Postulate 1

Abstract: Modern fundamental physics theories such as the Standard Model (SM) contain many assumptions(postulates). So where do all these assumptions come from? This is not real understanding. It is curve fitting. So why bother? But what if we can narrow down the number of postulates to one simple one? We then have ultimate *understanding! So what is that single simple postulate?*

*The fundamental insight that answers this question is that Cantor's Real Number(eg.,**1**) requirement of that Cauchy sequence ($z_1,z_2,..z_N,..$) of rational numbers(1) is here provided by the Mandelbrot set(2) iteration formula ($z_{N+1}=z_Nz_N+C$) eq.1a (&1b) sequence ($z_1,z_2,..z_N,...$).*

*Thus "**postulate** 1" (real set) gets us eq.1a,1b and so is that* 'single postulate' *given the eq.1a Large **C** rotations of the Small C eqs.1, 1b values of z:*

Small C *For $C\to 0$(i.e., small **C**) in eq.1a we have only one* non*iterative result: $1,0\approx z_1=z_\infty\equiv$ $z=zz+C$ (eq.1)*

*Plug eq.1 **C** into eq.1b ($\delta C=0$) and, after simple factoring to find z, get Special Relativity (SR is $dr^2-dt^2=ds^2$ eq.2A in DavidMaker.com) and with the two eq.2AIs gives two unbroken 2D degeneracies in eq.2B (Clifford algebra, sect.2 for leptons) and uses them to get 2AIA and so (binary rea#l)math of the z observables (eq.3.4).*

Large ***C_M*** *is the entire 1a Mandelbrot set(containing many small **C** z observables, sect.4) and so fractalness.*

*Note for large **C** the 2AIA diagonal turns eq. 2AI into eq.9 electron, muon, tauon (fig.1) on 3 Lepton family Reimann surfaces respectively given eq.2AII. There are two observable z fractal scales.*

N+1th Fractal Scale *Cosmological scale for r_H in eq.9 (appendix B).*

*We then get new eigenvalues associated with $(10^{40})^N$Xcosmology, The C_M rotation turns SR into GR (eq.4.2) and breaks the two 2D degeneracies into a **4D** Clifford algebra of Mandelbulbleptons.*

Nth Fractal Scale *Subatomic scale for r_H in eq.9 (appendix B) 10^{40}Xsmaller selfsimilar scale.*

Many Body *eg.,Three 2AI pure states (baryons, PartII) and PartIII mixed states.*

Get Z_o,+W,-W from $r=r_H=C_M=$ allowed noise rotations so we get the Standard Model (SM).

*So when you postulate 1 real set this is the only result (or just **postulate** 1). We derived both physics and math.*

Summary

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. *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 recently suggested in a Utube video that all of physics can be extracted from the Mandelbrot set. Here we have merely shown how to do it and why it is important.

Table of Contents 1∪1

Introduction

Recall our single **postulate of 1** (real set) gives us the physics because of our fundamental insight:

*The fundamental insight that answers this question is that Cantor's Real Number(eg.,**1**) requirement of that Cauchy sequence ($z_1,z_2,..z_N,..$) of rational numbers(1) is here provided by the Mandelbrot set iteration formula ($z_{N+1}=z_Nz_N+C$) eq.1a (&1b) sequence ($z_1,z_2,..z_N,...$).*

*Thus "**postulate** 1" (real set) gets us eq.1a,1b and so is that* 'single postulate' *given the eq.1a Large **C** rotations of the Small C eqs.1, 1b values of z.*

Note for example 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 $Z_{2n+1}\equiv 1-z_{2n+1}$, even $Z_{2N}\equiv 1+z_{2N}$ 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 ∞–∞ 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 kδz≡C→0(i.e.,small C) in eq.1a then $z_1=z_\infty\equiv z=zz+C$ (eq.1). Eq.1 implies(1,0) corresponding to the dichotomy 'set1 always with subset ∅': so {set1,∅}→(1,0) given ∅∪∅=∅→0∪0=0≡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.

Also we define C from noise C≡kδz if k in general arbitrary real. So in eq.1.1 if k is exactly a constant and/or k is small (i.e., k<<δz) 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 δk=0 inside. But δz is constrained to be small on the edge therefore allowing for a small varying k on the edge of any particular Mandelbrot set lobe (in δkδz≈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 δδz≈0 is very small.

Section 1 Rewrite equation 1 in z=1+δz form

(Define z≡z'+δz, z'≡1, kδz≡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 δδz 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 δz=dr-idt for all orthogonal (90°, ⊥) dr and dt and so arbitrary dx⊥dy (eg., δz=dx+idy) (1.3)

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

Note k then is a constant with respect to dr,dt variation (in any given 2D plane).

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

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

the equivalent of eq. 1a,1b. Note to 'solve for z (=1+δz) we must solve for the (linear dr±dt) factors.

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 for dr-dt solutions. So all dr,dt cases imply invariant

$$drdt+dtdr=0 \qquad (2B1)$$

Note in general if dr≠dt then 2B1 holds. Next **factor** the real part of eq.2 to get
$\delta(dr^2-dt^2)=\delta[(dr+dt)(dr-dt)]=\delta(ds^2)=[[\delta(dr+dt)](dr - dt))] +[(dr +dt)[\delta(dr – dt)]]=0.$ (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 second solution C_M just rotates dr→dr'≡dr-C_M, dt→dt'≡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 1st and 4th 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 δz=dr+idt≈ $(dr_1+dr_2)/2 + i(dt_1-(-dt_2))/2\equiv(dx_1+dx_2)_{2AI}+i(dx_3+dx_4)_{2AI})\equiv ds_{rt}+ids_{tr}$. 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 the invariance of the real eq.2A ds term remains. Next we take a dr (or dt) derivative of $\delta z=dse^{i\theta}$ and name the resulting coefficients "observables".

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 θ=f(t) where we define k≡ξdr/ds, ω≡ξdt/ds, k'sinθ≡r, k'cosθ≡t. dse^{i45}=ds' =ds. Then eq.2AIA becomes

$$dz = dse^{i(\Delta\theta)} = dse^{i\left(\frac{\sin\theta dr}{ds}+\frac{\sin\theta dt}{ds}\right)} \equiv z"$$
$$dz = dse^{i\left(\frac{rdr}{k'ds}+\frac{tdt}{k'ds}\right)} \equiv z"$$
$$\frac{\partial z"}{\partial r} = \frac{\partial\left(dse^{i\left(\frac{rdr}{k'ds}+\frac{tdt}{k'ds}\right)}\right)}{\partial r} = \frac{i}{k'}\frac{dr}{ds}z". \text{ or}$$
$$\frac{dr}{ds}z" = -ik'\frac{\partial z"}{\partial r}$$

From part 4 below for C_M rotation define C_M=dr=ξdr' (ξ≡m, k'/m≡ħ, dr'/ds=v_r, $mv_r\equiv p_r$, z"≡ψ)

$$\frac{dr}{ds}z" = -ik'\frac{\partial z"}{\partial r} \quad \text{or}$$
$$p_r\psi = -i\hbar\frac{\partial\psi}{\partial r} \quad \text{Observables condition gotten from eq.2AIA circle.} \quad (3.1)$$

Observability (is 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: **δz=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 130° dichotomic rotation, sect.4.3).

Other Consequences Of Eq.2AIA

Recall k≡$\sqrt{\kappa_{rr}}$dr'/(k'ds)= 2π/λ so k'2π/λ=ξdr/ds=mv= ħ2π/λ=h/λ so λ=h/p=DeBroglie wavelength. Also ω=$\sqrt{\kappa_{oo}}$ mdt/(k'ds) so (k'/m)ω=(dt/ds)$\sqrt{\kappa_{oo}}$≡E in the new pde. So E=hω. So from eq.3.4 also Hψ=-iħ∂(δz)/∂t≡ Eδz=ħωδz. 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 .

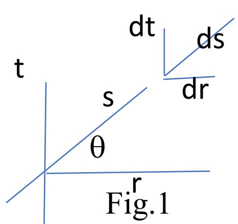
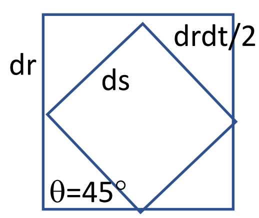
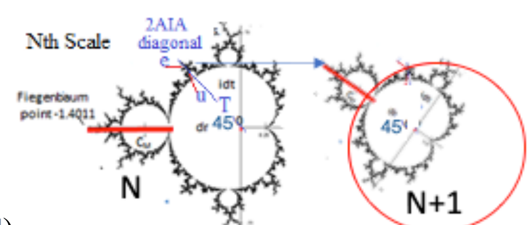


Fig.1





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

Introduction See Ch.2. X½

Recall that Eq. 1 (with its small C) gave us eq.2AIA at min ds at 45°, for our observables (eigenvalues). Also from eq.1.1 dr=drdr+C_M on a given Mandelbulb on the next smaller (10^{40}X) fractal scale (our subatomic 10^{-40} Nth scale):

$$drdr<<dr \text{ and so } dr\approx C_M \equiv dr_C. \quad (4.1a)$$

Define mass ξ from: $C_M \equiv \varepsilon \equiv \xi dr \equiv \xi r_H$. So $C_M/r_H=\varepsilon/r_H=\xi\equiv m_L$. So from figure 1 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 $r_H=\varepsilon/m_L \equiv 2e^2/(m_L c^2)$ in eq.4.1 below. $2P_{3/2}$ B flux quantization modifies this to $r_H=\varepsilon/m_e$ See Ch.2, figure 4.

ds Invariance

Also to preserve eq.1 little C and so the eq.2A ds invariance (define: $\varepsilon=C_M$)

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

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.

Here $dr_C=C\rightarrow\pm C_M$ (dichotomic 130° rotation in eq.1 with $C=C_M$=Fiegenbaum point 1.40115..(but in those tiny baseline units) instead of 0 in eq.4.1 and we fill in the gaps with that C. The $\pm C_M$ rotation results in composites.

Note the Kerr metric $(a/r)^2$ masses (eq.6.1.1 & 6.4.13) is the origin of the nonzero Mandelbulb extrema (normalized m_τ in $C_M=1=m_\tau$ plus $m_\varepsilon+m_e$.. $\varepsilon=\xi dr_c=(1)dr$ from the Kerr metric.

Note also $(1/64)^2K=\xi dr_c=\xi r_H=9.11X10^{-31}X2.818X10^{-15}$. So $K=1.05X10^{-41}$ is our conversion between Mandelbrot set mass units and mks mass units $[(1/64)^2/r_H]K=m_e$.

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 θ=45°. Note also putting C_M into eq.2AI dr+dt at 45° here **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) 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)

For large dr (eg., Limacon in Mandlebrot set) baseline -1 then here $dr^2=+C_M-C_M$, $C_M\equiv E_1^2$ in eq.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 $\gamma^\mu\gamma^\nu dx_\mu dx_\nu+\gamma^\nu\gamma^\mu dx_\nu dx_\mu = (\gamma^\mu\gamma^\nu+\gamma^\nu\gamma^\mu)dx_\mu dx_\nu$ (μ,ν=1,2,3,4; $\mu\neq\nu$). So from eq.2AI and resulting eq.(2C) then $ds^2 = (\gamma^1dx_1+\gamma^2dx_2+\gamma^3dx_3+\gamma^4dx_4)^2 =(\gamma^1)^2dx_1^2+(\gamma^2)^2dx_2^2+(\gamma^3)^2dx_3^2+(\gamma^4)^2dx_4^2+ \Sigma_{\mu\nu}(\gamma^\mu\gamma^\nu dx_\mu dx_\nu+\gamma^\nu\gamma^\mu dx_\nu dx_\mu)$. 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 **$\gamma^\mu\gamma^\nu+\gamma^\nu\gamma^\mu$ =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 γ^4dx_4. So with $\kappa_{\mu\nu}$ in eq.3.2 we have

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

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"$\equiv\psi$). For example using 4.6:

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

(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 m_1+m_2

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 130° rotation) in 4.1b. Recall $C_M\equiv\varepsilon\equiv\xi dr$

So we have large C_M dichotomic 130° 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"$\propto$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 130°

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 $(dr^2+dt^2+..)z''=(dr^2+dt^2+..)e^{quaternionA}$Bosons because of eq.2AIA. 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 2^{nd}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.3.2. example
C_M in eq.4.1 is a 130° 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 $dr^2\delta z=(\partial^2/\partial r^2)(\exp(iA_r+jA_o))=(\partial/\partial r[(i\partial A_r\partial r+\partial A_o/\partial r)(\exp(iA_r+jA_o)]$
$=\partial/\partial r[(\partial/\partial r)iA_r+(\partial/\partial r)jA_o)(\exp(iA_r+jA_o)+[i\partial A_r/\partial r+j\partial A_o/\partial r]\partial/\partial r(iA_r+jA_o)(\exp(iA_r+jA_o)+$
$(i\partial^2 Ar/\partial r^2+j\partial^2A_o/\partial r^2)(\exp(iA_r+jA_o)+[i\partial A_r/\partial r+j\partial A_o/\partial r][i\partial A_r/\partial r+j\partial/\partial r(A_o)]\exp(iA_r+jA_o)$ (A2)
Then do the time derivative second derivative $\partial^2/\partial t^2(\exp(iA_r+jA_o)=(\partial/\partial t[(i\partial A_r\partial t+\partial A_o/\partial t)$
$(\exp(iA_r+jA_o)]=\partial/\partial t[(\partial/\partial t)iA_r+(\partial/\partial t)jA_o)(\exp(iA_r+jA_o)+$

$[i\partial A_r/\partial r+j\partial A_o/\partial t]\partial/\partial r(iA_r+jA_o)(\exp(iA_r+jA_o)+(i\partial^2A_r/\partial t^2+j\partial^2A_o/\partial t^2)(\exp(iA_r+jA_o)$
$+[i\partial A_r/\partial t+j\partial A_o/\partial t][i\partial A_r/\partial t+j\partial/\partial t(A_o)]\exp(iA_r+jA_o)$ (A3)
Adding eq. A2 to eq. A3 to obtain the total D'Alambertian A2+A3=
$[i\partial^2A_r/\partial r^2+i\partial^2A_r/\partial t^2]+[j\partial^2A_o/\partial r^2+j\partial^2A_o/\partial t^2]+ii(\partial Ar/\partial r)^2+ij(\partial A_r/\partial r)(\partial A_o/\partial r)$
$+ji(\partial A_o/\partial r)(\partial A_r/\partial r)+jj(\partial A_o/\partial r)^2++ii(\partial Ar/\partial t)^2+ij(\partial A_r/\partial t)(\partial A_o/\partial t)+ji(\partial A_o/\partial t)(\partial A_r/\partial t)+jj(\partial A_o/\partial t)^2$.
Since ii=-1, jj=-1, ij=-ji the middle terms cancel leaving $[i\partial^2Ar/\partial r^2+i\partial^2Ar/\partial t^2]+$
$[j\partial^2A_o/\partial r^2+j\partial^2A_o/\partial t^2]+ii(\partial Ar/\partial r)^2+jj(\partial A_o/\partial r)^2+ii(\partial Ar/\partial t)^2+jj(\partial A_o/\partial t)^2$
Plugging in 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)
$i[\partial^2A_r/\partial r^2+i\partial^2A_r/\partial t^2]=0$, $j[\partial^2A_o/\partial r^2+i\partial^2A_o/\partial t^2]=0$ or $\partial^2A_\mu/\partial r^2+\partial^2A_\mu/\partial t^2+..=1$ (A5)
A4 and A5 are Maxwell's equations (Lorentz gauge formulation) in free space, if μ=1,2,3,4.

$$\Box^2A_\mu=1,\ \Box\bullet A_\mu=0 \qquad (A6)$$

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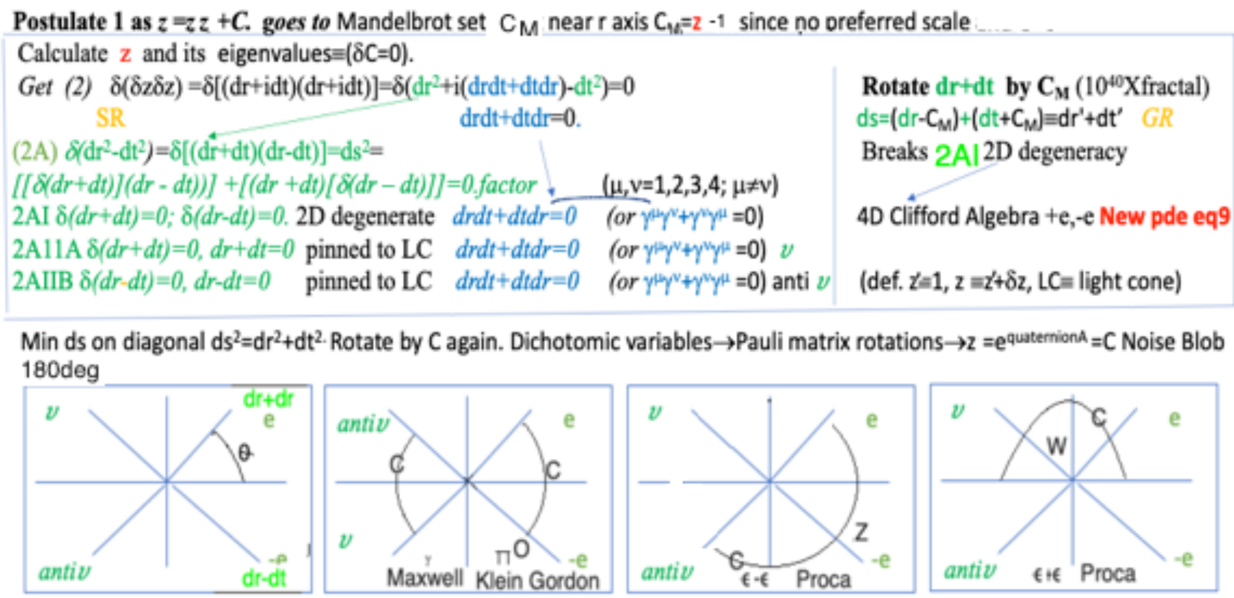

Large Baseline **Small Baseline**

Fig.1 Small Baseline fill in

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 δz=-1(middle of Mandelbrot set) adding noise C causes a counterclockwise rotation as we see from the $\delta z=\frac{-1\pm\sqrt{1-4C}}{2}$. Analogously from **2AC** we get with the eq.4.1 doublet ε±ε the Proca equ (3*) neutrino and electron Δ ε* at $r=r_H=2.8\text{X}10^{-15}$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 Source = $E_{ZW}=\frac{1}{\sqrt{\kappa_{00}}}=$
$\frac{1}{\sqrt{1-\frac{\Delta\varepsilon}{1\pm2\varepsilon}-\frac{r_{He}}{r}(1+(\varepsilon\mp\varepsilon)/2)}}\approx\frac{1}{(1\pm\varepsilon)\sqrt{\Delta\varepsilon}}$. At $r=r_{He}$ the +is for Z and the – is for W. So W (right fig.) is

a single electron $\Delta\varepsilon+\nu$ perturbation at $r=r_H=\lambda$ (Since two body m_e.): So $H=H_o+m_ec^2$ inside V_w. $E_w=2hf=2hc/\lambda$, $(4\pi/3)\lambda^3=V_w$. For the two leptons $\frac{1}{V^{1/2}}=\psi_e=\psi_3, \frac{1}{V^{1/2}}=\psi_\nu=\psi_4$. Fermi 4pt= $2G\iiint_0^{r_W}\psi_1\psi_2\psi_3\psi_4\,dV=2G\iiint_0^{r_W}\psi_1\psi_2\frac{1}{V^{1/2}}\frac{1}{V^{1/2}}V\;=2\iiint_0^{r_W}\psi_1\psi_2 G\equiv$ $\iiint_0^{V_W}\psi_1\psi_2(2m_ec^2)\mathrm{d}V_w=\iiint_0^{V_W}\psi_1(2m_ec^2)\psi_2\mathrm{d}V_w$. (A3)
What is Fermi G? $2m_ec^2(V_W)=.9\times10^{-4}$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
$3^{2.7\times62}=10^N$ 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.

2AIA Diagonal Fit And Δk=0 Rest Masses

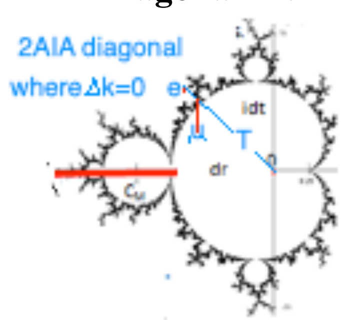

Fig.2 On the 45° N+1th selfsimilar fractal scale that ¼ noise mapping on the Reimann surfaces puts the smallest one of these at the Fiegenbaum point and the diagonal from the limacon cusp. (See PartI appendix B).

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).