gibbs jumps. Thus the space time (and so Gamow factor) briefly jumps up and down every ε (So every 270My, the mass extinctions, the last one being at 248My.) and to a much weaker 1/100 amplitude for Δε every 2.5My. The whole thing rising at once gives rise to some interesting phenomenology. For example a metric quantization event is seen to happen localy at first and then spread out from the observer at speed c. So for example the previous 248My metric jump event can be seen still happening at 248My from us, where in general we then see "rings" of these cyclic events.



Rayleigh Taylor Instability M1

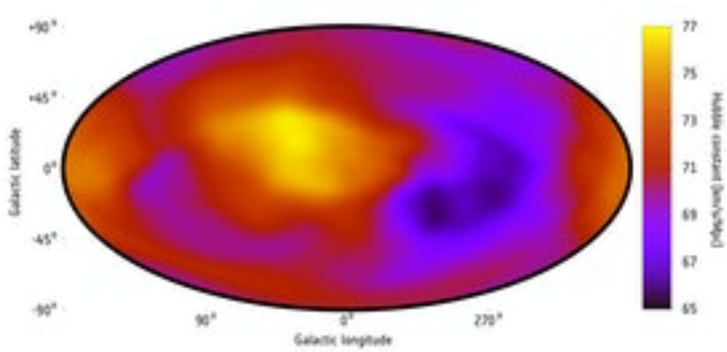


Rayleigh Taylor Instability for universe. Object B zitterbewegung resonances for rotational bands.

270My apart thick radii (red lines) as in this right figure along with remnants of the Rayleigh Taylor instability (4.3.3) of the original big bang**.** Note from rings in image nonrelativistically $\Delta z=.02=x/13.7$, $x\approx 270$My.

The researchers looked at 800 galaxy clusters across the universe, measuring the temperature of each cluster's hot gas. They then compared the data with how bright the clusters appeared in the sky.

If the universe was in fact isotropic, then galaxy clusters of similar temperatures, located at similar distances, would have similar levels of luminosity. But that was not the case.



A map showing the rate of the expansion of the Universe in different directions across the sky.K. Migkas et al. 2020, CC BY-SA 3.0 IGO

In my theory the universe is fractal (note Mandelbrot set discussion below) with 10^40X fractal scale separation. Postulate 1 implies eq.1a and eq.1b and they in turn imply eq.2AI and that Clifford algebra. so they imply leptons, eq.2AI (eq.9) is the electron which has spin so is dipole which also thereby is fractal. So we are inside of the next largest "electron" and it is a dipole, as in that image below. Thus **an interior cosmological dipole is the most blatant manifestation of the fractalness**
From the mainstream:
"The researchers looked at 800 galaxy clusters across the universe, measuring the temperature of each cluster's hot gas. They then compared the data with how bright the clusters appeared in the sky.
If the universe was in fact isotropic, then galaxy clusters of similar temperatures, located at similar distances, would have similar levels of luminosity. But that was not the case. "
Note this dipole has the same orientation as the axis of evil (for the CBR).

6.6 Origin Of Mass

Introduction Nth scale is 10^{-40}X small baseline

Recall that Eq. 1 (with its small C) gave us eq.2AIA at min ds at 45°, for our observables (eigenvalues). Also eq.1.1 gives $-dr=drdr+C_M$ so define mass ξ from dr distance and C_M so that $C_M=<z>+<zz>\equiv\xi dr=\xi(dr_{local}+dr_{Mandelbrot})=\xi(dr_{local}+(dr_N+dr_{N+1}))=\xi(dr_1+dr_2)=\xi dr_1+\xi dr_2$ given $C_M=<z>+<zz>=\xi dr_1+\xi\xi dr_2$. On the big (cosmological) fractal eq.9 baseline dr_2 is a large constant r_H since zz>>z so we can define ε from $\varepsilon=\xi\xi dr_2$. So $\varepsilon/\xi=\xi dr_2$ with $\varepsilon=\varepsilon_N+\varepsilon_{N+1}$. $C=\xi dr+\varepsilon/\xi\equiv\varepsilon_1$. So: $\varepsilon=\varepsilon_N+\varepsilon_{N+1}$. In $dr-\varepsilon_1\equiv dr-(\varepsilon/\xi+\xi dr)\equiv dr'$ (4.1d)

From object A&B, $\xi=m_\tau+m_\mu+m_e$. m_e is the ground state.$\kappa_{00}=1-\xi-(\varepsilon/\xi)/r\equiv 1-\xi-r_H/r$, So $\xi=m_\tau+m_\mu+m_e$ is compatible with the Kerr metric at $r=r_H$ since $1-\xi+r_{HN}+r_{HN+1}=\xi-r_{HN}=1-(m_\mu+m_e)-r_{HN}$ and $(a/r)^2\rightarrow m_\mu$ and m_μ is the rotational eigenvalue as it must be in the Kerr metric 6.1.1. Also in the object B Kerr metric also $(a/r)^2\equiv(\xi rdr/ds)/r)^2=(\xi dr/ds)^2=C_M\equiv\xi r_H$ from 4.1a for the small fractal baseline. So $\xi(dr/ds)=C_M ds/dr\equiv h/\lambda=mv$ (eg., 6.1.3).

Also on the big cosmological eq.9 object B&A fractal baseline (in sect.6.3 implies) vibrational m_τ and rotational m_μ modes so $\xi\equiv m_L=m_\tau+m_\mu+m_e=\Delta+m_e$ with m_e the ground state and $r_H=\varepsilon/m_L\equiv 2e^2/(m_Lc^2)$ in eq.4.1 below. So a large noise perturbation just leaves KE=Δ high energy and $\xi=m_e$. So $r_H=\varepsilon/m_L\equiv 2e^2/(m_Lc^2)$ in eq.4.1 below. $2P_{3/2}$ B flux quantization modifies this (in the Kerr metric) to $r_H=\varepsilon/m_e$ large . See Ch.2, figure 4.

Section 3.3 (object B implications sect.4.1.3; 4.1.4) then give us the origin of the mass of 2AI. For example object B is close to object A (so smaller inertial frame dragging and larger $(a/r)^2$) and larger mass term ξ in 4.1.2 and so in 4.1.3. Also 2AI is off the diagonal so $\xi dr>0$ so $C_M=\xi dr=\varepsilon$ so $\varepsilon/\xi=\lambda$=De Broglie and so $\varepsilon_o/r_H=\Delta\varepsilon$=4AI is larger than if object B was farther away.

In that regard recall that object B is outside the big 10^{11}LY horizon so its state is still oscillatory in the eq.9 Heisenberg QM formulation for p for example $T(t)|p>=p(t)>$ where $T(t)=e^{iHt/\hbar}$. Recall alternatively inside r_H the $i\rightarrow 1$ so the time evolution is purely exponential, hence the $r=r_oe^{kt}$ accelerating universe expansion discovered by Perlmutter et al in 1998. We did a radial coordinate transformation (sect.7.8) to the comoving observer frame and got $\ln(r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-\ln[e^{\mu}-1]]2$ which is locally still $r=r_oe^{kt}$ but jumping by ε and Δε and entangled state values (sect.4.2.4). The dyadic radial coordinate transformation of $T_{oo}=\varepsilon^2$ dyadic divided by m_e to that local coordinate system comoving with $r=r_oe^{kt}$ gives "constant" gravity G (see Ch.12). So what the N+1th fractal scale observer sees as the electric field the Nth fractal scale observer sees as gravity. The dyadic angular transformation at our present $r=r_H$ gives coefficient $1/(1\pm\varepsilon)^2$ (from 4.7.3). Mass is also time since $2GM/c^2$=invariant in sect.7.4 with G changing with time. So mass is also our clock time.

Fractal Selfsimilarity And Object B Implications

Given our dr frame of reference between our two fractal baseline scales separated by that 10^{40}X scale jump we have that drdr<<dr $=C_M$ (subatomic) and dr<<dr'dr'$=C'_M$ (cosmological, sect.4.1) in the context of the Kerr metric.

Given object B decreases the effects of frame dragging and so accentuates the effect of the Kerr metric $(a/r)^2$ term thereby creating a nonzero mass ξ in the g_{oo} of the Kerr metric: the self similarity between the two baseline scales implies that $C'_M \propto C_M$ so that dr'dr'∝dr and so: Kdr'dr'$= K\left(\frac{a}{r}\right)^2 = \xi dr \equiv \xi r_H$,

$K = \frac{r_{Ho}}{m_0c^2}$, $a/r \equiv \xi r \frac{dr}{dt}\frac{1}{r}$, dr=λ, v=dr/dt, m=ξ, h=Kc/ds. So $\lambda = \frac{h}{mv}$ (6.6.1)

This result in the context of 2AIA (eq.3.2, mv/ħ≡k=2π/λ) allows you to interepret dr as a wave length λ. So we defined both mass ξ and derived the De Broglie wavelength λ and found the origin of Planck's constant h and so found the origin of quantum mechanics and mass.

Section 6.7 N+1 Fractal Scale Object B and C Rotation, Vibrational, Entangled State Transitions For r<r_H

In section 7.4 we do the radial coordinate transformation. In this section we do the transformation to the rotating frame allowed by object B. With object B close by there are two quantum states rotation ε and ground chiral state Δε just as you see in Raman spectra for a diatomic molecule and the entangled states. These are the lepton states 4AI 4AII of section 1). So $\omega_1 \rightarrow \omega_2$. and ω_o gets through at the cosmological r_H boundary (i.e., rope not broke). So what was outside (object A cosmological object) as ordinary "diatomic" quantum states (τ vibration $E=\hbar\omega_o(N+1/2)$ and rotation ε $E=\hbar\omega'_o\sqrt{(L(L+1))}$, $\omega_o >> \omega'_o$) is the metric quantization inside and also the entangled states. The single unentangled level metric quantization gets you the particle masses, the entangled states (classical analog: grand canonical ensemble with nonzero chemical potential) are those metric quantization states (PartIII). Note with metric quantization you can just copy the well known equations associated with the quantum physics of a diatomic molecule to determine what goes on in those metric quantum jumps (the ω_o and H is obviously different from these book values). There is the also the rotational state ε.

From the Kerr metric there is the Δε electron nondiagonal term if object B was not moving. The nearby Fiegenbaum metric point generates spin ½ =s background. But object B also rotates around object A (actually vice versa) so ε (s'=L-s) also exists. Note in Chapter 9 we derived energy eigenvalues for *perturbative* r in r_H+r thereby perturbing the B flux quantization h/2e. The ambient metric is a cosmological global phenomena for the N+1th fractal scale so we use $g_{\mu\nu}$ instead of $\kappa_{\mu\nu}$ and so have r_H/r cosmological contribution in that case. Below fig5 we also noted that $g_{oo}=(dr/dr')^2=(dr/(dr\pm\varepsilon))^2=1/(1\pm\varepsilon)^2\approx(\partial x_o/\partial x'_o)^2$ where g_{oo} component also acts as a dyadic for ds components for the transformation from a nonrotating flat space time. So we can also use a nonperturbative derivation of the P state (solution to the new pde) oblate rotation states in the above section (on object B rotational ε eigenstate implications) to obtain mass eigenvalues since the ε eigenvalue is already known. The new state is then defined by the $\partial x_o/\partial x'_o\equiv\gamma\equiv1/(1+\varepsilon)$ kinematic transformation term in the dyadic 0-0 term whenever κ_{oo} is used implying the r_H. So we have done a rotational coordinate transformation of g_{oo} to the coordinate system commoving with the rotating system (analogous to the radial commoving transformation of sections 7.2, 7.3) and getting a new source ε in g_{ooP}'. Section 7.4).

6.8 3 Metric Quantization Levels From Object B

Recall there are 3 main levels of metric quantization coming out of object B, the Δε,ε,1 levels (i.e., electron, muon, tauon) arising from the QM ground state, rotation and vibration levels of object A with B that get through the r_H boundary and also become GR metrics inside. This means that instead of that single GR single ambient metric rubber sheet there are 3 g_{ij}. So $\omega_1\rightarrow\omega_2$. across the r_H boundary so rotation and oscillation $\hbar\omega$ eigenstates are passed inside as metric quantization provided by object B as $r\rightarrow0$: Metric disturbances cross the metric boundary and curved space unscattered just as light moves through magnetic and electric fields unscattered.

Alternatively, you could also say that object B gives the metric quantized energy levels Δε, ε, τ analogous to carbon monoxide vibrational τ and rotational ε and ground state electron mass Δε energy levels. Also there is that 2D complex plane solution of equation 2a and this plane contains both equation 2AI and 2AII, eg., the electron and the anti neutrino 2AIIB which share the same 4D 6 cross term Clifford algebra eq.4A1 terms. So with these 3 complex planes we have then for the first plane an electron and electron anti neutrino, for the second plane a muon and muon anti neutrino and for the 3rd plane a tauon and tauon anti neutrino. So in the decay channels these fundamental leptons and neutrino are always associated (i.e., associated production). So neutrinos are associated with their respective leptons $(\psi_e+\psi_{e\nu})+(\psi_\varepsilon+\psi_{\varepsilon\nu})+(\psi_\tau+\psi_{1\nu})=\psi$.

Each ω oscillation at the horizon whether it be from oscillatory, rotational, eigenstates brings in an associated ω_τ, ω_μ though the object A horizon r_H as a seperate $g_{\mu\nu}$ implying a separate 2D metric from equation 1 and equation 2 for each $g_{\mu\nu}$. Thus we have three 2D space-times the neutrino, electron neutrino multiplets.

Pure States

$e^{i\Delta\varepsilon}\rightarrow1/[\sqrt{}(1-\Delta\varepsilon-r_H/r)](1/(1\pm\varepsilon))=(1/\sqrt{}\Delta\varepsilon)(1/(1\pm\varepsilon)$ W,Z. ⊥Paschen Back $E=Bu_b(0+0+1+1)$

$e^{i\varepsilon}\rightarrow1/[\sqrt{}(1-\varepsilon-r_H/r)](1/(1\pm\varepsilon))=(1/\sqrt{}\varepsilon)(1/(1\pm\varepsilon)$ $\pi^\pm, \pi^o$.|| Paschen Back $E=Bu_b(0+0+1+1)$

See section 6.12 and PartIII for **mixed** metric quantization states $e^{i(\varepsilon+\Delta\varepsilon)}$.

Multiple Applications Of The Time Development Operator $U=e^{iHt}$ In $\psi(t)=U[\psi(t_o)]$

6.9 Ultrarelativistic Object B Also Source Of The Mexican Hat Potential

Recall $\psi(t) = U[\psi(t_o)]$ with $U=e^{iHt}$. $t=t_o+dt$.
You substitute in the respective t and H (in the U). $U=U_{KG}+U_B$, where U_{KG}=Klein Gordon 2nd derivative component since our ϕ turns out to be a scalar.
So from the fractal theory object B has to be ultrarelativistic (γ =1836) for the positrons to have the mass of the proton. So the time behaves like mc^2 energy: has the same gamma: $t \to t_o/\sqrt{(1-v^2/c^2)}=KH$ since energy $H=m_oc^2$ has the same γ factor as time does. So in the e^{iHt} of object B the $Ht/\hbar=(H/\sqrt{(1-v^2/c^2)})t_o/Kt_o= KH^2=\phi^2$. Define $\phi=H\sqrt{K}$. Note also ultrarelativistically that p is proportional to energy: for ultrarelativistic motion $E^2=p^2c^2+m_o^2c^4$ with m_o small so E=Kp. Suppressing the inertia component of the κ thus made us add a scalar field ϕ. Thus $\phi'=p(t)=e^{iHt/\hbar}|p_o\rangle=\cos(Ht/\hbar)=\exp(iH^2t_o/Kt_o)=$ $\exp(i\phi^2)=\cos(\phi^2)=\phi'=1-\phi^4/2$. Thus for a Klein Gordon boson we can write the Lagrangian as $L= T-V=(d\phi/dx)(d\phi/dx)-\phi'^2= (d\phi/dx)(d\phi/dx)-\phi'^2= (d\phi/dx)(d\phi/dx)-i(1-\phi^4)'^2$. Thus we define this Klein Gordon scalar field ϕ=4AI by itself from:
$\left(D_\mu\right)^t\left(D_\mu\phi\right)-\frac{1}{4}\lambda\left(((\phi^t\phi)^2-v^2)\right)^2$ Note in the covariant derivative
$D_\mu\phi=\left[\vartheta_\mu+igW_\mu t+ig'\frac{1}{2}B_\mu\right]\phi$
W is from our new pde S matrix. Need the B_μ of the form it has to make the neutrino charge zero. Need to put in a zero charge Z. The B component is generated from the r_H/r and the structure of the B and A=W+B $=A_\mu=cos\theta_W B_\mu+sin\theta_W W_\mu^1$ is needed to both have a zero charge neutrino and nonzero mass electron. So Define
$A_\mu=cos\theta_W B_\mu+sin\theta_W W_\mu^1$
$Z_\mu=-sin\theta_W B_\mu+cos\theta_W W_\mu^1$
The left handed doublet was given by the fractal theory (section 4.4)
$l_e=\binom{v_{EL}}{e_L}$
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 $1\pm\varepsilon$.

6.10 MandlebulbLeptons Rewritten As Hamiltonians

The MandelbulbLepton is under the square root in the energy term $1/\sqrt{\kappa_{oo}}$ $E=1/\sqrt{(1-\varepsilon-\Delta\varepsilon-r_H/r)}$ is seperable, we can measure the electron energy by itself so by definition:
$$E_{ZW}=\frac{1}{\sqrt{1\pm\varepsilon 2}}\frac{1}{\sqrt{1-\Delta\varepsilon-\frac{r_H}{r}}}=\frac{1}{(1\pm\varepsilon)\sqrt{1-\Delta\varepsilon-\frac{r_H}{r}}}=\frac{1}{(1\pm\varepsilon)\sqrt{\Delta\varepsilon}}$$
But in general all Mandlebulbs must be included.

6.11 S States Are Point like Particles And P States Are Not Point Like Particles P States At $r=r_H$

Recall $\Delta\varepsilon$ is ultrarelativistic so integrating the 2AI+2AI+2AI (PartII) Fitzgerald contraction in the 2P state (L=1), $r=r_H$ gives ($\cos\theta\equiv v/c=\beta$), $\theta=90°$
$$r_H\int\sqrt{(1-\cos^2\theta)}\cos\theta d\theta=r_H\int\sin\theta\cos\theta d\theta=r_H\sin^2\theta/2=r_H/2\equiv r_{HP}$$

so there is contraction by only a factor of 2 from the vantage point of the plane of rotation (From the axial perspective the radius is Fitzgerald contracted to near zero.).
From part II. the ε P state big radius: $r_{HP}\equiv 2ke^2/\text{electron}\approx 2ke^2/m_ec^2 = 2.817F = r_H$
$NS_{1/2}$ **States at $r=r_H$**
Summary
Instead of linearizing a flat space Minkowski metric as Dirac did to get his Clifford algebra, leave it as a point source Schwarzschild metric with $r_H = 2e^2/m_Lc^2$ instead of $2GM/c^2$ (i.e., splitting r_H) in $1-r_H/r=\kappa_{oo}$ ($m_L=m_e+m_\mu+m_\tau$) also thereby maintaining a *general covariance* for the (Lepton) Dirac equation.
Divide $\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2+\kappa_{tt}dt^2=ds^2$ by ds^2 and define $p_x=dx/ds$ and we find using the Dirac gammas $(\gamma^x\sqrt{\kappa_{xx}}p_x+\gamma^y\sqrt{k_{yy}}p_y+\gamma^z\sqrt{\kappa_{zz}}p_z+\gamma^t\sqrt{\kappa_{tt}}p_t)^2 = \kappa_{xx}p_x^2+\kappa_{yy}p_y^2+\kappa_{zz}p_z^2+\kappa_{tt}p_t^2=1$. Then linearize like Dirac did: $(\gamma^x\sqrt{\kappa_{xx}}p_x+\gamma^y\sqrt{\kappa_{yy}}p_y+\gamma^z\sqrt{\kappa_{zz}}p_z+\gamma^t\sqrt{\kappa_{tt}}p_t)=1$. Plug in the operator formalism and we get a generally covariant m_L pde. The energy turns out to be $E=1/\sqrt{\kappa_{00}}=1/(1-r_H/r)^{.5}=1+r_H/2r-\mathbf{(3/8)(r_H/r)^2}$ $+..\equiv 1+V_c-\Delta V+...$ After multiplying (this normalized) E by m_Lc^2 we note the first term is lepton mass energy, V_C is the usual Coulomb potential energy and that we split off the electron component m_ec^2in E and get for the 3rd term:
$\int\psi_{2,0,0}{}^*\Delta V\psi_{2,0,0}dV=\Delta E=$Lamb shift(eq.6.12.1, PartI, DavidMaker.com) =h27MHz component.
We get an equivalence principle for κ_{ij} by assuming the only particle with nonzero rest mass is the electron (with the baryons $2P_{3/2}$, $2P_{1/2}$ composites and μ,τ $S_{1/2}$ excited states, PartI) and that splitting of r_H into separate $r_{HN+1}=2GM/c^2$ and $r_{HN}=2e^2/m_Lc^2$ comes from a cosmological and electron selfsimilar (fractal) universality (with that fractal set giving us m_L) of this new Lepton pde.

Appendix C solution has a nonzero proper mass and so are solutions to eq.2AI and so the Fiegnbaum point is a MandelbulbLepton, the length of the Mandelbrot set. A S state MandelbulbLepton τ+μ+e (appendix C) doesn't rotate (note P states in contrast are L=1; S states S=0) so there is a simple large Fitzgerald contraction across r_H. For $r=r_H$ S state $\kappa_{oo}=1/\kappa_{rr}$ for $\kappa_{00}=1-r_H/r$ in the spherical symmetry of the Schwarzchild metric.Tauon normalization in the Mandelbrot set is really normalization of the Fiegenbaum point distance, the longest part of the stable region in the Mandelbrot set. This requires new distance and time units be defined using 6.4.13 ambient metric division.
6.4.13 and 6.1.1 C_M^2 6.4.13 require normalization to allow flat space background and eq.1 to hold. So we then have obsevables as in section 4. For example we can create a flat space ambient metric for an isolated electron:

$$\left(1-\epsilon-\Delta\varepsilon/2-\frac{r_H}{r}\right)\frac{dt^2}{1-\varepsilon-\Delta\varepsilon/2}+..\equiv\left(1-\frac{\frac{r_H}{1-\varepsilon-\Delta\varepsilon/2}}{r}\right)dt'^2+. \qquad (6.11.1)$$

This flat space normalization (particle field in a flat space metric manifold) follows from our Mandelbulb formulation of appendix B where we is get observables (2AIA) through the eq.2A *local flat* background and so eq.2 and so eq.1. That is why we chose the Mandelbrot set iteration sequence to give us the Real#Cauchy sequence in the first place. If we are going yto do the appendix B we are going to do this. Note this also gives us the magnitude of our Mandelbulb Fitzgerald contraction. γ=(2X1836)X of τ and μ in
$r_L = r_H/(2m_pc^2)$ Lepton r_L (6.11.2)
Thus the object B: S and P state metric quantization is the source of the tiny S state radius

$\varepsilon \equiv r_c \equiv 2ke^2/(\text{tauon+muon}) \approx 2ke^2/(2m_pc^2)$ (6.11.3)

This explains why leptons (S states) appear to be point particles and baryons aren't!

$$E_e = 2\frac{1}{\sqrt{1-\frac{r_c}{r}}}(tauon + muon + m_e/2) - (tauon + muon + PE\tau + PE\mu) \qquad (6.11.4)$$

6.12 Calculate $S_{1/2}$ State Energy Caused By That New $1/\sqrt{\kappa_{oo}}$ In Equation 9

Recall noise C is defined from C≡δz in eq.2AI. Note from eq.1.1 that $\frac{-1\pm\sqrt{1-4C}}{2}$=δz. So that δz is real for this new Mandelbulb noise≡C'<¼ (±¼) creating our noise Mandlebulbs in 1.25+Mandelbulb noise diameters $=1.25 + (2\sum_{n=2}^{\infty}\left(\frac{1}{4}\right)^n)$=1.4167.. 1/64 is at the Mandelbrot set $\{C_M\}$=1.40115.. Fiegenbaum point so stable and also fractal.
Eq.2AI solution≈MandlebulbLepton≡tauon+muon+electron=H
Note from equation 4.1a and the definition of mass ξ = tauon+muon+electron is clamped in place unless large pertubations of the tauon +muon term (partII).
Note the $PE=e^2/2r$ potential for the electron since it is orbiting the Hydrogen atom proton $mv^2/r=ke^2/r^2$ so $KE=\frac{1}{2}mv^2=(\frac{1}{2})ke^2/r$ =PE in PE+KE=E. So for the electron (but not the tauon or muon who are not in this orbit) $PE=(\frac{1}{2})ke^2/r$.
So for tauon+muon+electron we have $r_H=(1+1+.5)e^2/[(\text{tauon+muon})]$. Note since we have normalized out the τ+μ in the metric coefficient κ_{oo} the $S_{1/2}$ state second term= $V=((1+1+.5)e^2/[(\tau+\mu+m_e/2)r])(\tau+\mu+m_e/2)$=electron potential energy.
$r=n^2a_o=4a_o$. Also recall the 2,0,0 state hydrogen eigenfunction $\psi_{2,0,0}=(1/(2a_o))^{3/2}(1-r/(2a_o))e^{-r/2ao}$.Also from 4.1a and eq. 4.4.1: $r'_H=(1+1+.5)e^2/(m_\tau+m_\mu+m_e)=2.5e^2/2m_pc^2$. Next find $\psi_{2,0,0}$ eigenfunction average radial center of charge value of:

$$E_e = 2\frac{2m_pc^2}{\sqrt{1-\frac{r_c}{r}}} - 2(tauon + muon + PE\tau,\mu) = \frac{2m_ec^2}{2} + 2\frac{2.5e^2}{2r(2m_pc^2)}2m_pc^2 -$$
$$2\frac{3}{8}\left(\frac{2.5e^2}{r2m_pc^2}\right)^2 2m_pc^2 - 2\frac{e^2}{2r(2m_pc^2)}2m_pc^2 - 2\frac{e^2}{2r(2m_pc^2)}2m_pc^2.$$

$$2m_ec^2 + \frac{(2)e^2}{2r(2m_pc^2)}2m_pc^2 + \frac{(2)e^2}{2r(2m_pc^2)}2m_pc^2 + \frac{(2).5e^2}{2r(2m_pc^2)}2m_pc^2$$
$$- 2\frac{3}{8}\left(\frac{2.5}{r2m_pc^2}\right)^2 2m_pc^2 - \frac{e^2}{r(2m_pc^2)}2m_pc^2 - \frac{e^2}{r(2m_pc^2)}2m_pc^2$$
$$= 2m_ec^2 + \frac{2e^2}{2r(2m_pc^2)}2m_pc^2 + \frac{2e^2}{2r(2m_pc^2)}2m_pc^2 + \frac{(2).5e^2}{2r(2m_pc^2)}2m_pc^2$$
$$- 2\frac{3}{8}\left(\frac{2.5}{r2m_pc^2}\right)^2 2m_pc^2 - \frac{e^2}{r(2m_pc^2)}2m_pc^2 - \frac{e^2}{r(2m_pc^2)}2m_pc^2$$

From eq.4.7.2 the Taylor series new third 3/8 term for the electron is $=\Delta E_e=$

$$+2\frac{3}{8}\left(\frac{2.5ke^2}{r2m_pc^2}\right)^2 2m_pc^2 = 2\frac{3}{8}\left[\frac{2.5(8.89X10^9)(1.602X10^{-19})^2}{(4(.53X10^{-10}))(2(1.67X10^{-27})(3X10^8)^2}\right]^2(2(1.67X10^{-27})(3X10^8)^2$$

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

$= hf = 6.626X10^{-34} 27{,}400{,}000$ so that f=27Mhz (6.12.1)

Multiplied at the end by 2 to get $m_e c^2$ mass. Recall also the 1000Mhz component is due to the electron zitterbewegung cloud itself taking up space which we get by adding the Compton wavelength directly into the Coulomb potential radius at $6a_o$.
Thus we account for the entire Lamb shift without evaluating any higher order diagrams. See Ch.9 for gyromagnetic ratio derivation. So we don't need renormalization anymore. See eq.8.3 for anomalistic gyromagnetic ratio which also comes out of that $\sqrt{\kappa_{oo}}$ in eq.9.

Why Does The Ordinary Dirac Equation ($\kappa_{\mu\nu}$=constant**) Require Infinite Fields?**

Note from section 1.3.2 that equation 9 $\kappa_{\mu\nu}$=possibly nonconstant. So it does not have to be flat space, whereas for the standard Dirac equation $g_{\mu\nu}$=constant in eq. 4.2.1. Also eq.9 has closed form solutions (eg. section 4.9), no infinite fields required as we see in the above eq.6.12.1. So why does the mainstream solution require infinite fields (caused by infinite charges)? To answer that question recall the geodesics $\Gamma^m_{ij}v^iv^j$ give us accelerations, with these v^k s limited to <c. Recall g_{ij} also contains the potentials (of the fields) A_i. We can then take the pathological case of $\int g^{ij} = \int A = \infty$ in the S matrix integral context and $\partial g_{ik}/\partial x^j = \mathbf{0}$ since the mainstream (circa 1928) Dirac equation formalism made the g_{ij} constants in eq.4.2.1. Then $\Gamma^m_{ij} \equiv (g^{km}/2)(\partial g_{ik}/\partial x^j + \partial g_{jk}/\partial x^i - \partial g_{ij}/\partial x^k)$ $=(1/\mathbf{0})(\mathbf{0})$=*un*defined, but *not* zero. Take the $\partial g_{ik}/\partial x^j$ to be mere 0 *limit* values and then $\Gamma^\alpha_{\beta\gamma}$ becomes *finite* then. Furthermore 9.13 (Coulomb potential) would then imply that $A_o=1/r$ (and U(1)) and note the higher orders of the Taylor expansion of the Energy=1/(1-1/r) term $(=1-1/r+(1/r)^2-(1/r)^3$...(geometrical series expansion) where we could then represent these n th order $1/r^n$ terms with individual 1/r Coulomb interactions accurate if doing alternatively Feynman vacuum polarization graphs in powers of 1/r). Also we could subtract off the infinities using counterterms in the standard renormalization procedure. *Thus in the context of the S matrix this flat space-time could ironically give nearly the exact answers if pathologically* $\int A = \infty$ and so we *have explained why QED renormalization* works! Thus instead of being a nuisance these QED infinities are a necessity if you *mistakenly* choose to set $r_H=0$ (so constant κ_{ij}).
But equation 9 is not in general a flat space time (i.e.,.in general $\kappa_{\mu\nu}\neq$constant) so we do not need these infinities and the renormalization and we still keep the precision predictions of QED, where in going from the N+1th fractal scale to the Nth fractal scale $r_H=2GM/c^2 \to 2e^2/m_ec^2$ See sect.3.9 and Ch.9 where we calculate the Lamb shft and anomalous gyromagnetic ratio in closed form from our eq.9 energy: $E=1/\sqrt{\kappa_{oo}}=1/\sqrt{(1-r_H/r+\Delta\varepsilon)}$ (Ch.3.9) and the square root in the separable eq.9 (Ch.9 and section 4.9 for Lamb shift calculation without renormalization.).

Metric quantization (and C) As A Perturbation Of the Hamiltonian

$H_o\psi=E_n\psi_n$
for normalized ψ_ns. We introduce a strong *local* metric perturbation H'=ΔG due to motion through matter let's say so that:
$H'+H=H_{total}$ where H ≡ΔG is due to the matter and H is the total Hamiltonian due to all the types of neutrino in that H_{M+1} of section 4.6.H'=C^2. Because of this metric perturbation

$\psi=\Sigma a_i\psi_{Ii}$=orthonormal eigenfunctions of H_o. $|a_i|^2$ is the probability of being in the neutrino state i. The nonground state a_is would be (near) zero for no perturbations with the ground state energy a_i (electron neutrino) largest at lowest energy given for ordinary beta decay for example. Thus the passage through matter creates the nonzero higher metric quantization states (i.e., H' can add energy) with:
$a_k=(1/(\hbar i)\int H'_{lk}e^{i\omega lkt}dt$
$\omega_{lk}=(E_k-E_l)/\hbar$
Thus in this way motion through matter perturbs these mixed eigenstates so that one type of neutrino might seemingly change into another (oscillations).

Pure States From 2AI+2AI+2AI Equation 6.13.2 (Also see Part II of This Book)
Instead of the (hybrid) mixed metric quantization state $1/\sqrt{(\Delta\varepsilon+\varepsilon)}$ of sect.6.13 we find the masses of the pure states $1/\sqrt{\Delta\varepsilon}$ and $1/\sqrt{\varepsilon}$ individually in the bound state 4AI+4AI+4AI (or 2AI+2AI) at $r=r_H$ of part II so that $1-r_H/r=0$ in 6.13.2 (r_H =Nth fractal scale, our subatomic scale).
Note these are not the free particle pure states $\Delta\varepsilon$ (electron) and ε (muon) giving also the galactic halo constant stellar velocities.
$e^{i\Delta\varepsilon}\rightarrow 1/[\sqrt{(1-\Delta\varepsilon-r_H/r)}](1/(1\pm\varepsilon))=(1/\sqrt{\Delta\varepsilon})(1/(1\pm\varepsilon)$ =mass of W,Z i.e., ⊥same as Paschen Back: $E_Z=Bu_B(0+1+1+1)$) (fixes the value of the LS coupling coefficient)
$e^{i\varepsilon}\rightarrow 1/[\sqrt{(1-\varepsilon-r_H/r)}](1/(1\pm\varepsilon))=(1/\sqrt{\varepsilon})(1/(1\pm\varepsilon)$= mass of $\pi^{\pm}$, π^{o}. || Paschen Back
Fixes the value of the LS coupling coefficient

More Implications of The Two Metrics Of Equation 7 Of eq. 4 .2 and Eq.11.2 Gaussian Pillbox Approach To General Relativity
From equation 11.2 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. 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 $r=r_H$:

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

which also fulfills the fundamental small C requirement of eq.2AI Dirac equation zitterbewegung (for $r<r_C$ and $r\approx r_H$) and the eq.2A Minkowski metric requirement for $\alpha=1$.
It also keeps our squre 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 $ds^2=-dx_o^2+\Sigma_{i=1}^n dx_i^2$ (6.14.1)
Submanifold is $-x_0^2+\Sigma_{i=1}^n x_i^2=\alpha^2$
In static coordinates r,t : (the new pde harmonic coordinates for $r<r_H$)
$x_o=\sqrt{(\alpha^2-r^2)}\sinh(t/\alpha)$: (6.14.2)
$x_1=\sqrt{(\alpha^2-r^2)}\cosh(t/\alpha)$:
$x_i=rz_i$ $2\le i\le n$ z_i is the standard imbedding n-2 sphere. R^{n-1}. which also imply the De Sitter metric 6.14.3. Recall from eq. 6.13.6
$ds^2=-(1-r^2/\alpha^2)dt^2+(1-r^2/\alpha^2)^{-1}dr^2+d\Omega^2_{n-2}$ (6.14.3)

$\alpha \to i\alpha$, $r \to ir$ 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 $\alpha \to i\alpha$ in equation 6.14.2.
$x^2+y^2+z^2-t^2=0$ of 6.14.1 with also $(x=r\sin\theta,\ y=r\cos\theta) \to$
$(x=\sqrt{(\alpha^2-r^2)}\sinh(t/\alpha),\ y=\sqrt{(\alpha^2-r^2)}\cosh(t/\alpha))$, $\alpha \to i\alpha$. 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 2byly 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! I checked this out.

Note the sine wave has a period of 10trillion years and we are now at 370billion years, near $\theta=-\pi/2$ in $r=r_o\sin\theta$ where the upswing is occurring and so accelerating expansion is occurring. This is where we start out at in the sect.7.3 derivation. Since the metric is inside $r<r_H$ it is also a source as we see in later section 5.4

Observations Inside Of r_H

The metric quantization pulses ride the metric like sound waves moving in air, including going in straight lines in our toroidal universe. That means that when we look in the direction of object B using nearby metric quantization effects, like galaxies falling into a compression part of the vibration wave, which also organizes galaxy clusters as in the Shapely and Perseus-Pisces concentration, we are looking in straight lines at least for local superclusters (<2BLY) and so are actually looking in the direction of object B. But the CBR E&M radiation that is bent by strong gravity follows that toroidal path and so you really are looking at the (red shifted) light coming from yourself as you formed 370BY ago in this expanding frame of reference.
So the direction to the nearby galaxy clusters, even out to the Shapely concentration, is metric quantization dependent so we have straight line observation, but the CBR follows the curved space and so the galaxy superclusters we see in a given direction have CBR concentration counterparts in exactly the opposite direction. Note distant galaxy clusters are also not seen along straight lines, but lines on that spherical torus. So you only see hints of the actual directions of object B, of the object A electron dipole, etc. for relatively nearby superclusters.
The spherical torus Bg gravimagnetic dipole shape comes from the rotational motion implied by the new pde (from eq.2AI). Recall the new pde applies to dipole Bg field and

spin motion; The electron has spin as you know. The new pde spherical torus is applied on top of a Minkowski space-time inside rH because the Gaussian pillbox does not (usually) contain anything if its radius is smaller than rH. So astronomers really are observing the inside of an electron (i.e.,what comes out of the new pde) in this fractal model!

6.15 Relevance (Of These Two Metrics Of Section 1.1.5) to Shell Model of The Nuclear Force Just Outside r_H

Note my model is a flat de Sitter $\alpha \to i\alpha$ inside r_H and perturbed Schwarzschild (i.e.,Kerr) just outside, the two metrics of section 3.1 and Part II (on 2AI+2AI+2AI) above. The transition between the two is quite smooth. So at about r_H we have a force that gets stronger as r increases.
But this is what the simple harmonic oscillator does in this region. So my model gives the simple harmonic oscillator (transition to Schwarzschild metric) and the flat part inside that the Shell model people have to arbitrarily have to adhoc put in (they call it the flattening of the bottom of the simple harmonic potential energy). Anyway, the above fractal theory explains all of this.
Also the object B perturbation metric is a perturbative Kerr rotation.

7 Comoving Coordinate System: What We Observe Of The Ambient Metric

7.1 Comoving Coordinate System

Here we multiply eq. 4.6 result $p\psi=-i\partial\psi/\partial x$ by ψ^* and integrate over volume to define the expectation value:

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

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

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

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

In the above equation let $A=\alpha$, from equation 9 Dirac equation Hamiltonian H, $[H,\alpha]=i\hbar\, d\alpha/dt$ (Merzbacher, pp.597).
The second and first integral solutions to the Heisenberg equations of motion (i.e., above $[H,\alpha]=i\hbar d\alpha/dt$) is: $r=r(o)+c^2p/H+(\hbar c/2iH)[e^{(i2Ht/\hbar)}-1](\alpha(0)-cp/H)$. (7.1.2)

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

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

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

Summary:

Fractal Scale Content Generation From Generalized Heisenberg Equations of Motion

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

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

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

7.3 Derivation of The Terms in Equation 7.2.3

For free falling frame no coordinate transformation is needed of source T_{oo}. For non free falling comoving frame with N+1fractal eq.9 motion we do need a coordinate transformation to obtain the perturbation ΔT of T_{oo} caused by this motion (in the new coordinate system we also get 5.1.2: the modified R_{ij}=source describing the evolution of the universe $\ln(r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-\ln[e^{\mu}-1]]2$ in our own coordinate frame).

THE DISCOVERY INSTRUMENT Spectroscope Slit

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

7.4 Dyadic Coordinate Transformation Of T_{ij} In Eq. 7.2.3

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 $T_{oo}\rightarrow T_{oo}'=T_{oo}+dT_{oo}.\equiv T_{oo}+G_{oo}$ (Section 7.4 attachment).

The Dirac equation object has a radial center of mass of its zitterbewegung. That radius expands due to the **ambient metric expansion** of the next larger N+1th fractal scale (Discovered by Slipher. See his above instrumentation). We define a Z_{oo} E&M energy-momentum tensor 00 component replacement for the G_{oo} Einstein tensor 00 component. The energy is associated with the Coulomb force here, not the gravitational force. The dyadic radial coordinate transformation of Z_{ij} associated with the expansion creates a new z_{oo}. Thus transform the dyadic Z_{oo} to the coordinate system commoving with the radial coordinate expansion and get $Z_{oo}\rightarrow Z_{oo}+z_{oo}$ (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 $S_{1/2}$ state of equation 2.6. $\varepsilon=.06006=m_{\mu}+m_e$

From equation 11.4 and $e^{i\omega t}$ oscillation in equation 11.4. $\omega=2c/\lambda$ so that one half of λ equals the actual Compton wavelength in the exponent of section 4.11. Divide the

Compton wavelength $2\pi r_M$ by 2π to get the radius r_M so that $r_M=\lambda_M/(2(2\pi))= h/(2m_ec2\pi)=$ $6.626X10^{-34}/(9.1094X10^{-31}X2.9979X10^8X4\pi)=1.9308X10^{-13}$

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

Take $H_t=13.74X10^9$ years$=1/2.306X10^{-18}$/s. Consistent with the old definition of the 0-0 component of the old gravity energy momentum tensor G_{oo} we define our single $S_{½}$ state particle (E&M) energy momentum tensor 0-0 component From eq.3.1 Z_{oo} we have:

$c^2Z_{oo}/8\pi\equiv\varepsilon$ =0.06,. $\varepsilon=½\sqrt{\alpha}$=square root of charge.

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

Also from equation 9 the ambient metric expansion component Δr is:

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

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

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

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

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

(7.4.4)

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

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

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

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

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

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

Make the cancellations and get:
2(.065048)[(1.9308X10^{-13}/(3X10^8X9.11X10^{-31}X3.0334(1+.0654))] (2.306X10^{-18}) =
=2(.065048)(2.2X10^8)(2.306X10^{-18}) = 6.674X10^{-11} Nm^2/kg^2≡G (7.4.5)
from plugging in all the quantities in equation 7.4.5. This new z_{oo} term is the classical $8\pi G\rho/c^2=G_{oo}$ source for the Einstein's equations and we have then **derived gravity** and incidentally also derived the value of the Newtonian gravitational constant since from our postulate the m_e mass (our "single" postulated source) is the *only* contribution to the Z_{oo} term. Note Dirac equation implies +E and -E solutions for –e and +e respectively and so in equation 7.4.5 we have e^2=ee=q_1Xq_2 in eq.7.4.5. So when G is put into the Force law Gm_1m_2/r^2 there is an *additional* m_1Xm_2 thus the resultant force is proportional to Gm_1m_2 =(q_1Xq_2)m_1m_2 which is always positive since the paired negatives always are positive and so the gravitational force is always attractive.
Also recall in the free falling frame (So comoving with M=m_e so is constant) fractal scale for $ke^2/((GM')M)=10^{40}$ fractal jump, $ke^2/(m_ec^2)=ke^2/(Mc^2)$ is also constant so if G is going up (in 7.4.4) then M' is going down. Note then $r_H=ke^2/(m_ec^2)\rightarrow10^{40}Xr_H=r_H(N+1)$= =$GM'm_e/(m_ec^2)=GM'/c^2$=famous Schwarzchild radius.
To summarize we have then just done a coordinate transformation to the moving frame to find the contributing fields associated with the moving frame. Analogously one does a coordinate transformation to the charge comoving frame to show that current carrying wires have a magnetic field, also a 'new' force, around them. Also note that in the second derivative of eq.7.1.2 **$d^2r/dt^2=r_o\omega^2e^{\omega t}$= radial acceleration.** Thus in equations 7.1.4 and 7.1.5 (originating in section 4) **we have a simple account of the cosmological radial acceleration expansion** (discovered recently) **so we don't need any theoretical constructs such as 'dark energy' to account for it.**

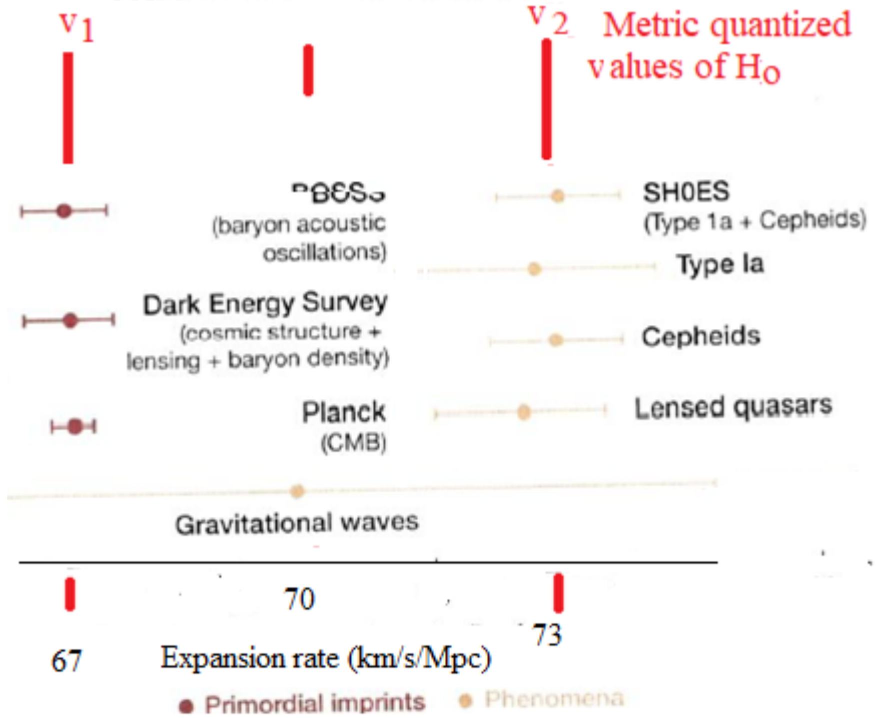
If r_o is the radius of the universe then $r_o\omega^2e^{\omega t}\approx10^{-10}$m/sec^2=$a_M$ is the acceleration of all objects around us relative to a inertial reference frame and comprises a accelerating frame of reference. If we make it an inertial frame by adding gravitational perturbation we 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.

7.5 Metric Quantized Hubble Constant

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

89.3km/sec/2.5megaly- 85.26km/sec/2.5megaly,=**4km/sec**/2.5megaly
and 89.3km/sec/2.5megaly- 89.3km/sec/2.5megaly=**8km/sec**/2.5megaly.

So the Hubble constant, with refernence to the 2.5my metric quantization jump time, appears quantized in units of **4km/sec**,**8km/sec**, etc. Other larger denominator „averages"



are not accurate. **Hubble Constant Measurements**

7.6 Cosmological Constant In This Formulation

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

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

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

Since from equation 7.6.1 $a=a_o(e^{\omega t}-1)$ then $a'' = (\omega^2/c^2)\sinh\omega t = a(\Lambda/3) = (\Lambda/3)\sinh\omega t$ and there results:

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

From section 12.1 above then $\omega=1.99X10^{-18}$ with 1 year=$3.15576X10^7$ seconds, also $c=3X10^8$ m/s. So:

$\Lambda= 3(\omega^2/c^2)=1.32X10^{-52}/m^2$, which is our calculated value of the cosmological constant. Alternatively we could use $1/s^2$ units and so multiply this result by c^2 to obtain:

$1.19X10^{-35}/s^2$. Add to that the above matter (i.e.,ρ) contributions to get $\Lambda=1.658X10^{-35}/s^2$ contribution.

7.7

Note that we have thereby derived the Newtonian gravitational constant G by using a radial coordinate transformation of the $T_{oo}=e^2\delta(0)$ charge density component to the coordinate system commoving with the expansion of the N+1 th fractal scale (cosmological).

Note that our new force we derived was charge and mass independent but the old force was charge dependent. Also note that the new force metric has universal geodesics that even curve space for photons. The old one had a q in the k_{ij} (chap.17). If q=0 as with the photon there would be no effect on the trajectory of the photon whereas the same photon moving near a gravitational source would be deflected. Recall again this is all caused by the taking of the derivative in the above coordinate transformation.

So as a result of this coordinate transformation photons are deflected by the N+1 fractal scale metric and area not deflected by the Nth scale metric.

Also the G does not change in the commoving coordinates for the same reason as the speed of light does not change as you enter a black hole, your watch slows down because of GR to compensate.

References

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

7.8 Comoving Interior Frame

Recall from solution 2 (section 1.2) that the new pde zitterbewegung $E=1/\sqrt{\kappa_{oo}}$ energy smudged out $r=\langle r_o e^{i\omega t}\rangle$ with $\omega\rightarrow i\omega$ inside r_H. so m r=sinhωt. Do a coordinate transformation (Laplace Beltrami) to the coordinate system of the r>rH commoving observer (us) and that equation pops right out.

I just wanted to explain to you the origin of that Mercuron.

My new pde uses a source term koo in the external inertial reference frame. In contrast for the comoving term the field itself can be the origin of the field, especially near the time of the big bang so I must transform to the comoving coordinate system to derive the fields the comoving observer measures.

In that context in the commoving De Sitter metric reference frame inside r_H we are not in free space anymore with instead the source term as the multiple of the Laplacian of the metric tensor in harmonic local coordinates (recall the Dirac eq.) whose components satisfy Ricci tensor = $R_{ij}=-(1/2)\Delta(g_{ij})$ where Δ is the Laplace-Beltrami second derivative operator is not zero. Geometrically, the Ricci curvature is the mathematical object that controls the growth rate of the volume of metric balls in a manifold. Note also the second derivative (Laplacian) of sinωt is $-\omega^2\sin\omega t$. Also recall that inside r_H so that $r<r_H$, then sinωt–>sinhωt, which is rewritten as sinhμ to match with $R_{22}=e^{-\lambda}[1+½\, r(\mu'-\lambda')]$ with μ=λ (spherical symmetry). So the de Sitter metric submanifold is itself the source of this R_{22} which is a nontrivial effect in the very early, extremely high density, universe.

I solved this R_{22} equation and got

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

That MandelbulbLepton analysis (appendix C) implies that m is the muon contribution (as a fraction of the tauon mass). Set $r_{M+1}=10^{11}$LY and get rbb (radius of BigBang) of about 30million miles, approximately the size of Mercury's orbit (hence the "Mercuron"), a large enough volume to just pack together those 10^82 electrons (With 3 each a proton) at r=rH separation.

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

In the commoving De Sitter metric reference frame inside r_H we are not in free space anymore so the multiple of the Laplacian of the metric tensor in harmonic local coordinates whose components satisfy $R_{ij} = -(1/2)\Delta(g_{ij})$ where Δ is the Laplace-Beltrami second derivative operator is not zero. Geometrically, the Ricci curvature is the mathematical object that controls the growth rate of the volume of metric balls in a manifold Note the second derivative (Laplacian) of sinωt is $-\omega^2\sin\omega t$. Also recall that inside r_H so that $r<r_H$, then sinωt→sinhωt, which is rewritten as sinhμ to match with $R_{22}=e^{-\lambda}[1+½\, r(\mu'-\lambda')]$ with μ=λ (spherical symmetry). So the de Sitter metric submanifold is itself the source of this R_{22} which is a nontrivial effect in the very early, extremely high density, universe. (Note that the contemporary G calculation in Ch.12 just uses the de Sitter sinhμ (just as in Ch.12 coordinate transformation because this feedback effect no longer is dominant in this era). So the usual spherically symmetric: $R_{22}=e^{-\lambda}[1+½\, r(\mu'-\lambda')]-1=0$ → de Sitter metric sinhμ, itself is the source, comoving coordinate system→

$R_{22}=e^{-\lambda}[1+½\, r(\mu'-\lambda')]-1=\sinh\mu$. (applies only for μ≈1, |sinμ|≈1) (A)

With μ=λ this can be rewritten as: $e^{\mu}d\mu/(1-\cosh\mu)=dr/r$ (B)

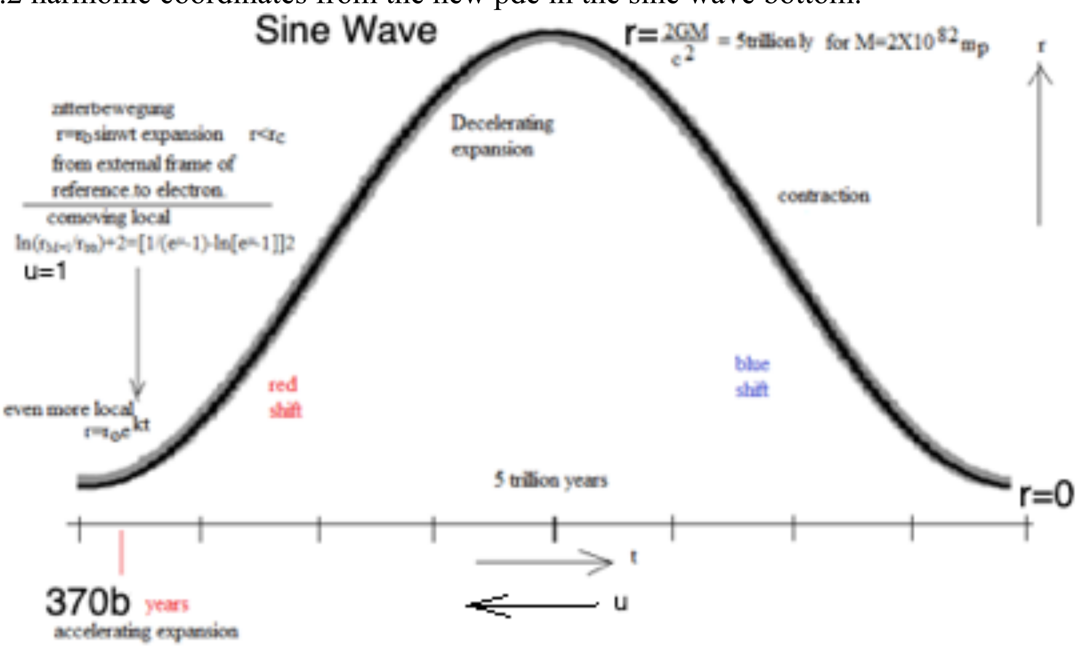
The integration is from μ=ε=1 projection at 45° particles at r=smallest (see section 1,C=0) to the present day mass of the muon= .06 (of tauon mass, C>0). Note our postulate of ONE is still needed to calculate the big bang Integrating equation B from ε=1 to the present ε value we then get:

$\ln(r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-\ln[e^{\mu}-1]]2$ (7.8.1)

```
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 logarithm
      rM1=e**ex
      !rMorbb
      !bb=log(ee)
      if (ex.GT.36.0)THEN
      goto 2001
      endif
      write(10,2000) rr,rM1
 1000   CONTINUE
 2000   format(f7.2,1x,1x,1x,f60.6)
 2001   end
```

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



Recall object B is close by so we must include the small Kerr metric oblation term acosθ=.9602 in $r_{bb}^2 = r^2+a^2\cos^2\theta$ that gives an added $\Delta\varepsilon$ when it is inserted.
So substituting into ln $(r_{M+1}/r_{bb})+2=[1/(e^{\mu}-1)-\ln[e^{\mu}-1]]2$ using the r_{bb} value=~30M miles to the present r_{M+1}= 13.7X10^{9}LY value for the case with and without the oblation term gives $\ln(r_{M+1}/r_{bb})=36.06$ and current value ε=.06, and $\Delta\varepsilon$=.00058 from the oblation term. Thus the present day mass of the muon gives us the size of the universe at the time of the big bang, it was not a point! Note that (from appendix A) all the 10^{81} baryons at r_H (~10^{-15}m) separation were packed into this $(4\pi/3)r_{bb}^3$ volume and so not violating baryon number conservation since from this fractal theory these objects originated from a previous collapse. Thus we do not need to be concerned with baryogenesis because the baryons survived the big bang. Equation B implies that the commoving time turns out to be 370by. So the universe is not 13.7by old but 370by. This long of time explains the thermalization of the CBR and the mature looking galaxies and black holes at 13by ago. The contemporaneous tangent line intersection with the r axis for $r=roe^{kt}$ gives the 13by. Thus we have derived the values of the free lepton masses in our new pde and have a curved space, non perturbative curved space generalization of the Heisenberg equations of motion. The comoving field is almost inertial on the straight sides so the sine wave is

observed as a perfect sine wave by the external Dirac equation observer and near perfect by the comoving observer (that self field term on the bottom blunts the sine wave there.) This would be the Schwarzschild metric (a=0) without object B. Given the incomplete inertial fram dragging angular momentum then provides an oblation term.
Recall that the new pde for $r<r_H$ gives $i\omega\rightarrow\omega$ in its Heisenberg equations of motion.(Ch.10) Thus $r=r_o e^{wt}$ or $\ln(r/r_o)=\omega t=\omega t_o\sqrt{(1+\varepsilon)}$ where the sum of the free lepton masses in the new pde is under the square root sign. Recall this equation gives our expanding universe and the second derivative gives the acceleration in this expansion. Note the (section 1.2.1) 10^{81} particles give above $r=r_H$ if edges touching can be contained in volume of radius $1.746X10^{12}$ m Also the present radius of the universe is approximately $13.7X10^9$LY=$1.27X10^{27}$m. Given the oblation term $a^2\cos^2\theta\equiv\Delta^2$ from the above rotation metric we have then
$\ln(r_{M+1}/\sqrt{(r_M{}^2+\Delta^2)})=\ln(1.27X10^{27}/1.746X10^{12})=34.22$ if $\Delta=0$. Given the muon mass =.06 ((1/16.8) tauon mass) we find that $\Delta=1.641X10^{12}$m so that
$\mathrm{acos}(1.64X10^{12}/1.746X10^{12})=20°$, our polar angle from the rotation axis.
Recall from the above nonperturbative derivation we got $\varepsilon=.060$ without oblateness and with oblateness r_L get the added rotation contribution $\Delta\varepsilon=.00058$. Note here (i.e.,eq.5.1.2) that there is no big bang from a point. Instead it is from 434million km radius object, so with just enough volume to hold all the baryons (10^{81}each of radius~.434Fermi) and so this type of "big bang" event can be easily computer modeled as a core collapse supernova like rebound (but too hot even for iron production). Note that the mass of the electron is determined by the drop in inertial dragging (giving that oblation term) due to nearby object B. 1, ε, $\Delta\varepsilon/2$ is the ratio of the tauon to muon to electron mass and so our new Dirac pde 9 gives us the three fundamental S state lepton masses with $\Delta\varepsilon$ the single ground state lepton with nonzero rest mass. Note also $\Delta\varepsilon=m_e\propto\hbar$ from eq.9 and $m_e\propto e^2\propto\alpha h$ since r_H is an integration constant. . The main result though of this chapter is that the *present numerical value of the lepton masses imply this huge fig.2a 10^{40}X scale jump* (from S state classical electron radius=10^{-18}m to the r_{final} cosmological radius) of equation 5.1.2 from the electron equation 9 object to the cosmological scale equation 9 object implied by equation 5.1.2. 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.).
That formula for the electron mass and also the fine structure constant alpha has the ambient metric epsilon (muon) in it.
Looked up the variation of alpha from: arXiv:1608.04593
$\Delta\alpha/\alpha = -2.18 \pm 7.27 \times 10^{-5}$. At 13by.
So to get it at 1by divide by 10 then: $\Delta\alpha/\alpha= 2X10^{-6}$ at 1by.
The fine structure constant is proportional to the square of 1.25-([(1/64)/(1-ep/2)]+1/16+1/4).
Looked at the change in ep in the Grand Canyon Tonto to Unkar jump vs 270 My.
ep/2=.03 changes 1by by 10% which is: .003. 0.003 of 1/64 is $4.7X10^{-5}$. After squaring it is 1/32.
get $1.46X10^{-6}$. Actual is $2X10^{-6}$.

My electron mass formula appears to also work for a completely different application: that of calculating the rate of change of the fine structure constant alpha.

Sine Wave

The 10 trillion years represents the period of object A we are inside. The 6billion year oscillation represents the gamma =917 of electron object B that we are on the edge of. It has a frequency 917X object A's from our frame of reference.

7.9 Summary

In the external reference frame the κ_{oo}=1-r_H/r and the equation 9 (4AI) zitterbewegung gives a smudged out blob r=<$r_o e^{ikt}$> first solution (r>r_H, new pde, eq.9, 4AI) and R_{ij}=0 from the second solution. But in the commoving frame of reference inside r<r_H in the new pde is not free space anymore and so R_{ij} does not equal 0 anymore and so equals the above De Sitter dual choices sinh or cosh so the second solution requires R_{ij}=sinhu (R_{22} eq.A left side does not match with cosh). A second derivative of sinh is once again a sinh so this is a source in the Laplace-Beltrami second derivative operator-(De Sitter source). This result also comes out of the second solution but for the commoving internal observer frame of reference. Recall that the multiple of the Laplacian of the metric tensor in harmonic local coordinates whose components satisfy $R_{ij}=-(1/2)\Delta(g_{ij})$ where Δ is the Laplace-Beltrami second derivative operator. In that regard geometrically, the Ricci curvature is the mathematical object that controls the growth rate of the volume of metric balls in a manifold.

So R_{ij}=sinhu comes out of the new pde with the second solution! This is equal to e^{ud}u/(1-coshu)=dr/r whose solution is $\ln(r_{M+1}/r_{bb})+2=[1/(e^u-1)-\ln[e^u-1]]2$.

This equation and the metric quantization sect. 6.8 stair step give the equation of motion stair v steps of our universe for the inside r_H and so give that quantized Hubble constant.

Note here also the muon (and so the pion) were 100X times heavier at the big bang making the nuclear force equal to the E&M force then.

7.10 Construct The Standard Model Lagrangian

Note we have derived from first principles (i.e.,from postulate 1) the new pde equation for the electron (2AI, eq.9), pde for the neutrino (eq.2AII) Maxwell's equations for the photon, the Proca equation for the Z and the W (Ch.3) and the found the mass for the Z and the W (4.2.1). We even found the Fermi 4 point from the object C perturbations. The distance to object B determines mass and we found that it is equivalent to a scalar field (Higgs) source of mass in sect.4.1.5. We have no gluons or quarks or color in this model but we can at least derive the phenomenology these concepts predict with our 2AI+2AI+2AI at r=r_H strong force model (ie., 2AI+2AI+2AI 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 Nth fractal scale. Here it is:

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

2
$$- \partial_\nu W^+_\mu \partial_\nu W^-_\mu - 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^2c_w^2(Z^0_\mu W^+_\mu Z^0_\nu W^-_\nu - Z^0_\mu Z^0_\mu W^+_\nu W^-_\nu) + g^2s_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)^2H^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_wMA_\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_wA_\mu(\phi^+\partial_\mu\phi^- - \phi^-\partial_\mu\phi^+) - \tfrac{1}{4}g^2W^+_\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^2s_wA_\mu\phi^0(W^+_\mu\phi^- + W^-_\mu\phi^+) + \tfrac{1}{2}ig^2s_wA_\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^-$$

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

4
$$\tfrac{ig}{2\sqrt{2}}\tfrac{m_e^\lambda}{M}[-\phi^+(\bar{\nu}^\lambda(1-\gamma^5)e^\lambda) + \phi^-(\bar{e}^\lambda(1+\gamma^5)\nu^\lambda)] - \tfrac{g}{2}\tfrac{m_e^\lambda}{M}[H(\bar{e}^\lambda e^\lambda) + i\phi^0(\bar{e}^\lambda\gamma^5 e^\lambda)] + \tfrac{ig}{2M\sqrt{2}}\phi^+[-m_d^\kappa(\bar{u}^\lambda_j C_{\lambda\kappa}(1-\gamma^5)d^\kappa_j) + m_u^\lambda(\bar{u}^\lambda_j C_{\lambda\kappa}(1+\gamma^5)d^\kappa_j] + \tfrac{ig}{2M\sqrt{2}}\phi^-[m_d^\lambda(\bar{d}^\lambda_j C^\dagger_{\lambda\kappa}(1+\gamma^5)u^\kappa_j) - m_u^\kappa(\bar{d}^\lambda_j C^\dagger_{\lambda\kappa}(1-\gamma^5)u^\kappa_j] - \tfrac{g}{2}\tfrac{m_u^\lambda}{M}H(\bar{u}^\lambda_j u^\lambda_j) - \tfrac{g}{2}\tfrac{m_d^\lambda}{M}H(\bar{d}^\lambda_j d^\lambda_j) + \tfrac{ig}{2}\tfrac{m_u^\lambda}{M}\phi^0(\bar{u}^\lambda_j\gamma^5 u^\lambda_j) - \tfrac{ig}{2}\tfrac{m_d^\lambda}{M}\phi^0(\bar{d}^\lambda_j\gamma^5 d^\lambda_j) +$$

5
$$\bar{X}^+(\partial^2 - M^2)X^+ + \bar{X}^-(\partial^2 - M^2)X^- + \bar{X}^0(\partial^2 - \tfrac{M^2}{c_w^2})X^0 + \bar{Y}\partial^2 Y + igc_wW^+_\mu(\partial_\mu\bar{X}^0X^- - \partial_\mu\bar{X}^+X^0) + igs_wW^+_\mu(\partial_\mu\bar{Y}X^- - \partial_\mu\bar{X}^+Y) + igc_wW^-_\mu(\partial_\mu\bar{X}^-X^0 - \partial_\mu\bar{X}^0X^+) + igs_wW^-_\mu(\partial_\mu\bar{X}^-Y - \partial_\mu\bar{Y}X^+) + igc_wZ^0_\mu(\partial_\mu\bar{X}^+X^+ - \partial_\mu\bar{X}^-X^-) + igs_wA_\mu(\partial_\mu\bar{X}^+X^+ - \partial_\mu\bar{X}^-X^-) - \tfrac{1}{2}gM[\bar{X}^+X^+H + \bar{X}^-X^-H + \tfrac{1}{c_w^2}\bar{X}^0X^0H] + \tfrac{1-2c_w^2}{2c_w}igM[\bar{X}^+X^0\phi^+ - \bar{X}^-X^0\phi^-] + \tfrac{1}{2c_w}igM[\bar{X}^0X^-\phi^+ - \bar{X}^0X^+\phi^-] + igMs_w[\bar{X}^0X^-\phi^+ - \bar{X}^0X^+\phi^-] + \tfrac{1}{2}igM[\bar{X}^+X^+\phi^0 - \bar{X}^-X^-\phi^0]$$

Fig. 10

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

7.11 Summary

This is a first principles derivation of mathematics and theoretical physics. "Astronomers are observing from the inside of what particle physicists are studying from the outside, ONE object, the new pde (2AI) electron". Recall the electron was the only object in the first quadrant (so positive integer), every other object is an excited state, caused by increasing noise C. So we started with postulate of 1 and ended with ONE after all this derivation (solving two equations for two unknowns) derivation, we derived ONE thing, which must be the same thing! So we really did just "postulate ONE" and nothing else, as we claimed at the beginning. That makes this theory remarkably comprehensive (all of theoretical physics and rel# math) and the origin of this theory remarkably simple: "one". So we have only ONE simple postulate here.

7.12 The Above Mainstream Model (fig.10) Has Many Free Parameters, This Fractal Model has None

For example the Mandelbrot set $\{C_M\}=r_H$ in dr-C_M so we can always set $C_M=2ke^2/m_ec^2$. $c^2m_edr=c^2m_eC_M=2ke^2$ to define our length units. In section 1.2.7 we show that with a *single* m_e (nonzero proper mass) we can start with arbitrary ke^2/r energy units and have no free parameters among these values. Note this 2A1 electron has the only nonzero proper mass m_e (i.e.,so only C_M) in free space making it the only fractal solution. In the time domain the h in E=h(1/t) just defines energy units (equation 4.6) in terms of event time intervals t. The gyromagnetic ratio of m_e is derived from the rotated 4AI, eq.9 new pde. The muon mass comes from the distance to object B (Ch.5). The proton mass comes from the flux quantization h/2e (Sect.8.1). The other highest energy boson masses come from the Paschen Back effect given this proton mass (Ch.8). The strength of the strong force arrises from the ultrarelativistic field line compression in the 2AI+2AI+2AI model

(Ch.8). The mass energies and quantum numbers of the many particles below about 1.5GeV come out of the Frobenius solution (Ch.9) which is merely a solution to eq.9 (i.e., 2AI). Recall the CP violation is due to the fractalness (selfsimilarity with a spinning electron): we are inside a rotating object Kerr metric implying a cross term dϕdt in it. So you can derive the CP violation magnitude that they use in the CKM matrix. Multiply through the Fermi interaction integral (from the Standard model output and this output from the theory) and integrate to get the Cabibbo angle eq.10.8.7). The pairing interaction force of superconductivity is even derived by substituting the $\kappa_{\mu\mu}$ in the geodesic equations (sect.4.5). You can derive the neutrino masses for a nonhomogenous non isotropic space time (Ch.3). We derived the exact value of the pion mass (Ch.9).
Note since quarks don't exist in this model (they are merely those $2P_{3/2}$ trifolium lobes at $r=r_H$) those 6 quark mass free parameters vanish. The Mandelbrot set 10^{40}X scale change automatically sets the universe size and the gravitational constant size (sect.7.4) in comparison to classical electron mass and E&M force strength respectively.

If you do a tally **that free parameter list has just shrunk from ~30 down to 0**: so they are all derivable parameters, not free.. In contrast setting these parameters as free parameters is really postulating them because the parameter values are postulated. The equations they are used in constitute many more postulates (fig.10), so the number of potulates you get doing it that way goes out the roof, 100 or so?
But you have to ask yourself: where did all these assumptions come from? You actually do not understand the fundamental physics at all if you require a lot of postulates, free parameters, etc., you are merely curve fitting. In contrast here we have only one simple postulate and get the whole shebang out all at once: that being the standard model particles and cosmology and gravity. We finally 'understand' in the deepest sense of that word!
Note this model (Ch.1) also has none of the mainstream paradoxes either (Klein paradox, Dirac sea, 10^{96}grams/cm^3 vacuum, infinite mass and charge,.. in Ch.4) and not a single gauge but it still keeps the QED precission (eg., see Lamb shft calculation in 6.12).

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