

It's Broken, fix it

Abstract If your car engine is broken you *fix it* if you want to go anywhere. In that regard Dirac in 1928 made his equation(1) flat space(2). But space is not in general flat, there are forces.

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

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

References

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

(2) Spherical symmetry: $(\gamma^x \sqrt{\kappa_{xx}} dx + \gamma^y \sqrt{\kappa_{yy}} dy + \gamma^z \sqrt{\kappa_{zz}} dz + \gamma^t \sqrt{\kappa_{tt}} dt)^2 = \kappa_{xx} dx^2 + \kappa_{yy} dy^2 + \kappa_{zz} dz^2 - \kappa_{tt} dt^2 = ds^2$
 $\kappa_{xx} = \kappa_{yy} = \kappa_{zz} = \kappa_{tt} = 1$ is flat space, Minkowski, as in his Dirac equation(1).

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

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

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

For $N = -1$ (i.e., $e^2 \times 10^{-40} \equiv G m_e^2$) κ_{ij} is then by inspection the Schwarzschild metric g_{ij} ; so we just derived General Relativity and the gravity constant G from Quantum Mechanics *in one line*.

Otherwise people have been trying to do this for over 100 years with no success.

For $N = 1$ (so $r < r_c$) Newpde-Dirac zitterbewegung expansion stage explains the universe expansion thereby explaining cosmology *in one line* (appendix A). For example:

For $N = 1$ zitterbewegung harmonic coordinates and Minkowski metric submanifold gets the De Sitter ambient metric we observe. DESI data appears to extrapolate to this harmonic oscillation.

For $N = 0$ at $r = r_H$ SP^2 is the $3e$ baryons, (QCD not required) and Hund's rule $1S_{1/2} \mu$, $2S_{1/2} \tau$ leptons since stable $2P_{3/2}$ at $r = r_H$ (section IIIa). The 4 Standard electroweak Model (SM) Bosons (Z_0, W^+, W^-, γ) are derived from required 4 axis rotations of the Newpde e, ν (App.C, eqs.16, C1). Thus we derived the SM from first principles* (postulate0) which has not been done before.

For $N = 0$ spherical harmonic $2P_{3/2}$ at $r = r_H$ with B flux quantization gives ultrarelativistic electron $+e$ ($\gamma = 917$) extremely narrowed E field lines at center *explaining the strong force* with the same large γ also explaining the big baryon masses (sect.IIIa and part2.). We do not need QCD anymore

For $N = 0$ the higher order Taylor expansion (terms) of $\sqrt{\kappa_{ij}}$ gives the anomalous gyromagnetic ratio and Lamb shift *without* the renormalization and infinities (Appendix A,B): very important.

So $\kappa_{\mu\nu}$ provides the general covariance of the Newpde. Eq. 4 even provides* us space-time r, t .

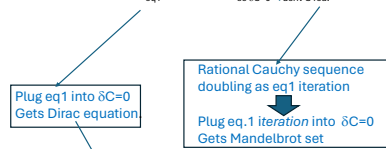
So we got all of physics here by mere inspection of this (curved space) Newpde with no gauges.

So where does this Newpde come from? From a *first principles* (ie postulate0) derivation: given algebraic definition of zero $0 = 0X0$, $1 = 1X1$, $1 = 1+0$ (so $z = zz + C$ eq1), and 0 constant so $\delta C = 0$. Eq1 *iteration* plugged into $\delta C = 0$ giving the Mandelbrot set. Plug eq1 directly into $\delta C = 0$ get Dirac eq. Both together is the $2D + 2D = 4D$ Newpde*. It works because it is the simplest imaginable idea of ultimate Occam's Razor **postulate0**. We figured it out. We finally understand.

Concept: Ultimate Occam's Razor(postulate0) → math&Newpde

Origin of mathematics:

List#s-define symbols and (single simple axiom) postulate0: $z=zz+C$ (with C constant) so $\delta C=0 \rightarrow$ deriv C real



Origin of physics:

$$\text{Newpde} \quad \nabla_\mu (\sqrt{\kappa_{\mu\nu}}) \partial \psi / \partial x_\mu = (\omega/c) \psi$$

fig2

Intriguing result: Mandelbrot set $10^{40}NXC_M$, N integer in Newpde) of fig1 implies that by increasing the scale by $10^{40}X$ we are right back to where we started! So

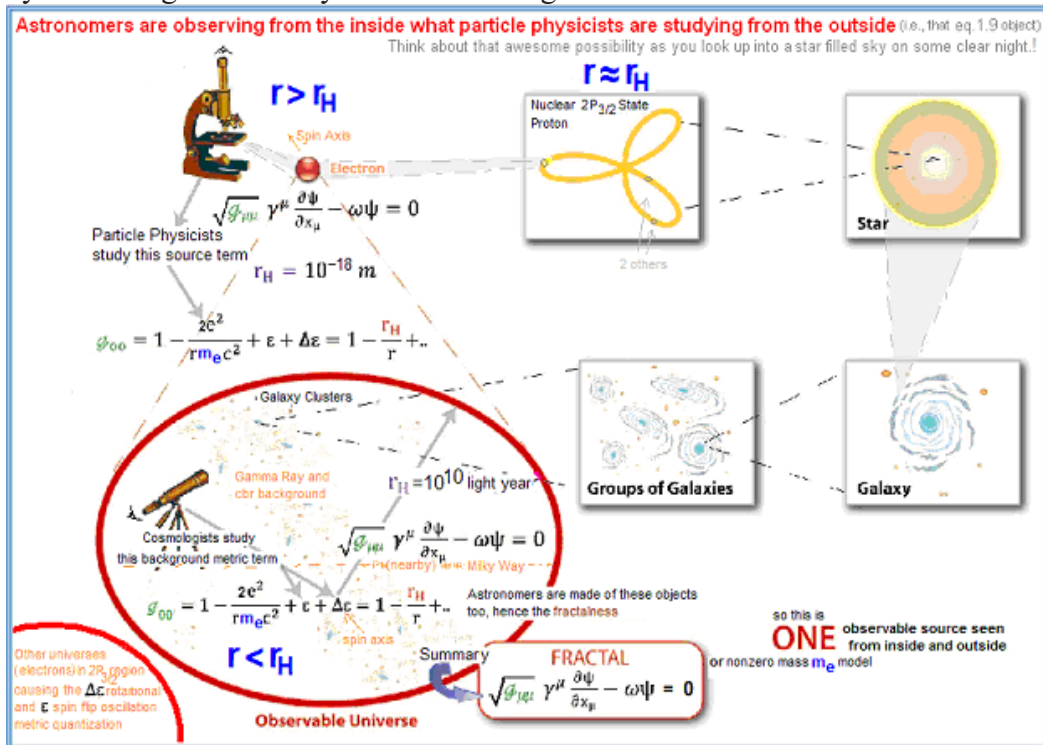


fig3

Object B + objectA + objectC=proton again: Respectively appendices A,B,C ($g_{00}=\kappa_{00}$ fractal scale bridging condition implies above smaller objects(galaxies, globulars,..A3)

Spherical Harmonic Solutions to Newpde: $2P_{3/2}, 1S_{1/2}, 2S_{1/2}$ at $r=r_H$ since Stable $2P_{3/2}$ at $r=r_H$	
N=0 at $r=r_H$ $2P_{3/2}$ $3e$ baryons (QCD not required) Hund's rule $1S_{1/2}, 2S_{1/2}$ leptons	
4 SM Bosons from 4 axis extreme rotations of $e.v$	
N=1 (i.e., $e^2 \times 10^{-40} \text{cm}^2$). κ_0 is then by inspection the Schwarzschild metric $g_{\mu\nu}$ (For $N=-1, \Delta \epsilon < 1$). So we just derived General Relativity (GR) and the gravity constant G from Quantum Mechanics (QM) in one line.	
N=1 Newpde zitterwegung expansion stage is the cosmological expansion.	
N=0 Newpde spherical harmonic $2P_{3/2}$ at $r=r_H$ with B flux quantization gives relativistic γ ($\gamma=917$) extremely narrowed E field lines at center explaining strong force & big Baryon Mass	
N=0 The third order Taylor expansion (terms) in $\sqrt{\kappa_0}$ gives the anomalous gyromagnetic ratio and Lamb shift without the renormalization and infinities.	
So κ_0 provides the general covariance of the Newpde.	
So we got a lot of physics here by mere inspection of this Newpde with no gauges!	

Conclusion If you can straighten out mathematics (eg., one simple axiom0 gets everything) you will also straighten out theoretical physics.

*

Origin Of Mathematics is postulate0

Abstract I have derived both mathematics and physics from first principles (ie So we finally understand how it all works!). Nobody else has done that. $z=zz+C$ is the key & first principle=0 given the algebraic properties defining 0 (ie $0=0X0, 1=1X1, 1=1+0$, sect.1) imply $z=zz+C$ (C constant thus $\delta C=0$ **real#** derivative sect.2) which then implies Mandelbrot set and Dirac eq (5).

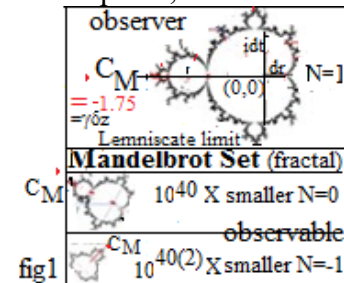
1) Algebraic Properties of 0: $0=0X0, 1=1X1$ (defining symbol $zz=z$ for $z=0$ or $z=1$) and $1=1+0$ defining symbol $z=zz+C$ eq1 if some $C=0$. A **Real number** is defined as the limit of a rational Cauchy sequence that must double here as the unique iteration $z_{N+1} \equiv z_N z_N + C$ if some $C=0$ since we then get $z=zz+C$ for $z_0=0, 1$ so can **Postulate0** as $z_0=0, 1$ (eg. some $C=0$ at origin in fig1)

1a) Theorems from Postulate0 eq1: $1=1X1=1X(1+0)=1X1+1X0=1+0$. After 4 such () definitions get $zz_N + zz_M \equiv z(z_N + z_M)$ & $(a+b)(c+d) \equiv ac+ad+bc+bd$ **distributive law** implying $1X0=0$, (so $z=0$ or $z=1$) then $1Xz=z$ so (for $z=1$) $1 \equiv z/z$ so $1/z$ (new symbol $/$) case of the **multiplicative inverse** for fields. $\delta C=0$ defines $C_1 - C_2 = 0$ so **ring additive inverse**. **zzN Associativity** $z_M = 0$: so $e \equiv bc$ then $abc = a(e)$; $ab \equiv f$ then $abc = (f)c$ so $(ab)c = a(bc)$. **zzN associativity** so $z=1$. So **postulate0** ($z_0=0$) generates **real#** mathematics (for big C too). So plug ansatz $z=1+\delta z$ into **eq1** get $\delta z + \delta z \delta z = C$ (3)

$$\text{So (for } -1/4 > C) \quad \frac{-1 \pm \sqrt{1+4C}}{2} = \delta z \equiv dr \pm i dt \quad (4)$$

2) C is Constant (Thus we must plug **eq1** $\delta z + \delta z \delta z = C$ (and its iteration $z_{N+1} - z_N z_N = C$) into $\delta C=0$)

2a) Plugging the eq1 rel iteration ($z_{N+1} - z_N z_N = C$) into δC implying $\delta C = \delta(z_{N+1} - z_N z_N) = \delta(\infty - \infty) \neq 0$ for some C. The Cs that result *instead* in finite z_∞ s (so $\delta C=0$) define the **Mandelbrot set C** in fig1. The lemniscate circles sum projection(11) to the fig1 $dr \approx dR$ axis is continuous as required by the derivative in $\delta C \equiv (\partial C / \partial R) dR = 0$ at $C = C_M = C_{M(N=1)} 10^{xN}$ where $\frac{\partial C}{\partial C_M} \frac{\partial C_M}{\partial x} \frac{\partial x}{\partial R} = 0$ extremum $\frac{\partial x}{\partial R} = 0$ lemniscate scale jump xN is at $(\frac{\partial C}{\partial C_M} = 0) C_M = -1.75$ ($N=1$) with the largest $x \approx 40$. The $N < 0$ eq11 $\omega, k = \text{"observables"}$ (in fig1) come from eq11 $\delta z = dse^{i(kr - \omega t)}$ that must also multiply eq20



For example for $N=1$ huge $\delta z \delta z \gg \delta z$ since we always 'observe' tiny $N=0$ 'observables' such as photon electron-atomic scale $\Delta \omega$ interactions So extreme solve $\delta C=0$ so are the only zoompoints (pulling out fig1 lemniscates) <http://www.youtube.com/watch?v=0jGaio87u3A> continuous lemniscates'

2b) Plugging eq1 directly into $\delta C=0$ is also required. So given $N=1$ eq1 and thus eqs 3,4 $\delta C = \delta(\delta z + \delta z \delta z) = \delta \delta z + 2(\delta \delta z) \delta z \approx \delta(\delta z \delta z) = \delta((dr + i dt)^2) = \delta[(dr^2 - dt^2) + i(dr dt + dt dr)] = 0 =$ (5) **Minkowski metric** + **Clifford algebra** $\equiv$ **Dirac equation** (See eq7a γ^μ derivation from eq5.). But fractal scale $N=0$ 2D δz perturbation provides 2 extra degrees of freedom for the ($N=1$, 2D) independent Dirac dr implying 2D Dirac + 2D Mandelbrot = 4D Dirac

Newpde $\equiv \gamma^\mu (\sqrt{\kappa_{\mu\mu}}) \partial \psi / \partial x_\mu = (\omega/c) \psi$ for v, e ; $\kappa_{00} = e^{i(2\Delta\epsilon/(1-2\epsilon))} - r_H/r$, $\kappa_{rr} = 1/(1+2\Delta\epsilon - r_H/r)$; $r_H = C_M/\xi = e^2 X 10^{40N}/m$ (fractal jumps $N = \dots, -1, 0, 1, \dots$) $1 > \epsilon \equiv \mu \gg \Delta\epsilon \equiv m_e$ (appendix A, B, C, fig2). **Postulate0** means *real 0 exists* (causing the newpde to have *real* eigenvalue operators). Thus **a number** dr/ds "exists" if it's also a *real* eigenvalue on the eigenfunction ψ of the Newpde. davidmaker.com

3)completeness and choice are immediately proven

Also note our postulate of 0 with that **eq1** (ie $z=zz+C$) provides the important mathematical concepts of “**Completeness**” ($\min(z-zz)>0$) given $((-1.75)^2-1.75=4.8>0)$ for the -C domain (sect.2, $C\leq 0$) of $(-1.75,0)$ and “**choice**” (since the single “choice” function is “ $z=zz+C$ ”) so are amazingly NOT axioms anymore here! Also *counting* the zoom trifurcations (real eigenvalue counters in the Mandelbrot set given sect.2 Dirac eq result of a plugin) replaces **Peano’s** counting **axioms** (math induction).

Conclusion Postulate0 is the simplest idea imaginable (Hold that thought: Note that it draws a ‘blank’.), all the rest is applications If you can straighten out mathematics (eg., one simple axiom0 gets everything) you will also straighten out theoretical physics.

So we got all physics here by *mere inspection* of this (curved space) Newpde with no gauges It works because it is a first principles derivation from the simplest imaginable idea of ultimate Occam’sRazor**postulate0**: We figured it out. We finally understand.

Factor Equation 5

Note the Clifford algebra term in eq5 makes it so the factors of eq5 are all Dirac particles: e,v. Next factor **real** eq.5: $\delta(dr^2-dt^2)=\delta[(dr+dt)(dr-dt)]=0=[[\delta(dr+dt)](dr-dt)]+[(dr+dt)[\delta(dr-dt)]]=0$ (8) so $-dr+dt=ds, -dr-dt=ds\equiv ds_1$ (given eq.5 gives the Dirac eq. electron) $\rightarrow\pm e$. (7)

Given constraint $\delta ds^2=0$ then these eq.7 results graphically are diagonals in fig3 2nd,3rdquadrants.

& $dr+dt=ds, dr+dt=0; dr-dt=ds dr-dt=0$, light cone $\rightarrow v, \bar{v}$ (diagonals in fig3 1st,4thquadrants) (8)

& $dr+dt=0, dr-dt=0$ so $dr=dt=0$ (in eq.11 dr/ds) defines vacuum (while eq.4 derives spacetime)(9)

Note that those quadrants thereby give the finite *positive* scalar **drdt** in eq.7 (if *not* vacuum). It is finite because of the above Mandelbrot set C_M (Here at $-1.75=C_M$) iteration definition that implies $\delta z \neq \infty$. This then implies the eq.5 *non* infinite 0 extremum for **imaginary** $\equiv drdt+dt dr=0\equiv \gamma^i dr^i dt + \gamma^j dt^j dr = (\gamma^i \gamma^j + \gamma^j \gamma^i) drdt$ so $(\gamma^i \gamma^j + \gamma^j \gamma^i)=0, i \neq j$ (from **real** eq5 $\gamma^i \gamma^i=1$) Thus from eq.5:

$$ds^2= dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2 \quad (7a)$$

QM Operators from eq5

We square eqs.7 or 8 (given fig3) $ds_1^2=(dr+dt)(dr+dt)=(-dr-dt)(-dr-dt)=[dr^2+dt^2]+(drdt+dt dr)\equiv ds^2+ds_3=\mathbf{Circle}+\mathbf{invariant}$ (10). **Circle** $=\delta z=dse^{i\theta}=dse^{i(\Delta\theta+\theta_0)}=dse^{i((\sin\theta dr+\cos\theta dt)/(ds)+\theta_0)}$, $\theta_0=45^\circ$

min of $\delta ds^2=0$ given eq.7 constraint $dr+dt=ds$ (with θ measured CCW from the horizontal ‘dr’

axis) implying the graphical representation (note 45°) in fig3 and fig4.eq. 7 ($\rightarrow\pm e$) in fig3

2nd,3rdquadrants. Eq8 ($\rightarrow v, \bar{v}$) in fig4 1st,4thquadrants. We define this circle (ds = radius)

normalized dimensions $k\equiv dr/ds, \omega\equiv dt/ds, \sin\theta\equiv r, \cos\theta\equiv t. dse^{i45^\circ}=ds'$ so $\delta ds'=0$ (eg., normalized with ds and so arbitrary units $r\propto$ real r as in meters, feet,etc.,). Take the ordinary derivative of

$$\text{this 'Circle' with respect to this real } dr \text{ (since flat space). } \frac{\partial \left(dse^{i\left(\frac{rdr}{ds}+\frac{tdt}{ds}\right)} \right)}{\partial r} = i \frac{dr}{ds} \delta z \text{ so } \frac{\partial (dse^{i(rk+wt)})}{\partial r} = ik\delta z, k\delta z = -i \frac{\partial \delta z}{\partial r} \quad (11)$$

$\delta z\equiv\psi$. (10) and multiply both sides by $\hbar$. Note **circle** plus that **drdt+dt dr** invariant makes eq11 a *derivative only in the Dirac equation*. Also the derivative of constant C in $\delta C=\partial C/\partial R) dR=0$ makes postulated 0 a Newton quotient limit so (constant) real0 as a limit. Consistent with that the actual upper real limit to set C (eq3) is that tiny negative ‘dr’ value added to 0, so not exactly 0. (ie., $0\geq C$ for eq4). Thus in eq4 Newton quotient $\lim_{dr\rightarrow 0} dr/ds=1$ so dr is real as a limit only. So we proved that *dr is a real number* and also generated nonzero eigenvalues (11a) from the ratio dr/ds , (dr and ds both have limit 0 but the ratio of these limits does not have to be 1.) our real#

larger numbers as real eigenvalues of operators. Thus $\mathbf{k} = d\mathbf{r}/ds$ is an operator in eq.11 with **real eigenvalues** dr/ds since eq.11 implies $\mathbf{k}$ is an observable defining $p/\hbar$: *the central idea of QM which for the first time* is proven from first principles here (postulate). Also since $\delta z = \cos k$ then $\mathbf{k}$ has to be $2\pi/\lambda$ thereby deriving the DeBroglie wavelength λ . Also eq.11 with integration by parts implies $\langle p_r \rangle^* = \int (p_r \psi)^* \psi d\tau = \int \psi^* p_r \psi d\tau = \langle p_r \rangle$ and $\int \psi_a p \psi_b d\tau \equiv \langle a | p | b \rangle$ in Dirac bra-ket notation. Therefore $p_r = \hbar k$ is Hermitian given dr is *real*. See $N\hbar k$ count N in sect.IIIb.

IIa) Eq5 Minkowski Metric implies Lorentz transformations(9) frame of reference

Recall eq.5 with its Minkowski metric ($ds^2 = dr^2 - dt^2 = dr^2 - 1^2 dt^2 = dr^2 - c^2 dt^2$). eq8 v is the light cone making natural unit $1 = c = dr/dt$ always a coefficient 1 of dt and so invariant with respect to changes in dt and dr given ds invariance in eq.5 for flat space. Rotations in eq.16 are $\pm \delta z$. So **eq5 implies reference frame Fitzgerald contractions $1/\gamma$** (Lorentz contraction) $\delta z' = \delta z/\gamma$ boosted frame of reference. But for small enough (tiny) δz , but still with the equation 5 $N=1$ units scale, then in equation3 $C = \delta z + \delta z \delta z \approx \delta z$ where C is now for $N=0$. So $C \approx \delta z/\gamma = C_M/\xi = \delta z' = r_H$ (12) given γ having the same Lorentz γ transformations as mass ξ does.

So C_M defines charge e^2 . ξ defines mass $= mc^2$. From eqs.3,12 for $N=0$ small $C \approx \delta z = \delta z/\gamma = dr/\gamma = pds/\gamma$. If $p = mdr/ds = mv$ then $C = \delta z/\gamma = dr/\gamma = pds/\gamma = pds/m = (mdr/ds)(ds/m) = dr'$ the Lorentz contracted dr and so we have shown that for eq12 $\mathbf{k}$ mass $\hbar \mathbf{k} = p = mv$.

$z=zz$ for small noise $C \approx 0$ in postulate 0 sect1 so only $z=0, z=1$ giving two stable frames of reference (append IIIC)

Recall $z = 1 + \delta z$. So for no noise $C = 0$ (IIIc). So $z = zz$ for $z=0$ electron ($\psi = \delta z = -1$) or no electron ($\delta z = 0$, vacuum so largest ξ in $r_H = C_M/\xi$). Thus:

$\delta z = -1$, $z=0$: So $\delta C_M = \delta(\xi \delta z') = \delta \xi \delta z' + \xi \delta \delta z' = 0$ so if $\delta z' \approx -1$, $\delta \xi$ is **tiny** so stable, **electron** e (12a) So electron at $r_H = \hbar e^2/m_e c^2 = \text{motion}$. So B flux quantization and $2P_{3/2}$ at $r=r_H$ (sect IIIa, part2)

$1S_{1/2}$ electron excited state μ $1S_{1/2}$ $\gamma = 4.4$ is same r_H . See C5a. Mass of $\mu = 207m_e$ from eq A3C (13)

$\delta z = 0$, $z=1$: So $\delta \xi \delta z' + \xi \delta \delta z' = 0$. So $|\xi|$ is big (so **vacuum**) and $\delta \xi$ is **unstable big ξ** , where $C_M/\xi \approx 0$ is then the next closest thing to a vacuum0. Newpde Hund rule $2S_{1/2}$ τ (electron excited state. $\xi = 0$ $\tau + \mu$ with $N=2$ principle quantum number degeneracy=above, reduced mass $2P_{3/2} + \mu$ at $r=r_H$ in eq 12) is that **unstable big ξ'** since there are only two ξ (given 0,1 in $z=zz$) given the only possible $2P_{3/2}$ stability of sect IIIa so with 2

$$(2P_{3/2} + 1S_{1/2}) = \xi' = \tau + \mu \quad (14)$$

So in the Newpde $r_H = (2e^2/m)10^{40N}$ term ($\kappa_{00} = 1/\kappa_{rr} = 1 - r_H/r$) there are **two m** s: $m = m_e$ ($z=0$) has to be in the Newpde baryon $2P_{3/2}$ state at $r=r_H$ (IIIa, part2) and ($z=1$) $m = \tau + \mu$ for the free electron (appendix A3) $r_H' = \hbar e^2/\xi' \approx 10^{-18}m$ small in eq.18 making the free electron nearly a point particle.

$\delta \delta z = \delta_t \delta z$ implies **Hamiltonian in eq.11** can't be 0 in equation 5.

Also in eq3 $\delta C = \delta(\delta z + \delta z \delta z) = \delta \delta z + \delta(\delta z \delta z)$ so that if (from eq.11)

$$\delta(\delta z)/dt \equiv \delta_t(\delta z)/dt = (\partial(\delta z)/\partial t) dt/dt = H \delta z = \text{energy} X \delta z \quad (15)$$

implying large $\delta ds^2 = 0$ axis extreme rotations (high energy COM collisions) as well in eq16 (appendix C) below. Also recall that observer fractal scale $N=1$ (since $\delta z \gg 1$ there) is not normalizable but as we saw observable (fig1) $N=0$ is normalizable (eg., $\delta z = -1$ electron)

implying Bohr's $-1^* -1 = \delta z^* \delta z = \psi^* \psi = 1$ probability density for the electron (so that's not a postulate anymore and normalization validity is proven.

Eq.7 $dr+dt=ds$ $N=-1$ fractal scale δz perturbation also gives the general covariance of κ_{ij}
 ($N=0$, 2D) $\delta\delta z$ must be small but not zero so it *automatically* provides 2 extra degrees of freedom for the ($N=1$, 2D) independent Dirac dr and so $2D+2D=4$ dimensions ($N=0$ axis extreme perturbations C1 in appendix C). Recall the required $N=-1$ tiny δz so that must be a perturbation (giving large curvature general covariance of eq.17-19.) of the $N=1$ eq.7 $\delta z'+\delta z=(dx_1+idx_2)+(dx_3+idx_4)\equiv dr+idt$. But given the above $\delta z\approx dr\approx dt$ at 45° we must add and subtract $\delta z'$ in eq7 to keep the ds :

$$(dr-\delta z')+(dt+\delta z')\equiv dr'+dt'=ds \quad (16)$$

For very small δz then $\delta z+\delta z\delta z\approx\delta z\approx C$. Recall $C=C_M=-1.75$ was our extremum with $\delta z'=C_M/\xi\equiv(2e^2/m_e c^2)10^{40N}=r_H 10^{40N}$ with (Small scale seen from larger scale as 'dr' is big on that smaller scale 'r') $dr\approx r$ on $N=0$ for $N=1$ ($10^{40}X$ larger) observer. Define from eq.16 dr, dr' :

$$\kappa_{rr}\equiv(dr/dr')^2=(dr/(dr-\delta z'))^2=1/(1-r_H/r)^2=A_1/(1-r_H/r)+A_2/(1-r_H/r)^2 \quad (RN) \quad (17)$$

The partial fractions A_i can be split off from RN and so $\kappa_{rr}\approx 1/[1-r_H/r]$ in $ds^2=\kappa_{rr}dr'^2+\kappa_{\theta\theta}dt'^2$ (18)

Given eq5 $\delta(dr dt+dt dr)=\delta(2dt dr)=0$ thus invariant $dr'dt'=dr dt=\sqrt{\kappa_{rr}}dr'\sqrt{\kappa_{\theta\theta}}dt'$ so $\kappa_{rr}=1/\kappa_{\theta\theta}$ (19)

Note here $N=-1$ gravity thereby creates 4D curved space time $\delta z'$ eq16 and so the equivalence principle: so we really did derive GR, all of it.

2D+2D=4D due to Mandelbrot set $N=1$ 2D Dirac $dr=\delta z$ plus 2D perturbation $N=0$ $\delta z'$

Thus in 2D $\delta z'+\delta z=(dx_1+idx_2)+(dx_3+idx_4)\equiv dr+idt$ so with $x_1, x_2, x_3, x_4 \rightarrow (dr, dt) \rightarrow x, y, z, t$ with dr then 3D with orthogonal axis $dr^2=dx^2+dy^2+dz^2$. But (eq 7a) $dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$ also applies so dr can point in the direction of any dx_i (eg., $dx^2-dt^2=(\gamma^x dx+i\gamma^t dt)^2$). Note also that all dx s are squared and added to $-dt^2$. So writing eq7a for orthogonal axis' $dr^2\equiv dx^2+dy^2+dz^2$ **then** (to be able to individually square those dx 's (if let's say $dy=dz=0$) to get dr^2 and the eq.7a γ^μ s) in 7a we *must* define $\gamma^r dr=\gamma^x dx+\gamma^y dy+\gamma^z dz$ with $\gamma^i \gamma^j+\gamma^j \gamma^i=0$, $i\neq j$, $(\gamma^i)^2=1$ in $(\gamma^r dr+i\gamma^t dt)^2=(\gamma^x dx+\gamma^y dy+\gamma^z dz+i\gamma^t dt)^2=dx^2+dy^2+dz^2-dt^2=ds^2=dr^2-dt^2$. Thus we have derived the well known 4D Clifford algebra Dirac γ matrices. So the **Dirac equation is what gives us our 4D** space-time degrees of freedom imbedded in merely that Mandelbrot set 2D complex plane: the dr changes in eq17 and time providing the two 'phase' exponent changes in the Hamiltonian H in $\psi=e^{iHt/\hbar}$, of the eq11 & $C=-2$, $\delta C=0$ extremum sinusoidal zpe oscillation mimicking the laser reference beam phase effects in holography (eq.C1) creating the *appearance* of higher dimensionality effects ($D>2$) for a Dirac lepton observer! Us! But we must still incorporate those $N=-1$ fractal scale δz perturbation equations 17-19 in $\kappa_{\mu\nu}$ to get

$(\gamma^x \sqrt{\kappa_{xx}}dx+\gamma^y \sqrt{\kappa_{yy}}dy+\gamma^z \sqrt{\kappa_{zz}}dz+i\gamma^t \sqrt{\kappa_{tt}}dt)^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$. We must also impose the **lemniscate min extremum $C=-2$ sinusoidal δz** by multiplying both sides by this $(\delta z)^2\equiv\psi^2$ and $\hbar^2/ds^2$. In that way $(dr/ds)\delta z$ here then is a eq11 sinusoidal

operator: $k\delta z=(dr/ds)\delta z=-i\partial\delta z/\partial r=-i\partial e^{i(kr-\omega t)}/\partial r=k\delta z$ or Fourier series superposition of eq11 k solutions. The covariance is carried by right side tensor κ_{ij} . Also use eq14 ξ and object A Dirac zitterbewegung $\delta z=\psi=e^{i(kr-\omega t)}=e^{i\epsilon}$ and object B frame dragging attenuation Kerr metric perturbation $\Delta\epsilon$ and so eqs A10 and B3: 4D QM

Newpde $\equiv\gamma^\mu(\sqrt{\kappa_{\mu\mu}})\partial\psi/\partial x_\mu=(\omega/c)\psi$ for $\mathbf{e}, \nu$, $\kappa_{00}=e^{(2\Delta\epsilon/(1-2\epsilon))}-r_H/r$, $\kappa_{rr}=1/(1+2\Delta\epsilon-r_H/r)$, (20)
 $r_H=C_M/\xi=e^2X10^{40N}/m$ ($N=-1, 0, 1, \dots$), $\Delta\epsilon=0$ for neutrino ν and $N=-1$ (eq.24,B2). See Appendix A,B&C

So Postulate(0) $\rightarrow$ Newpde

(III)

Solutions To The Newpde (ie applications)

z=0 Newpde N=0 stable state $2P_{3/2}$ at $r=r_H$ (baryons) implying also $2S_{1/2}, \tau; 1S_{1/2}, \mu$

The only nonzero proper mass particle solution to the Newpde is the electron m_e ground state **e**.

At $r=r_H$ the only multiparticle *stable* state is the $2P_{3/2}$ **3e** state=reduced mass= p

IIIa Stability(bound state) of $2P_{3/2}$ at $r=r_H$

At $r=r_H$, we have *stability* ($dt'^2 = \kappa_{00} dt^2 = (1 - r_H/r) dt^2 = 0$) since the dt' clocks stop at $r=r_H$. After a possible positron (central) electron annihilation that 2 γ ray scattering can be only off that 3rd large mass (in $2P_{3/2}$) the diagonal metric(eq.17) E&M time reversal invariance is a reverse of the γ ray pair annihilation with the subsequent $e^\pm$ pair creation inside the r_H volume given $\sigma = \pi r_H^2 \approx (1/20)$ barn making it merely a *virtual* creation-annihilation event (Sect.9.10). So our $2P_{3/2}$ composite **3e** (proton= $P=D/2$) at $r=r_H$ is the *only* stable multi **e** composite. Also see PartII.

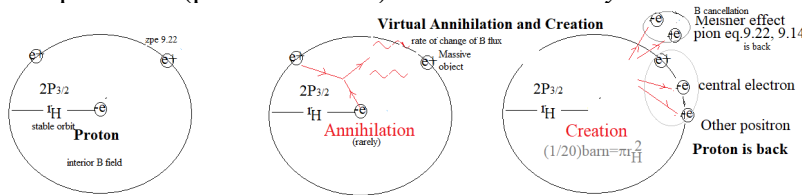


Fig1a For $2P_{3/2}$ ground state $3m_e$

representation the interior curved space ultrarelativistic nature of $2P_{3/2}$ at $r=r_H$ allows for *only* a 2 positron $2m_e$ and one central electron bound state allowing for a reduced mass representation of the 2 positron bound state eq.7.1. $D/2 = m_p$ with very high γ ($=917$) due to B field flux (BA)

quantization= $mh/e = 3h/e$, 3lobes for SP^2 (PartII). So $2\pi r_H/t \approx c$, $e/\gamma t = i$, $B = \frac{\mu_0 i}{2r_H}$ so $\Phi = BA =$

$$\frac{\mu_0 i}{2r_H} (\pi r_H^2) = \frac{\mu_0}{2r_H} \left(\frac{e}{\frac{2\pi r_H}{\gamma c}} \right) (\pi r_H^2) = \Phi_0 N = 3\Phi_0 = \frac{h}{e} 3. \text{ Note the } \gamma, \text{ in } r_H/\gamma, \text{ cancels. } SP^2 \text{ includes}$$

$1S_{1/2} = \mu$ so $\gamma = 3 \frac{h}{e} (1 + \mu) \frac{1}{\frac{\mu_0}{4} e c}$. μ from eq.A3C: You can't just throw away $1S_{1/2}$ given Hund's

rule. Solve this equation. Get $\gamma = 917$, $2(917)m_e = m_p = \text{proton mass}$. Also eq.9.22 in part2 solves the radial component of the Newpde at $r=r_H$ with the $J=0$ component solution giving the $\pm$ pion zpe mass. The 2nd pair creation (top one in the above diagram) then gives the zpe emf of eq.9.22 partII as a Faraday's law result of these resulting rapid B field changes and so required zpe

Meisner effect (the eq.9.22 pion spin0 cloud implies $\nabla^2 \phi + m^2 \phi = 0 = \frac{1}{r^2} \frac{d}{dr} \left(r^2 \frac{d\phi}{dr} \right) +$

$m^2 \phi = 0$ Klien Gordon eq solution $\phi = \frac{Ae^{-mr}}{r}$ origin of the Yukawa nuclear force) or scaler component solution of Proca equation.

Also in the frame of reference of these two positron (*only*) observers the central electron is also ultrarelativistic, so heavy, and so with a tiny Δx uncertainty and so it easily fits inside their r_H .

Comparison with QCD

The Newpde $2P_{3/2}$ **trifolium** 3 lobed, **3e**, state at $r=r_H$ the electron **spends 1/3 of its time in each lobe** (fractional (1/3)e charge), the **spherical harmonic lobes can't leave** (just as with Schrodinger eq (asymptotic freedom), we have **P wave scattering (jets)** and there are **6 P states (udscbt)**. The two **e** positrons must be ultrarelativistic (due to interior B flux quantization, so $\gamma=917$) at $r=r_H$ so the **field line separation** is Lorentz contracted, **narrowed** at the central electron **explaining the strong force** (otherwise **postulated by qcd**). Thus the quarks are merely these individual $2P_{3/2}$ probability density **stationary lobes** explaining also why **quarks appear nonrelativistic**.

But note these purely mathematical lobes don't leave but the electron physical objects *can* leave so QCD must fail at very high energies ($\gg 1\text{GeV}$ ~bound state), which it does (see LHC Totem data). Thus these detailed calculations of QCD work as long as this connection to the above Newpde $2P_{3/2}$ state holds! Thus when the GeV level $2P_{3/2}$ at $r=r_H$ bound state electrons stay in these lobes. *So we can reproduce QCD from our Newpde half integer spherical harmonics!* So the bottom line is that protons are just 2 Newpde positrons and an electron in $^2P_{3/2}$ at $r=r_H$ states. We simply must throw away QCD as quickly as possible, adding all these unnecessary (qcd) postulates and free parameters to physics is nonsense.

IIIb) $10^{40}X$ scale jump between $N=1, N=0$ with 10^{80} electrons in between

in the zoom: <http://www.youtube.com/watch?v=0jGaio87u3A> near the tiny limaçon near that -1.75 point (see fig 9, appendix M5) we follow that dR thread to the right and find after a $10^{40}X=r$ scale a second Mandelbrot set lemniscate (that is the only one we need because of the fractalness and this also **implies -1.75 really is the only zoom point**). In between there are splits 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 lemniscate (snowman) shape comes up in about 62 seconds. So $3^{2.7 \times 62} = 10^N$ so $172 \log 3 = N = 80$. So there are about 10^{80} splits per initial split. But each of these Mandelbrot set. -1.75 points is a $C_M/\xi \equiv r_H$ in electron (eq.10 above). So for each larger electron there are **10^{80} constituent electrons**. Thus counting these trifurcations makes it so we do not require Peano's axioms (for counting)

Alternatively recall the fractal dimension definition relation: $N=r^D$. But $r=10^{40}$ (fig1) and the Mandelbrot set fractal dimension $=D=2$ so the number of particles inside (the horizon r_H of) the universe N is r^D , $N=(10^{40})^2=10^{80}$. explaining the number of particles (inside r_H) in the universe (Dirac's guess was 10^{79}) recall from sect1 **$CM/\xi = e^2 10^{40N}/m = r_H$** . gives mass in $m_e/10^{40N}$ eq.1.13 and size in $r=r_H 10^{40N}$. So 1) $r=r_H 10^{40N}$ and 2) $m_e/10^{40N}=m$, same N .

Single field but observed from different frames of reference

These fields on the different fractal scales **are really all the same** field but seen from the different frames of reference created by the different fractal $10^{40N}X$ jump mass contributions to the zitterbewegung frequency oscillation (BD 1.13) frames of reference (top of appendix A) of the Newpde. But that also means that the fields from consecutive fractal scales have to be the same at the small asymptotes (eg., $g_{00}=\kappa_{00}$ locally in the halo(partIII) and homogenous Mercuron (B5) which then connects, "bridges", the $N=0$ to $N=1$ fractal scales let's say (see partIII or bottom of appendix B). This certainly makes this then a true "unified field", a TOE.

Mandelbrot set *one-to-one* Counter of N of $N\hbar\omega=E$, $N=10^{80}$ quantizes our unified field

But in the very hot (billions of degrees) Mercuron frame of reference (eq A3C) there is one photon for what was two electrons (because then Wein's displacement law implies no ambiguity in N in $E=N\hbar\omega$) so our $10^{80}/2$ count gives us the quantization ($N=\text{integer}$) of the electromagnetic field (analogous to being in the special COM frame of reference of the oscillator with speed v in the usual SHM field quantization). This Mandelbrot set count N explains why all energy is split into these $E=hf$ quanta, that being the most profound of all our results. Counting these 10^{80} fractal splits in the Mercuron is the correct method of E&M field quantization.

IIIc) Alternatively postulate $z=zz$ (Note $0=0X0$. So we still postulated 0.) with added white noise C (So $z=zz+C$ eq1). Single slit experiment Wave Particle Duality(WPD) complementarity comes from that 45° angle of the (Dirac equation eq.20) electron particle **e** on that **e,v** graph

(sect.IIIC,fig3) where C noise position uncertainty is largest (so wide slit, photoelectric effect) with ds^2 circle always wave (equation) on the axis' (eqC1) then $C=0$ (narrow slit, Airy pattern) 0° gives only the wave. *No one, except here, has ever done a first principles derivation of WPD.*
Summary **The Concept** (not to be confused with these thousands of applications)

The concept is simple because it is "simplicity" itself:

"Ultimate Occam's razor postulate(0) implies mathematics&Newpde"

given "0 is the simplest idea imaginable" (Hold that thought: 0, "I drew a blank".)

So this is "first principles", thus we have actually figured it out! We completely understand!!!

It works(fig1) because it is THE first principle! And it makes sense because all QM physicists know about **Lorentz covariant**(9) Dirac equation *real* eigenvalues and all mathematicians know that the limit of a Cauchy sequence of rational numbers is a Cauchy *real* number. So by merely **postulating**

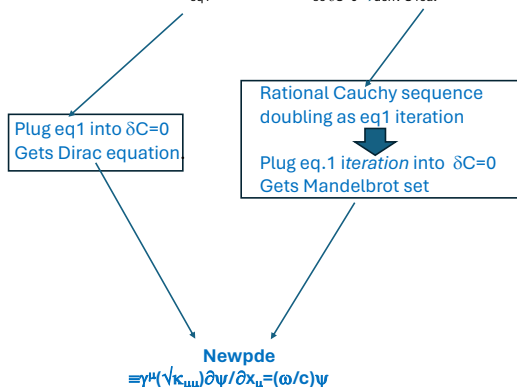
" $z=zz+C$ implies *real*#0"

(C constant so $\delta C=0$ and $z=zz+C$ eq1 gets us the multiplicative properties of **0**. See M4) there then must be a rational Cauchy *sequence* with limit 0 that then doubles as an *iteration* of eq1 in $\delta C=0$ that thereby gives the (fractal) Mandelbrot set. Also the required plugging eq1 into $\delta C=0$ gives the Dirac equation(eq5). The 2D Mandelbrot set perturbation of this 2D Dirac eq gets the **generally covariant** fractal 4D Newpde.

Concept: Ultimate Occam's Razor(postulate0) $\rightarrow$ math&Newpde

Origin of mathematics:

List#s-define symbols and (single simple axiom) **postulate0: $z=zz+C$** (with C constant)
eq1 so $\delta C=0 \rightarrow$ deriv C real



Origin of physics:

Intriguing result: Mandelbrot set $10^{40N} X C_M$, N integer in Newpde) of fig1 implies that by increasing the scale by $10^{40} X$ we are right back to where we started! So

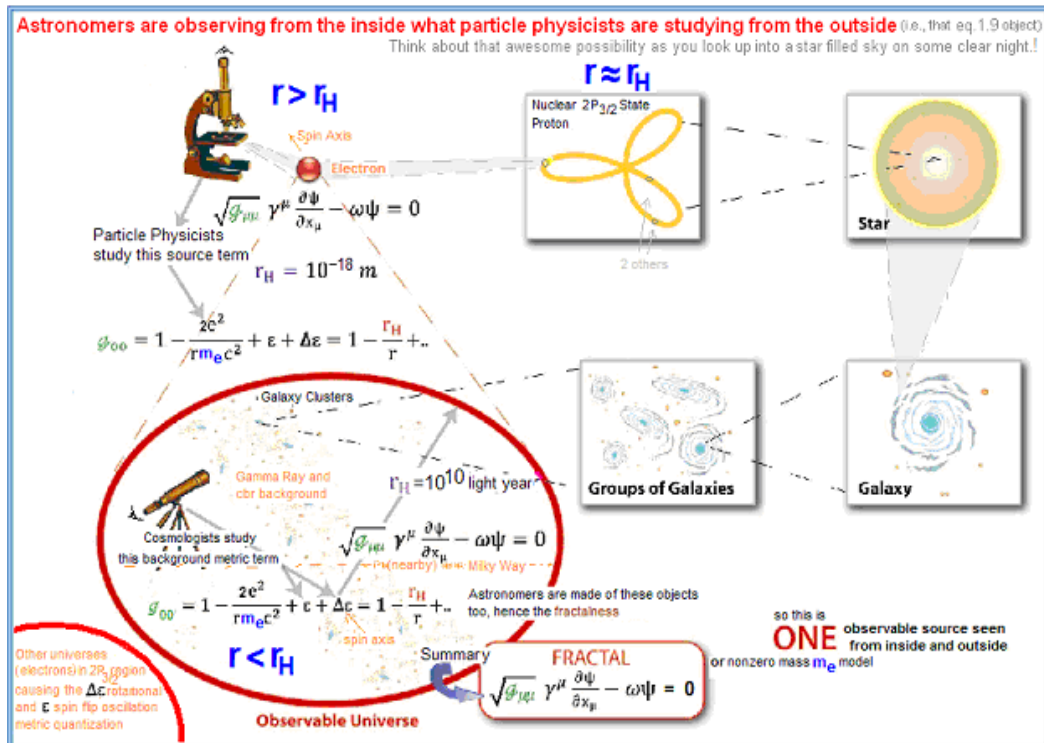


fig3

Object B + object A + object C = proton again: Respectively appendices A,B,C
 $(g_{00} = \kappa_{00})$ fractal scale bridging condition implies above smaller objects (galaxies, globulars, A3)

From equation A11 rebound explosion will be (~ 100 antinodes = D across the Mercuron) on r_{bb} ; see part III, even so implying a Rayleigh Taylor instability so web like explosion remnants in both such as in M1 and Mercuron circumferential $320(\approx \pi D)$ giving (in fig4) the initial radius (now at $\sim 400 \text{ MLY}$) of those 'BAO' cbr web like structures at reionization. On average single galaxies dominate a 4 MyLY wide region $100 \times$ smaller, the next metric quantization down. Globulars next ($100 \times$ smaller) and stellar neighborhoods next ($100 \times$ smaller) and planets ($100 \times$ smaller), then moons ($100 \times$ smaller), etc. So in fig2 A11 gets all the rest! Even supernova rings at high enough resolution (eg beads split at least at 1987a) are ~ 100 antinodes

References

- (6) Penrose in a tube video implied that the Mandelbrot set might contain physics. Here we merely showed how to find it. I once heard Murray Gell Mann say the same thing in a lecture I attended. For example the lower *extremum* point $C_M = 1.75 \times 10^{40N}$ (fig1) merely contributes to the successive onion shell horizons in $r_H = C_M / \xi$ in $\kappa_{00} = 1 - r_H / r$ in the $\sqrt{\kappa_{ij}}$ in the Newpde. The Mandelbrot set merely contributes these extreme numbers in the $r_H = C_M / \xi$ in κ_{00} in the Newpde.
- (7) Cantor: Ueber die Ausdehnung eines Satzes aus der Theorie der trigonometrischen Reihen, "Ueber eine elementare Frage der Mannigfaltigkeitslehre" Jahresbericht der Deutschen Mathematiker-Vereinigung." Cantor proved the real#s were dense with a binary # (1,0) argument. But our $z = zz$ list (appendix M) is also for # (1,0) thereby allows Cantor to use his binary argument at this fundamental level to prove an important property of the real numbers.
- (8) Tensor Analysis, Sokolnikoff, John Wiley $\kappa_{\mu\nu}$ here is covariant given it's Schwarzschild limit
- (9) The Principle of Relativity, A Einstein, Dover. The Minkowski metric gives Lorentz transform
- (10) Quantum Mechanics, Merzbacher, John Wiley p.42 operators (eq.11)

- (11) lemniscate circle sequence (Wolfram, Weisstein, Eric). Implies C^2 continuity for fig1 r axis
 (12) Quantum Mechanics, Merzbacher 2nd edition pp.605-607 Dirac equation derivation
 (13)Mandelbrot set fig1 generated by <http://www.youtube.com/watch?v=0jGaio87u3A> at $r=-1.75$

Appendix

Summary of Appendices A, B, C (and M)

In this fractal model we have a 100% chance of being in a $\sim 10^{11}$ parsec wide cosmological (Newpde $N=1$) electron and this electron in turn has a 75% chance of being in a (cosmological, $N=1$) proton (as opposed to being a free electron) given hydrogen is by far the most common element. That is because the proton in my ${}^2P_{3/2}$ at $r=r_H$ stable state solution to the Newpde is composed of 3 objects, two orbiting positrons and a central electron which we call objects A, B and C (bottom of fig3) on the cosmological $N=1$ fractal scale. We are in one of the two positrons, object A with object B being the central electron with these names then giving us our appendix labels (A,B,C,M). Appendix M is the ring math but with *one* axiom postulate0 replacing the many mainstream ring-field axioms so our axiom(0) by itself thereby implies both math and physics, giving us a “first principles” theory. Appendix M5 discusses the lemniscate continuity.

Table Of Contents (of appendix) Get κ_{oo} from object A and κ_r from central object B

Appendix A) **Object A** (fig2) given the structure(A10) in the Newpde gets κ_{oo} . κ_r unaffected.

Appendix B) **Object B** (fig2) use inertial frame dragging reduction due to object B

Appendix C) **Object C** (eg C2) gives us the Fermi G factor thereby completing the SM.

Appendix M) Ring Math *definitions* (not axioms. Single simple axiom $\equiv$ postulate0) from $z=zz+C$

Appendix A

We are inside **Object A** and its $N=1$ zitterbewegung oscillation is cosmology

From Newpde (eg., eq.1.13 Bjorken and Drell (BD) special case) $i\hbar \frac{\partial \psi}{\partial t} = \frac{\hbar c}{i} \left(\alpha_1 \frac{\partial \psi}{\partial x^1} + \alpha_2 \frac{\partial \psi}{\partial x^2} + \alpha_3 \frac{\partial \psi}{\partial x^3} \right) + \beta mc^2 \psi = H\psi$. For electron at rest: $i\hbar \frac{\partial \psi}{\partial t} = \beta mc^2 \psi$ so: $\delta z = \psi_r =$

$w^r(0)e^{-i\varepsilon_r \frac{mc^2}{\hbar} t}$ $\varepsilon_r=+1, r=1,2; \varepsilon_r=-1, r=3,4$.): This implies an oscillation frequency of $\omega=mc^2/\hbar$ where m is from eq.B2, which is fractal here.

Recall from sect1 **CM/ $\xi=e^2 10^{40N}/m_e=r_H$** gives both mass $m_e/10^{40N}$ eq.1.13 *and* size in $r=r_H 10^{40N}$

So 1) $r=r_H 10^{40N}$ *and* 2) $m_e/10^{40N}=m$, same N.

1) So for $N=1$ **$m=m_e X 10^{-40}$** (in eq1.13) $10^{-40} m_e c^2 / \hbar = \omega_{N=1} \approx \omega (1/10^{11}) (1/\text{years}) \approx \omega$ in BD eq1.13 $\psi = dse^{i\omega t}$. We are in the expansion stage. DESI data seems extrapolate to this sinusoidal oscillation scenario.

2) So for $N=1$, **$r=r_H 10^{40N}$** huge $r_H \approx 10^{11}$ LY. On our own fractal cosmological scale $N=1$ we are about halfway through the $r=r_o \cos \omega t = r_{le} e^{i\omega t}$ expansion stage. Recall sectIIIb $N=1$ $r \approx r_H = 2G(10^{80} m_e)/c^2$: we are inside this huge $r_H \approx 10^{11}$ LY) in $dt'^2 = (1-r_H/r) dt^2$ (eq19) so distant clocks dt tick many more times than ours making the universe much older than that 13.7by explaining the high z stellar metallicity, mature spirals and supermassive black holes and even net galactic spin since that is selfsimilar to Dirac equation BD eq.1.13 spin $\frac{1}{2}$ as well. Thus the fractal Newpde completely explains cosmology.

Newpde is spin $\frac{1}{2}$ and fractal spin $\frac{1}{2}$ puts inside a Kerr metric that inertially frame drags us nearly into a observed Schwarzschild (eq19). Since Kerr has dtdq terms it is not time dt invariant so (in

CPT) CP is not invariant explaining CP violation. Also explains recent Webb discoveries of 60% galaxy spin in one direction: we are just inside the ergosphere of an electron.

Recall Hund rule $2S_{1/2}$ τ and $1S_{1/2}$ $\mu=\varepsilon$ and the ground state electron $\Delta\varepsilon$ in eq.13 fig in IIIa

$2S_{1/2}$ τ has the same principle quantum number N as *stable* $2P_{3/2}$ P at $r=r_H$. In any case the Mercuron state largest global normalization must be for this *stable* $\psi=e^{i\tau}\approx 1$ (another more local still is normalizing out ε as in eq.A1.) So $\psi=e^{i(\tau+\mu+\varepsilon)t}=e^{i(\mu+\varepsilon)t}=e^{i(\varepsilon+\Delta\varepsilon)t}$. So $R_{22}=e^{-v}[1+\frac{1}{2}r(\mu'-v')]-1\approx -v=-\varepsilon$ for small ε (in $\approx -\sin\varepsilon$) also explaining the negative sign on the sine function. Also $\psi\rightarrow\delta z=e^{i(\varepsilon+\Delta\varepsilon)}dr$. So to get a metric coefficient dr^2 we must square $dr^2=dr_0^2e^{i(2\varepsilon+2\Delta\varepsilon)}=\kappa_{rr}dr'^2$ so that $e^{i(2\varepsilon+2\Delta\varepsilon)}=\kappa_{rr}$. (And we can further normalize out ε for even more local space time $\Delta\varepsilon$ perturbations by

$$e^{i2\Delta\varepsilon/(1-2\varepsilon)}=\kappa_{00} \quad (A1)$$

So near the initial expansion time:

$$R_{ij}=0 \rightarrow R_{ij}=-(1/2)\Delta(g_{ij}) \quad (A2)$$

(where Δ is the Laplace-Beltrami second derivative operator) is not =zero since it is this source mass. Thus the above fractal scale $N=1$ Laplace Beltrami source eq. A2 $-\sin\omega t=-\sin\mu=-\sin\varepsilon$ here comes out of the **Newpde zitterbewegung** BD eq1.13 for the $N=2$ observer (fig1: observer $N>$ observable $N-1$). Recall also that earlier comment “for huge N th fractal scale $|\delta z| \gg 1$ ”, eg fig1 “observer”, must be on a large $N=1$ fractal scale to observe the $N=0$ eq5 flat space limit.

A1 Inertial global background Huge $N=2$ scale, as the observer of $N=1$ cosmology scale (metric quantization, galaxy superclusters, etc), sees Newpde zitterbewegung source (in

fig1) negative square root in A14 ($\varepsilon \propto 1/\sqrt{(1-r_H/r)}$) in $R_{22}=-\sin\varepsilon \rightarrow \sinh\varepsilon$ inside the $N=1$ r_H with the manifold assumed rectilinear globally. By artificially going under horizon r_H , and changing $i \rightarrow 1$, $N=2$ he then sees what we ($N=1$) see $\sin\varepsilon \rightarrow \sinh\varepsilon$ thereby making $N=1$ cosmology an ‘observable’ in fig1. Serendipitously for $r<r_H$ then $R_{22}=-\sinh\varepsilon$ is also integrable, has a closed form solution (below eq A3A). So we require $\sin\varepsilon \rightarrow \sinh$ in $R_{22}=-\sinh\mu \quad (A2A)$

$=R_{22}=e^{-v}[1+\frac{1}{2}r(\mu'-v')]-1=-\sinh v=(-(e^v-e^{-v})/2), \quad v'=-\mu'$ so

$(e^\mu-1=-\sinh\mu$ for positive μ in $\sinh\mu$ then the $\mu=\varepsilon$ in the e^μ on the left is negative $(A2B)$

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

$e^{-v}[-r(\mu')]=1-\cosh\mu$. Thus $e^{-\mu}r(d\mu/dr)=1-\cosh\mu$

This can be rewritten as:

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

Equipartition of energy ($=3/2kT$ maximizing 3D entropy) in the Mercuron implies the τ and μ are the same energy $\tau=1=\mu$ there as in our multi deuteron equipartition model of a large nucleus (partII,sect.10.5). So in the r_{bb} Mercuron $\xi_1=\mu=\varepsilon=1$ and in the r_{M+1} present day, $\mu=\mu_{\text{muon}}=.05946(X \text{ tauon mass})$. So integrating we get: $\ln(r_{M+1}/r_{bb})+2=[1/(e^\mu-1)-\ln[e^\mu-1]]/2 \quad (A3C)$

So $r_{bb}\approx 30$ million miles ($\approx$ approximate orbit radius of Mercury, hence the name “Mercuron” radius, just fits the 10^{80} baryons each at $r=r_H$ for each proton so **baryogenesis not required**.)if $r_{M+1}\approx 10^{11}\text{Ly}$, $\mu=\mu_{\text{muon mass}}=.06$. Also note that the g factor= $g=e/2m$ and $w=gB=2\pi f$ with f the Larmor frequency which is what you use to measure the g factor(like in MRI). The

anomalous gyromagnetic ratio $gy=g-2$. Note if the mass is decreasing then gy (and the g factor) goes up as well. The difference in gy between 2023 (FermiLab) and 1974

(CERN) is 116592059[22]-11659100[10] =1 part in 10^5 increase which translates to 1 part in 10^8 increase in g since g is about 2000X larger than gy . Note g is increasing corresponding to a decreasing mass m in $g=e/2m$, by about 1 part in 10^8 over 50 years so about **1 part in 10^{10} over 1 year** in eq.A3C. Note 10^{10} years is the approximate time from (the big uptick) in eq.A3C, also coincidentally being the mainstream nominal age of the universe.

Thus we have the particle masses ambient inertial metric (N=1 so N=-1 also) effects

Thus we generate from this eq A3C evolution of the universe the ratio of the mass of the muon μ to mass of the tauon τ (recall Hund's rule $2S_{1/2} \tau$ and $1S_{1/2} \mu$ from Newpde) as a function of time. The proton mass derivation the mass relative to other physical constants like h/e . The equation B2 inertial frame dragging reduction gives the magnitude of mass $\mu = \varepsilon$ **2S Ortho side view** Lorentz contraction doubles the energy for $2S_{1/2}$ (from part II eq.7.1) so one $2S_{1/2}$ is the same mass as two $2P_{3/2}$ So

two $2P_{3/2}$ energy principle eigenvalue = one $2S_{1/2}$ energy principle eigenvalue

Must add $1S_{1/2}$ zpe to both sides: $2P_{3/2} + 1S_{1/2} = 2S_{1/2} + 1S_{1/2} = SP^2$ in scalar Schrodinger equation. So we have the mass of 2 protons = tauon + muon masses and the case 1 and case 2 cases of Ch.8. Also for the $2P_{3/2}$ state at $r=r_H$ the B flux quantization implies $2X917m_e = m_p$ (from part II eq.7.1) we thereby have the mass of the electron m_e , as well which in fact is the fundamental new pde mass here. These masses are the basis for constructing the heavier particle masses eg., m_p is fundamental in baryonic, mesonic multiplets from Newpde ch.8-9. The transverse "top view" (so shrunk by $1/917$ Compton wavelength) muon and eq.9.22 zpe pion is fundamental to the heavy CMS particles in appendix C5 to determining the heavy CMS detector particle masses and their other properties): predictions for future LHC discoveries!

Particle mass ε represents $N=1$ (inertial) background in our zitterbewegung and in g_{00} , used later. Recall the Hund's rule $2S_{1/2} \tau$, $1S_{1/2} \mu$ source of eq.13a $r_H = e^2/\xi$, $\xi = \tau + \varepsilon + \Delta\varepsilon$ for required small C.

A2) Local N=0 fractal scale background

Recall from our leapfrog discussion (sect IIIb) fractal scale $N=0$ can at least locally contribute to the metric. So instead of having the global inertial (mass) source $-\sin\varepsilon$ (sect A1) we put the curvature on the local manifold instead. The manifold itself carries the curvature so $R_{ij}=0$ throughout the Mercuron and outside locally.

From eqs 17-19 but with ambient metric ansatz: $ds^2 = -e^\lambda(dr)^2 - r^2d\theta^2 - r^2\sin\theta d\phi^2 + e^\mu dt^2$ (A3)

so that $g_{00} = e^\mu$, $g_{rr} = e^\lambda$. From eq. $R_{ij}=0$ for spherical symmetry in free space and $N=0$

$$R_{11} = \frac{1}{2}\mu'' - \frac{1}{4}\lambda'\mu' + \frac{1}{4}(\mu')^2 - \lambda'/r = 0 \quad (A4)$$

$$R_{22} = e^{-\lambda}[1 + \frac{1}{2}r(\mu' - \lambda')] - 1 = 0 \quad (A5)$$

$$R_{33} = \sin^2\theta \{e^{-\lambda}[1 + \frac{1}{2}r(\mu' - \lambda')] - 1\} = 0 \quad (A6)$$

$$R_{00} = e^{\mu-\lambda}[-\frac{1}{2}\mu'' + \frac{1}{4}\lambda'\mu' - \frac{1}{4}(\mu')^2 - \mu'/r] = 0 \quad (A7)$$

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

(eq. A4-A7 from pp.303 Sokolnikof(8)): Equation A4 is a mere repetition of equation A6. We thus have only three equations on λ and μ to consider. From equations A4, A7 we deduce that $\lambda' = -\mu'$ so that radial $\lambda = -\mu + \text{constant} = -\mu + C$ where C represents a possible $\sim$ constant ambient metric contribution which (allowing us to set $\sinh\mu=0$) could be imaginary in the case of the slowly oscillating ambient metric of nearby object B from B2. So $e^{-\mu+C} = e^\lambda$. Then A3-A7 can be written as:

$$e^{-C}e^\mu(1+r\mu') = 1. \quad (A9)$$

Set $e^\mu = \gamma$. So $e^{-\lambda} = \gamma e^{-C}$ ε and $\Delta\varepsilon$ are time dependent. So integrating this first order equation (equation A9) we get:

$\gamma = -2m/r + e^C \equiv e^\mu = g_{00}$ and $e^{-\lambda} = (-2m/r + e^C)e^{-C} = 1/g_{rr}$

or $e^{-\lambda} = 1/\kappa_{rr} = 1/(1-2m'/r)$, $2m/r + e^C = \kappa_{00}$ So from eq B4:

$$\kappa_{00} = e^C - 2m/r = e^{i(-\varepsilon + \Delta\varepsilon)^2} - 2m/r \quad (A10)$$

$m = e^2/\xi = \varepsilon^2/(\tau + \varepsilon + \Delta\varepsilon) = r_H$ from eq.13a,14 from object B equation eq.B2. Normalize out the 1 and 2ε for volumes smaller than $(1-2\varepsilon)^3$ if observer time scales t smaller than $ct = 1 + 2\varepsilon$ in which the

observer will probably never see a 1 or a ε transition (eg., Permian-Jurassic part IIB). Note time scale be for $2P_{3/2}$ at $r=r_H$ is 0 so we can normalize out $1+2\varepsilon+2\Delta\varepsilon$ since $t=0$ at $r=r_H$ (10ab)

A3) $e^{i(-\varepsilon+\Delta\varepsilon)2}$ component term of eq A10 in the fractal scale bridging condition

These fields on the different fractal scales **are really all the same** field but seen from the different frames of reference motion created by the different fractal 10^{40N} X jump mass eq 1.13 BD contributions of the zitterbewegung frequency oscillation frames of reference of the Newpde. **Bridging these fractal N scales in fig1 is possible for a unified field** if both observers are in the same frame of reference at least along some coordinate direction such as a central force azimuth angle ϕ like in Saturn's rings or galaxy halos.). Thus, consistent with eq.16-19 (our GR derivation) we can have a $N=1$ fractal scale $g_{00}=\kappa_{00}$ in the halo $g_{00}=1-2GM/(c^2r)=\kappa_{00}=\text{rel } e^{i2\Delta\varepsilon/(1-2\varepsilon)}=\cos(2\Delta\varepsilon/(1-2\varepsilon))$ (A10)) implying g_{00} constants, a (metric) quantization. But a constant $=g_{00}$ requires an external energy source to create a cylindrical geometry to make it an allowed GR dyadic tensor transformation distortion of a Schwarzschild metric which also is then necessarily a metric quantization jump just like the hydrogen atom quantization transition from a spherical to a 2P quantized state dumbbell geometry requires energy of some type. So Bosonic (g_{00}) transformation to leptonic (κ_{00}) requires energy-momentum transfer as *derived from* pair creation in QED (eg a γ ray has to transfer momentum to a heavy particle to pair create) that comes from the Newpde. We have then derived that for this metric quantization to occur we require a grand canonical ensemble with unknown nonzero chemical potential Q in a uniform space-time.

$$\text{rel } e^{i2\Delta\varepsilon/(1-2\varepsilon)}=\cos(2\Delta\varepsilon/(1-2\varepsilon)) \quad (\text{A10a})$$

Recall for circular motion $GMm/r^2=mv^2/r$ so $GM/r=v^2$ therefore $g_{00}=1-2GM/(c^2r)=1-2(v/c)^2$

$$g_{00}=\kappa_{00} \quad \text{Bridging condition}$$

Local (app.A) $\Delta\varepsilon$ pure state normalization: So from eq A1 and A10a: rel

$$e^{i2\Delta\varepsilon/(1-2\varepsilon)}=\cos(2\Delta\varepsilon/(1-2\varepsilon))=1-(2\Delta\varepsilon/(1-2\varepsilon))^2/2+.. \text{ so } g_{00}=1-2GM/c^2r=1-2(v/c)^2=\text{Rel } \kappa_{00}=1-(2\Delta\varepsilon/(1-2\varepsilon))^2/2 \text{ so } 2\Delta\varepsilon/(1-2\varepsilon)/2=v/c. \text{ So } c2\Delta\varepsilon/(1-2\varepsilon)/2=v=3 \times 10^8(.00058)/((2).88)=98\text{km/sec} \approx 100\text{km/sec}$$

ε normalization (app.A, include mixed state $\approx \Delta\varepsilon\varepsilon$): $g_{00}=1-2GM/(c^2r)=\text{Rel } \kappa_{00}=\text{rel}(e^{i[2\Delta\varepsilon+\varepsilon]})=\cos[2\Delta\varepsilon+\varepsilon]=1-[(\Delta\varepsilon+\varepsilon)^2]/2=1-[(2\Delta\varepsilon+\varepsilon)/(2\Delta\varepsilon+\varepsilon)]^2/2=1-[(2\Delta\varepsilon^2+\varepsilon^2+2\varepsilon\Delta\varepsilon)/(2\Delta\varepsilon+\varepsilon)]^2$. The $2\Delta\varepsilon^2$ is just the above first Taylor expansion term so just take the mixed state cross term $[\varepsilon 2\Delta\varepsilon/(\varepsilon+2\Delta\varepsilon)] = c[2\Delta\varepsilon/(1+\Delta\varepsilon/\varepsilon)]/2 = c[2\Delta\varepsilon+\Delta\varepsilon^2/\varepsilon+...2\Delta\varepsilon^{N+1}/\varepsilon^{N+}]/2 = \sum v_N$. Note each term in this expansion is itself a (mixed state) operator

$$v_N=[2\Delta\varepsilon^{N+1}/(2\varepsilon^N)]c \quad \text{A11}$$

As it is in eq.C1 below $(\Delta\varepsilon)^m$ is the operator in $\Delta\varepsilon^m\psi = -\frac{i^m\partial^m}{\partial t^m}\psi_{N=1} = H^m\psi_{N=1}$ so each term in this A11 expansion is an independent QM operator so with independent speed= v eigenvalues relative to COM.

$g_{00}=\kappa_{00}$ alters the New pde giving a Modified Newpde with $E=\frac{1}{2}mv^2$ with $v=N100(100^{-M})$ $M=0,1$ $e^2 10^{40N}/m=C_M/\xi \rightarrow (C_M N + cu C_{M-N-1})/\xi =$ where cu =unknown nonzero chemical potential modifies the Newpde creating new eigenfunction $\psi=MQ\psi$ with its own operators and eigenvalues created from $g_{00}=\kappa_{00}$. $H\psi=E\psi$ with $E=\frac{1}{2}mv^2$ with $v=N100(100^{-M})$ $M=0,1,..(\text{km/sec, from A11})$.

$E=hf=\frac{1}{2}mv^2=\frac{1}{2}1.67 \times 10^{-27}(10^5)^2$ so $f=1.26 \times 10^{16} \text{Hz}=\text{EUV}$, (Chapman layer absorption-> gravity wave downward force effecting Coriolis force. So instead of a photon we have a MQton. So a type III radio burst (at near Mach) from the sun detected at low plasma density near earth Metric Quantization photon MQton= hf : 12.6kHz the 10m/sec =35.3kHz N_2 ; 23.1Mhz for electrons.) So from eq. A11 for example $v=N100(100^{-M}) \text{ km/sec}$. $m=2, N=1$ here (Local arm). In part III we list hundreds of other examples of A11 part III fig4 metric quantization: (sun: 1, 2km/sec, galaxy halos m100km/sec without dark matter.). Given enough energy there is 100 antinodes across the Mercuron.

From equation A11 rebound explosion will be (~ 100 antinodes = D across the Mercuron) on r_{bb} , see part III, even so implying a Rayleigh Taylor instability so web like explosion remnants in both such as in M1 and Mercuron circumferencial $320(=\pi D)$ giving (in fig4) the initial radius (now at $\sim 400 \text{ MLY}$) of those ‘BAO’ cbr web like structures at reionization. On average single galaxies dominate a 4 MyLY wide region $100 \times$ smaller, the next metric quantization down. Globulars next ($100 \times$ smaller) and stellar neighborhoods next ($100 \times$ smaller) and planets ($100 \times$ smaller), then moons ($100 \times$ smaller), etc. So in fig4 A11 gets all the rest! Even supernova rings at high enough resolution (eg beads split at least at 1987a) are ~ 100 antinodes Initially Neutron stars rotate at 700 times a second, 20km radius so at very next $100 \times 100 \text{ km/sec}$ making this metric quantization the reason for this upper limit on neutron star speed. May 21, 2024, Greenfield Iowa, Dow Doppler: **1km/sec** tornado; also 1.5km/sec since hallow, **20m/sec** its overhead meso; Solar flares jump from 1km/sec, bottom of chromosphere, to 1km/sec top at 100km/sec: flare. So they jumped metric quantization levels just like electrons jump Rydberg levels $\frac{R_b}{N^2}$ in hydrogen atoms if there is enough energy.

$r_H=2m$ component term of eq.A10 (with 13a, eq14, eq.B4) Lamb shift

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

$$\left[\left(\frac{dt}{ds} \sqrt{\kappa_{00}} m_p \right) + m_p \right] F - \hbar c \left(\sqrt{\kappa_{rr}} \frac{d}{dr} + \frac{j+\frac{3}{2}}{r} \right) f = 0 \quad \text{A12}$$

$$\left[\left(\frac{dt}{ds} \sqrt{\kappa_{00}} m_p \right) - m_p \right] f + \hbar c \left(\sqrt{\kappa_{rr}} \frac{d}{dr} - \frac{j-1/2}{r} \right) F = 0. \quad \text{A13}$$

Comparing the flat space-time Dirac equation to the left side terms of equations A12 and A13:

$$2m_p(dt/ds)\sqrt{\kappa_{00}}=2m_p(1/\kappa_{00})\sqrt{\kappa_{00}}=2m_p(1/\sqrt{\kappa_{00}})=\text{Energy}=E \quad \text{A14}$$

electron $PE=(\tau+\varepsilon+\Delta\varepsilon)/\sqrt{\kappa_{00}}-(\tau+\varepsilon+PE_\kappa+PE_e+\Delta\varepsilon)$. We used the e^c in equation A14 in the above section with r_H from eq14. Note for electron motion around the hydrogen proton $mv^2/r=ke^2/r^2$ so $KE=\frac{1}{2}mv^2=(\frac{1}{2})ke^2/r=PE$ potential energy in $PE+KE=E$. So for the electron (but not the tauon or muon that are not in this orbit) $PE_e=\frac{1}{2}e^2/r$. A14a. Write the hydrogen energy and pull out the electron contribution A14a. So in eq.A13 the A10 $2m$ term for **free electron** equations 13a, 14 $r_H=(1+1+.5)e^2/(m_\tau+m_\mu+m_e)/2=2.5e^2/(2m_p c^2)$ (A15)

Variation $\delta(\psi^*\psi)=0$ At $r=n^2a_0$

Next note for the variation in $\psi^*\psi$ is equal to zero at maximum $\psi^*\psi$ probability density where for the hydrogen atom is at $r=n^2a_0=4a_0$ for $n=2$ and the $\psi_{2,0,0}$ eigenfunction. From eq.13a

$\xi=\tau+\varepsilon+\Delta\varepsilon=2P$, Total Newpde energy= $\xi/\sqrt{\kappa_{00}}$, (A14); $r_H=e^2/\xi$, $\kappa_{00}=1-r_H/r$. electron

energy= $(\tau+\varepsilon+\Delta\varepsilon)/\sqrt{\kappa_{00}}-(\tau+\varepsilon+PE_\kappa+PE_e+\Delta\varepsilon)$. Also recall eq 14, 14: $\xi_1=m_L c^2$

$=(m_\tau+m_\mu+m_e)c^2=2m_p c^2$ normalizes $\frac{1}{2}ke^2$ (Thus divide $\tau+\mu$ by 2 and then multiply the whole line by 2 (from eqA10 $2m$ numerator term) to normalize the $m_e/2$ result to get $m_e c^2$ plus whatever is

left over) $\varepsilon=0$ since no muon ε here.): Total Newpde energy= $\xi/\sqrt{\kappa_{00}}$ then from A14, A15: m_e electron Newpde energy in H atom 2S state $=(\tau+\varepsilon+\Delta\varepsilon)/\sqrt{\kappa_{00}}-(\tau+\varepsilon+PE_\tau+PE_\mu+\Delta\varepsilon)=(\text{Taylor expansion})=E_e = \frac{(\text{tauon}+\text{muon})(\frac{1}{2})}{\sqrt{1-\frac{r_{H'}}{r}}} - (\text{tauon} + \text{muon} + PE_\tau + PE_\mu - m_e c^2) \frac{1}{2} =$

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

$$= \frac{2m_e c^2}{2} + 2 \frac{e^2}{4r} - 2 \frac{3}{8} \left(\frac{2.5}{r m_L c^2} \right)^2 m_L c^2 = m_e c^2 + \frac{e^2}{2r} - 2 \frac{3}{8} \left(\frac{2.5e^2}{r m_L c^2} \right)^2 m_L c^2 \quad \text{A16}$$

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

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

$$= hf = 6.626 \times 10^{-34} \cdot 27,360,000 \text{ so that } f = 27 \text{ MHz Lamb shift.} \quad \text{A17}$$

The other 1050Mhz comes from the zitterbewegung cloud.

Note also we have also derived the potential energy of the electron here from first principles in A16

Note: Need infinities if instead using **flat space Dirac 1928 equation**. For flat space $\partial g_{ik}/\partial x^j = 0$ as a limit. Then must take field $g^{km} = 1/0 = \infty$ to get finite Christoffel symbol

$\Gamma^{m}_{ij} \equiv (g^{km}/2)(\partial g_{ik}/\partial x^j + \partial g_{jk}/\partial x^i - \partial g_{ij}/\partial x^k) = (1/0)(0) = \text{undefined}$ but still implying *nonzero* acceleration

on the left side of the geodesic equation: $\frac{d^2 x^\mu}{ds^2} = -\Gamma^{\mu}_{\nu\lambda} \frac{dx^\nu}{ds} \frac{dx^\lambda}{ds}$. Christoffel symbol $\equiv \Gamma^{\mu}_{\nu\lambda}$. So we

need infinite fields for flat space. Thus QED requires (many such) infinities. But we have in general curved space $g_{ij} = \kappa_{ij}$ in the New pde so do not require that anything be infinite and yet we still obtain for the third order Taylor expansion term of $\sqrt{\kappa_{\mu\nu}}$ the Lamb shift and anomalous gyromagnetic ratio correction (see below sections B2).

Appendix B

B1 Nearby Object B (fig3) reduces N=1 Kerr metric frame dragging (so *almost* complete Schwarzschild in our comoving frame) thereby providing the inertial component magnitudes of the κ_{00} and κ_{rr} terms in A10 in the Newpde

Our new (Dirac) pde has spin $S=1/2$ and so the self similar fractal ambient N=1 scale Kerr metric

$$ds^2 = \rho^2 \left(\frac{dr^2}{\Delta} + d\theta^2 \right) + (r^2 + a^2) \sin^2 \theta d\phi^2 - c^2 dt^2 + \frac{2mr}{\rho^2} (a \sin^2 \theta d\theta - c dt)^2, \quad \text{(B1)}$$

where $\rho^2(r, \theta) \equiv r^2 + a^2 \cos^2 \theta$; $\Delta(r) \equiv r^2 - 2mr + a^2$, $r^{\wedge 2} \equiv r^2 + a^2 \cos^2 \theta$, $r^{\prime 2} \equiv r^2 + a^2$. Slightly inside

$$r_H \text{ still } a \ll r, \quad \left(\frac{(r^{\wedge})^2}{(r')^2 - 2mr} \right) dr^2 + \left(1 - \frac{2mr}{(r^{\wedge})^2} \right) dt^2 + \dots = \left(\frac{1}{\frac{(r')^2}{(r^{\wedge})^2} - \frac{2mr}{(r^{\wedge})^2}} \right) dr^2 + \left(1 - \frac{2mr}{(r^{\wedge})^2} \right) dt^2.$$

$$\text{So } 1/(g_{rr} + 2m/r) \approx \frac{(r')^2}{(r^{\wedge})^2} = \frac{r^2 + a^2}{r^2 + a^2 \cos^2 \theta} = \frac{1 + \frac{a^2}{r^2}}{1 + \frac{a^2}{r^2} \cos^2 \theta} \approx \left(1 + \frac{a^2}{r^2} \right) \left(1 - \frac{a^2}{r^2} \cos^2 \theta \right) + \dots = 1 -$$

$$\frac{a^4}{r^4} \cos^2 \theta - \frac{a^2}{r^2} \cos^2 \theta + \frac{a^2}{r^2} + \dots \approx 1 + \frac{a^2}{r^2} (1 - \cos^2 \theta) + \dots = 1 + \frac{a^2}{r^2} \sin^2 \theta + \dots \equiv 1 + \left(\frac{a}{r} \right)^2 u^2 =$$

(our N = 1 mass = $\frac{cM}{\delta z \delta z}$ and the zitterbewegung) $= 1 + 2(\varepsilon + \Delta\varepsilon) + \dots \quad \text{(B2)}$

$$\text{in } \kappa_{\pi} = e^{(-\varepsilon + \Delta\varepsilon)^2} + 2m/r \quad (\text{B3})$$

Note in B1 those ambient metric **perturbation rotations** ($d\theta/dt$ T violation so (given CPT) thereby **CP violation**, dt/ds makes it COM energy dependent) due to cosmological object B caused drop in inertial frame dragging observed inside object A. We are in a rotating Schwarzschild metric (aka a Kerr metric) and so being close to the r_H horizon we notice (mostly) only the Schwarzschild metric (to 1 part in 100,000). But near $\mu=1$ (near the tiny Mercuron radius), far away from the big r_H horizon, the inertial frame is *not* dragged as much due to the nearness of object B as the Webb space telescope discovered (eg., 2/3 galaxies spin clockwise and they formed far away from r_H near where the Mercuron was.).

But to have our $\kappa_{00}=1/\kappa_{\pi}$ eq.19 near flat condition and Dirac eq. requirement, so 4D (with eq5 as the limit) of section IIa fig3 we must equate $1/(\text{eq B3})$ to A10: $\kappa_{00}=e^C - 2m/r = e^{i(-\varepsilon + \Delta\varepsilon)^2} - 2m/r$

If ε normalized out this is from eq.A1: $\sqrt{\kappa_{\pi}} = 1/\sqrt{(1+2\Delta\varepsilon/(1+\varepsilon))}$ B4

The $2m/\rho^2$ in B1 just sets the eq.14 value of that otherwise unknown $2m$ in eq.A10.

B2 Applications eg., use ε normalized eq B4 $\sqrt{\kappa_{\pi}} = 1/\sqrt{(1+2\Delta\varepsilon/(1+\varepsilon))}$

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

$$\left[\left(\frac{dt}{ds} \sqrt{\kappa_{00}} m_p \right) + m_p \right] F - \hbar c \left(\sqrt{\kappa_{rr}} \frac{d}{dr} + \frac{j+3/2}{r} \right) f = 0 \quad \text{B5}$$

$$\left[\left(\frac{dt}{ds} \sqrt{\kappa_{00}} m_p \right) - m_p \right] f + \hbar c \left(\sqrt{\kappa_{rr}} \frac{d}{dr} - \frac{j-1/2}{r} \right) F = 0. \quad \text{B6}$$

Using the above Dirac equation component we find the anomalous gyromagnetic ratio Δg_y for the spin polarized $F=0$ case. Recall the usual calculation of rate of the change of spin S gives $dS/dt \propto m \propto g_y J$ from the Heisenberg equations of motion. We note that $1/\sqrt{\kappa_{\pi}}$ rescales dr in $\left(\sqrt{\kappa_{rr}} \frac{d}{dr} + \frac{j+3/2}{r} \right) f$ in equation B6 with κ_{π} from B4. Thus to have the same rescaling of r in the second term we must multiply the second term denominator (i.e., r) and numerator (i.e., $J+3/2$) each by $1/\sqrt{\kappa_{\pi}}$ and set the numerator ansatz equal to $(j+3/2)/\sqrt{\kappa_{\pi}} = 3/2 + J(g_y)$, where g_y is now the gyromagnetic ratio. This makes our equation B5, B6 compatible with the standard Dirac equation allowing us to substitute the g_y into the Heisenberg equations of motion for spin S : $dS/dt \propto m \propto g_y J$ to find the correction to dS/dt . Thus again:

$$\begin{aligned} [1/\sqrt{\kappa_{\pi}}] (3/2 + J) &= 3/2 + J g_y, \text{ Therefore for } J = 1/2 \text{ we have:} \\ [1/\sqrt{\kappa_{\pi}}] (3/2 + 1/2) &= 3/2 + 1/2 g_y = 3/2 + 1/2 (1 + \Delta g_y) \end{aligned} \quad \text{B7}$$

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

Thus solve eq. B6 with Eq.13a,14 values in $\sqrt{\kappa_{\pi}} = 1/\sqrt{(1+2\Delta\varepsilon/(1+\varepsilon))} = 1/\sqrt{(1+2\Delta\varepsilon/(1+0))} = 1/\sqrt{(1+2 \times 0.0002826/1)}$. Thus from equation B4:

$[\sqrt{(1+2 \times 0.0002826)}] (3/2 + 1/2) = 3/2 + 1/2 (1 + \Delta g_y)$. Solving for Δg_y gives anomalous **gyromagnetic ratio correction of the electron** $\Delta g_y = .00116$.

If we set $\varepsilon \neq 0$ (so $\Delta\varepsilon/(1+\varepsilon)$) instead of $\Delta\varepsilon$ in the same κ_{00} in Newpde we get the anomalous **gyromagnetic ratio correction of the muon** in the same way.

Composite 3e: Meisner effect For B just outside r_H . (where the zero point energy particle eq. 9.22 is $.08=\pi^{\pm}$) part II case 1

Composite 3e CASE 1: Plus $+r_H$, therefore is the proton + charge component. Eq.19: $1/\kappa_{\pi} = 1 + r_H/r_H + \varepsilon'' = 2 + \varepsilon''$. $\varepsilon'' = .08$ (eq.9.22). Thus from eq.B6 $\sqrt{2 + \varepsilon''} (1.5 + .5) = 1.5 + .5(g_y)$, $g_y = 2.8$

The gyromagnetic ratio of the proton

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

$$1/\kappa_{\pi} = 1 - r_H/r_H + \varepsilon'' = \varepsilon \quad \text{Therefore from equation B5 and case 1 eq.19 } 1/\kappa_{\pi} = 1 - r_H/r_H + \varepsilon''$$

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

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

Appendix C Object C added perturbation of δz in eq.16 (gives us the well known electroweak model (SM), eg appendix C7)

Review of eq16

min of $\delta ds^2=0$ given eq.7 constraint $dr+dt=ds$ (with θ measured from the horizontal 'dr' axis) implies the graphical representation (note 45°) in fig3 and fig4 below . Also recall from section 1 that the required $N=0$ tiny $C \approx \delta z'$ must automatically be a $\delta z'$ perturbation of the observer $N=1$ eq.7 as in $\delta z' + \delta z = (dx_1 + idx_2) + (dx_3 + idx_4) \equiv dr + idt$. But given this $\delta z \approx dr \approx dt$ constant ds at 45° we must add and subtract $\delta z'$ to perturb eq7 $(dr - \delta z') + (dt + \delta z') \equiv dr' + dt' = ds$ (16)

So the $\delta ds^2=0$, 45° *small* extreme gave the e and ν . But we have not yet accounted for the 4 axis *large* $\delta ds^2=0$ extreme. Recall our solutions of eq.5 eq.7-9 mapped onto fig3 below.

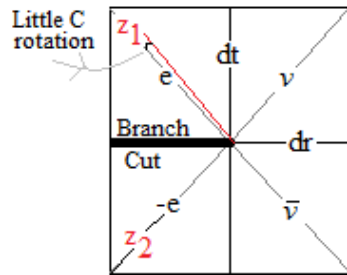


fig.3 Solutions to equation 5: eq7 quadrant II electron & III positron,

equations eq8,9 quadrant IV neutrino & quadrant I antineutrino. fig.3. $\delta ds^2=0$ and $\delta(dr+dt)=0$ imply $45^\circ-45^\circ$ So two body (e, ν) singlet $\Delta S = \frac{1}{2} - \frac{1}{2} = 0$ component so pairing interaction 4axis (sect.4.5). Note each 90° rotation is through a 45° first derivative newpde operator so each 90° rotation is really a differential operator

Newpde $r=r_H$, $z=0$, $90^\circ+90^\circ$ rotation of composites e, ν implied by Equation 16.

The Mandelbrot set perturbations in eq16 are the same as rotations on that e, ν plane given by eqs7-8. The 4 axis' are max extreme of $\delta(dr+dt)=0$, $\delta ds^2=0$ just as 45° is ds^2 min (this time they could be man made accelerator perturbations.). Thus from equation 11 for $(\theta=90^\circ)$ angle rotations $\theta \delta z \equiv (dr/ds) \delta z = -i \partial(\delta z) / \partial r$ for the first 90° rotation as a first derivative. For the next 90° rotation in fig.3 it is then a second derivative $\theta \theta \delta z' = e^{i\theta p} e^{i\theta'} \delta z = e^{i(\theta p + \theta')} \delta z = (dr/ds)((dr/ds) dr') = -i \partial(-i \partial(dr')) / \partial r = -\partial^2(dr') / \partial r^2$ large angle rotation in figure 3 $(dr^2 + dt^2) z''$ from some initial extremum axis angle(s) θ . These new rotations from axis to axis (SM) is through two (1st derivative) diagonals thus constituting a *derivative of a derivative* giving us Bosonic field theory (eg C7). So ortho $\Delta S = \frac{1}{2} + \frac{1}{2} = 1$ making 2 body (at $r=r_H$) $S=1$ Bosons. , so for 180° we also get Laplacians characteristic of the Boson field equations by those $90^\circ+90^\circ$ rotations so eq.16 implies Bosons accompany our leptons (given the $\delta z'$), **so these leptons exhibit "force"**.

Rotations in 2D complex plane use Pauli matrices that map one to one to a quaternion algebra.

Eq.16 perturbation solutions imply complex 2D plane Stern Gerlach dichotomic rotations using eq.A1 thereby using Pauli matrices σ_i algebra, which maps one-to-one to the quaternionA algebra. Using eq.16 we start at some initial angle θ and rotate by 90° the noise rotations are: $C = \delta z'' = [e_L, \nu_L]^T \equiv \delta z'(\uparrow) + \delta z'(\downarrow) \equiv \psi(\uparrow) + \psi(\downarrow)$ has a eq.16 infinitesimal unitary generator

$\delta z'' \equiv U = 1 - (i/2)\epsilon n^* \sigma$, $n \equiv \theta/\epsilon$ in $ds^2 = U^\dagger U$. But in the limit $n \rightarrow \infty$ we find, using elementary calculus, the result $\exp(-(i/2)\theta^* \sigma) = \delta z''$.

Can use eq. 12 and quaternions to rotate $\delta z''$ since the quaternion formulation is isomorphic to the Pauli matrices. $dr' = \delta z_r = \kappa_{ii} dr$ for **Quaternion A** $\kappa_{ii} = e^{iA_i}$ (C1A)

Recall from appendix B eq B4 $E = (\epsilon + \tau)/\sqrt{(1 - (\Delta\epsilon/(1 \pm 2\epsilon)) - r_H/r)}$, $r = r_H$ (11d)

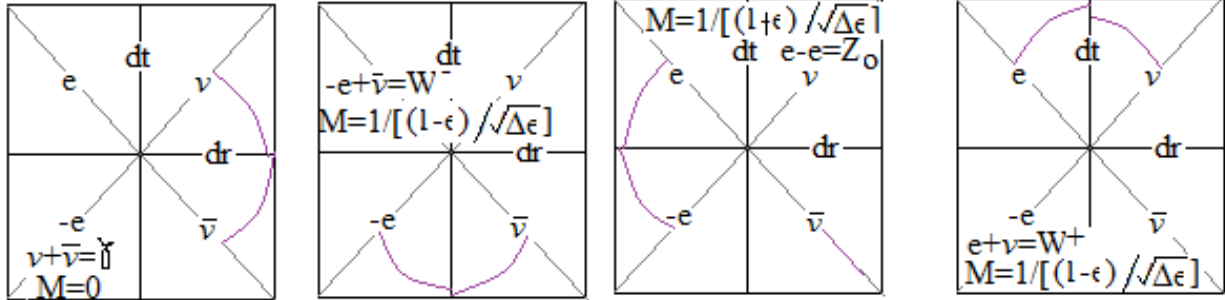


Fig5

For example:

IV $\rightarrow$ I rotational massless Proca $\rightarrow$ Maxwell

C4 Quadrants IV $\rightarrow$ I rotation eq.C2 $(dr^2 + dt^2 + \dots)e^{\text{quaternion A}} = \text{rotated through } C_M$ in eq.16.

example C_M in eq.C1 is a 90° CCW rotation from 45° through v and anti v

A is the 4 potential. From eq.17 we find after taking logs of both sides that $A_o = 1/A_r$ (A2)

Pretending we have a only two i,j quaternions but still use the quaternion rules we first do the r

derivative: From eq. C1 $dr^2 \delta z = (\partial^2/\partial r^2)(\exp(iA_r + jA_o)) = (\partial/\partial r)[(i\partial A_r/\partial r + \partial A_o/\partial r)(\exp(iA_r + jA_o))]$
 $= \partial/\partial r[(\partial/\partial r)iA_r + (\partial/\partial r)jA_o](\exp(iA_r + jA_o)) + [i\partial A_r/\partial r + \partial A_o/\partial r]\partial/\partial r(iA_r + jA_o)(\exp(iA_r + jA_o)) +$
 $(i\partial^2 A_r/\partial r^2 + j\partial^2 A_o/\partial r^2)(\exp(iA_r + jA_o)) + [i\partial A_r/\partial r + \partial A_o/\partial r][i\partial A_r/\partial r + \partial A_o/\partial r]\exp(iA_r + jA_o)$ (A3)

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

$(\exp(iA_r + jA_o))] = \partial/\partial t[(\partial/\partial t)iA_r + (\partial/\partial t)jA_o](\exp(iA_r + jA_o)) +$
 $[i\partial A_r/\partial t + \partial A_o/\partial t]\partial/\partial t(iA_r + jA_o)(\exp(iA_r + jA_o)) + (i\partial^2 A_r/\partial t^2 + j\partial^2 A_o/\partial t^2)(\exp(iA_r + jA_o))$
 $+ [i\partial A_r/\partial t + \partial A_o/\partial t][i\partial A_r/\partial t + \partial A_o/\partial t]\exp(iA_r + jA_o)$ (C4)

Adding eq. C2 to eq. C4 to obtain the total D'Alambertian $C3 + C4 =$

$[i\partial^2 A_r/\partial r^2 + i\partial^2 A_r/\partial t^2] + [j\partial^2 A_o/\partial r^2 + j\partial^2 A_o/\partial t^2] + ii(\partial A_r/\partial r)^2 + ij(\partial A_r/\partial r)(\partial A_o/\partial r)$
 $+ ji(\partial A_o/\partial r)(\partial A_r/\partial r) + jj(\partial A_o/\partial r)^2 + ii(\partial A_r/\partial t)^2 + ij(\partial A_r/\partial t)(\partial A_o/\partial t) + ji(\partial A_o/\partial t)(\partial A_r/\partial t) + jj(\partial A_o/\partial t)^2$.

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

$[j\partial^2 A_o/\partial r^2 + j\partial^2 A_o/\partial t^2] + ii(\partial A_r/\partial r)^2 + jj(\partial A_o/\partial r)^2 + ii(\partial A_r/\partial t)^2 + jj(\partial A_o/\partial t)^2$

Plugging in C2 and C4 gives us cross terms $jj(\partial A_o/\partial r)^2 + ii(\partial A_r/\partial t)^2 = jj(\partial(-A_r)/\partial r)^2 + ii(\partial A_r/\partial t)^2$

$= 0$. So $jj(\partial A_r/\partial r)^2 = -jj(\partial A_o/\partial t)^2$ or taking the square root: $\partial A_r/\partial r + \partial A_o/\partial t = 0$ (C5)

$i[\partial^2 A_r/\partial r^2 + i\partial^2 A_r/\partial t^2] = 0$, $j[\partial^2 A_o/\partial r^2 + i\partial^2 A_o/\partial t^2] = 0$ or $\partial^2 A_\mu/\partial r^2 + \partial^2 A_\mu/\partial t^2 + \dots = 1$ (C6)

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

$\square^2 A_\mu = 1$, $\square \bullet A_\mu = 0$ (C7).

Rotations between quadrants I $\rightarrow$ II, II $\rightarrow$ III, III $\rightarrow$ IV adds m^2 to the 2nd derivative here and so converts eq.C7 into the Proca equation with mass m contained in figure 5.

This looks like the Lorentz gauge formalism but it is actually a fundamental field equation (not interchangeable with some other as in gauge theories) hence it is *no gauge at all* and we have also avoided the Maxwell overdeterminism problem (8eq, 6 unknowns E_i, B_i). Constants are set using Gauss's law component of eq. A16. Must use Newpde 4D orthogonalization here.

Amplitudes of physical processes in QED in the noncovariant Coulomb gauge coincide with

those in the covariant Lorenz gauge. The Aharonov–Bohm effect depends on a line integral of $\mathbf{A}$ around a closed loop, and this integral is not changed by $\mathbf{A} \rightarrow \mathbf{A} + \nabla\psi$ which doesn't change $\mathbf{B} = \nabla \times \mathbf{A}$ either. So formulation in the Lorentz gauge mathematics works (but again C7 is no longer a gauge). Here mass carries energy in the Dirac equation and so cancels out $E_{IV} - E_I = 0$. So the two v masses in a nonuniform G_{00} in appendix C8 cancel out in this quadrant $IV \rightarrow I$ rotation leaving the photon massless.

Geodesics for eq. C7

Recall equation 17 eq C1: $g_{00} = 1 - 2e^2/rm_e c^2 \equiv 1 - eA_0/mc^2 v^0$. We determined A_0 , (and A_1, A_2, A_3) in above eq.C1A. We plug this eq.C1A A_i into the geodesics

$$\frac{d^2 x^\mu}{ds^2} = -\Gamma_{\nu\lambda}^\mu \frac{dx^\nu}{ds} \frac{dx^\lambda}{ds} \quad (5.9)$$

where Christoffel symbol $\Gamma_{ij}^m \equiv (g^{km}/2)(\partial g_{ik}/\partial x^j + \partial g_{jk}/\partial x^i - \partial g_{ij}/\partial x^k)$. So from the first order Taylor expansion of our

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

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

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

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

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

gives a new $A(1/v^2)dv/dt$ force term added to the first order Lorentz force result in these geodesic equations (Sokolnikoff, pp.304). So plugging equation 4.24 into equation 4.23, the geodesic equations gives:

$$\begin{aligned} -\frac{d^2 x^1}{ds^2} &= \Gamma_{11}^1 v_1 v_1 + \Gamma_{12}^1 v_1 v_2 + \Gamma_{13}^1 v_1 v_3 + \Gamma_{10}^1 v_0 v_1 + \Gamma_{21}^1 v_2 v_1 + \Gamma_{22}^1 v_2 v_2 + \Gamma_{23}^1 v_2 v_3 + \Gamma_{20}^1 v_2 v_0 + \\ &\Gamma_{31}^1 v_3 v_1 + \Gamma_{32}^1 v_3 v_2 + \Gamma_{33}^1 v_3 v_3 + \Gamma_{30}^1 v_3 v_0 + \Gamma_{01}^1 v_0 v_1 + \Gamma_{02}^1 v_0 v_2 + \Gamma_{03}^1 v_0 v_3 + \Gamma_{00}^1 v_0 v_0 = \\ &\frac{g^{11}}{2} \left(\frac{\partial g'_{11}}{\partial x^1} \right) v_1 + \frac{g^{11}}{2} \left(\frac{\partial g'_{11}}{\partial x^2} \right) v_2 + \frac{g^{11}}{2} \left(\frac{\partial g'_{11}}{\partial x^3} \right) v_3 + \frac{g^{11}}{2} \left(\frac{\partial g'_{11}}{\partial x^0} \right) v_0 + \\ &\frac{g^{11}}{2} \left(\frac{\partial g'_{11}}{\partial x^2} \right) v_2 - \frac{g^{11}}{2} \left(\frac{\partial g'_{22}}{\partial x^1} \right) v_2 + 0 + 0 + \frac{g^{11}}{2} \left(\frac{\partial g'_{11}}{\partial x^3} \right) v_3 + 0 - \frac{g^{11}}{2} \left(\frac{\partial g'_{33}}{\partial x^1} \right) v_3 + 0 + \\ &\frac{g^{11}}{2} \left(\frac{\partial g'_{11}}{\partial x^0} \right) v_0 + 0 + 0 - \frac{g^{11}}{2} \left(\frac{\partial g'_{00}}{\partial x^1} \right) v_0 + O\left(\frac{A_i dv}{v^2 dt}\right) = v_2 \left(\frac{\partial g''_{11}}{\partial x^2} - \frac{\partial g''_{22}}{\partial x^1} \right) + v_3 \left(\frac{\partial g''_{11}}{\partial x^3} - \frac{\partial g''_{33}}{\partial x^1} \right) + \\ &\left(\frac{\partial g''_{11}}{\partial x^\alpha} v_\alpha + \frac{\partial g''_{11}}{\partial x^0} v_0 \right) - \left(\frac{\partial g''_{00}}{\partial x^1} \right) v_0 + O\left(\frac{A_i dv}{v^2 dx}\right) \approx - \left(\frac{\partial g''_{00}}{\partial x^1} \right) v_0 + v_2 \left(\frac{\partial g''_{11}}{\partial x^2} - \frac{\partial g''_{22}}{\partial x^1} \right) + \end{aligned}$$

$v_3 \left(\frac{\partial^2 g_{11}}{\partial x^3} - \frac{\partial^2 g_{33}}{\partial x^1} \right) + O \left(\frac{A_i dv}{v^2 dt} \right) \approx \frac{e}{m_\tau c^2} \left(-\vec{\nabla} \phi + \vec{v} X (\vec{\nabla} X \vec{A}) \right)_x + O \left(\frac{A_i dv}{v^2 dr} \right)$. Thus we have the

Lorentz force equation form $\left(- \left(\frac{e}{m_\tau c^2} \right) \left(\vec{\nabla} \phi + \vec{v} X (\vec{\nabla} X \vec{A}) \right) \right)_x$ plus the derivatives of $1/v$ which

are of the form: $\mathbf{A}_i(d\mathbf{v}/dr)_{av}/v^2$. **This new force $A(1/v^2)dv/dr$ is the SC pairing interaction.** So we discovered the origin of superconductivity eg if denominator $v=0$ asymmetric normal 2 body mode so nonidentical oscillators with *equal mass* (eg $\text{Cu}=40$, $64=4 \times 16$) and so this big pairing interaction nonlocal force (sect.5.4, part I) Schrodinger eq operator added to the Hamiltonian.

C5 Other 45°+45° Rotations (Besides above quadrants IV→I) Proca eq.

Rotations between quadrants I→II, II→III, III→IV adds m^2 to the 2nd derivative here and so converts eq.C7 into the Proca equation with mass m written in figure 5. In the 1st to 2nd, 3rd to 4th quadrants the A_u is already there as a single v in the rotation the mass is in both quadrants and in the end we multiply by the A_u so get the $m^2 A_u^2$ term in the Proca eq. for the W^+ , W^- . The mass still gets squared for the 2nd to 3rd quadrant rotation Z_0 .

For the **composite e, v** on those required large $z=0$ eq.16 rotations for $C \approx 0$, and for stability $r=r_H$ for $2P_{1/2}$ (I→II, III→IV, II→III) unless $r_H=0$ (IV→I);

C5a The $2P_{3/2}$ at $r=r_H$ two positron states are Ortho-para states are constrained by the Newpde $2P_{3/2}$ and $2P_{1/2}$ lobes at $r=r_H$. The $2P_{3/2}$ lobes are in the plane and $2P_{1/2}$ lobes are out of plane at a higher energy eigenvalue. So ortho states are side view and para states are top view. The para parallel internal μ , external π solutions radius is Fitzgerald contracted by $917=\gamma$ resulting in a small Compton wavelength and so large masses. From part II: At high enough positron energies the positron $\Delta \varepsilon$ becomes a single muon ε (see eq.13) moving inside r_H :

$$E = \mu_B B = \frac{\mu_B B A}{A} = \frac{e \hbar}{2 m_\mu} \frac{h}{e} \frac{1}{\pi r_H^2} = \frac{9.27234 \times 10^{-24}}{206.65} \left(\frac{4(2.0678 \times 10^{-15})}{2.481 \times 10^{-29}} \right) = \frac{7.669 \times 10^{-38}}{5.126 \times 10^{-27}}$$

$= 1.5 \times 10^{-11} \text{J} = 93.364 \text{MeV} \approx \text{muon}$. $\delta z = \psi \approx e^{i\varepsilon}$ is the fundamental Dirac state with the electron as usual the Newpde ground state even as in atomic physics. So the equation 13 muon ε produces a second (magnetic) muon ε so the 2muon 2ε is also the **fundamental $2\varepsilon \times 917$ para state** *inside* r_H

Para shrink

Muon shrink: $917(\varepsilon/(1 \pm \varepsilon))$ weak interaction.

$917(\varepsilon/(1 + \varepsilon)) = Z_0$, **80 GeV** Proca spin 1

$917(\varepsilon/(1 - \varepsilon)) = W^\pm$, **91 GeV**; “ “

2 Muon shrink: $917(2\varepsilon/(1 \pm 2\varepsilon))$ **the fundamental para state**

$917(2\varepsilon/(1 + 2\varepsilon)) = t$, **173 GeV**. Para state so Klein Gordon spin 0

$917(2\varepsilon/(1 - 2\varepsilon)) = 207 \text{GeV}$. I call this $J=0$ particle the James.

Outside r_H

Pion Shrink: 917π Klein Gordon spin 0

$917\pi = H$, **125 GeV**. H is merely a para parallel π , outside zpe for the para solutions

Note these para $\gamma=917 \times$ tiny λ , so huge mass $=m=h/c\lambda$, solve the hierarchy problem and also explain every part of the p-p collision data (Z, γ) curve from the (huge) CMS detector at LHC!

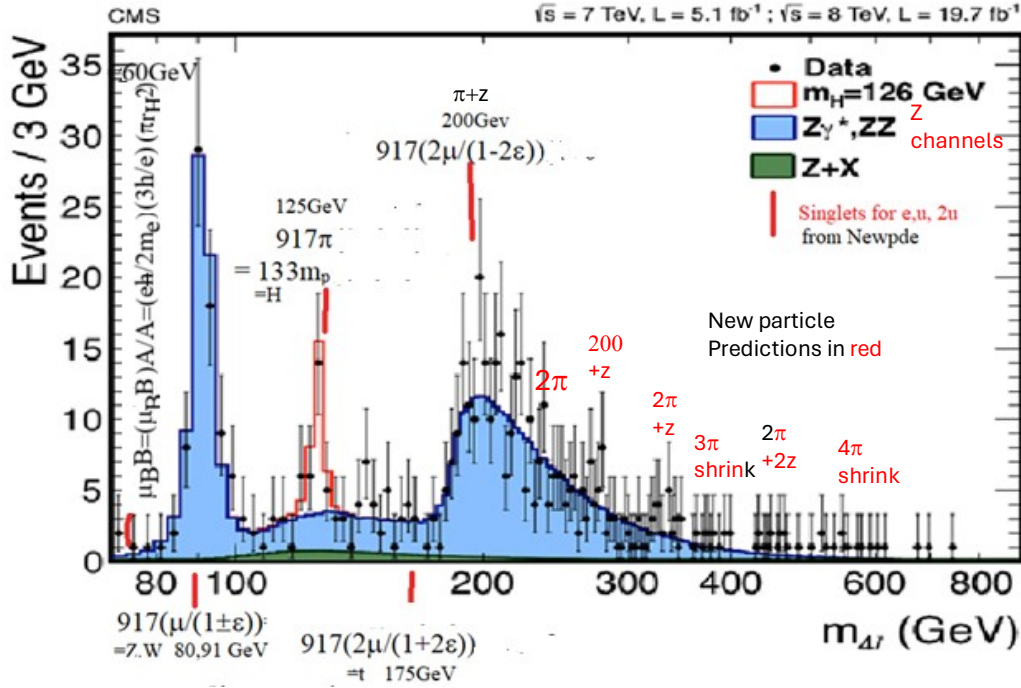


fig6

For the **composite e,v** on those required large $z=0$ eq.16 rotations for $C \approx 0$, and for stability $r=r_H$ for $2P_{1/2}$ ($I \rightarrow II$, $III \rightarrow IV$, $II \rightarrow III$) unless $r_H=0$ ($IV \rightarrow I$) are:

Ist $\rightarrow$ II quadrant rotation is the W^+ at $r=r_H$. Do similar math to C2-C7 math and get instead a Proca equation. The limit $\epsilon \rightarrow 1 = \tau$ (D13) in ξ_1 at $r=r_H$ since Hund's rule implies $\mu = \epsilon = 1S_{1/2} \leq 2S_{1/2} = \tau = 1$. So the ϵ is negative in $\Delta\epsilon/(1-\epsilon)$ as in case 1 charged as in appendix A1 case 2.

$E = 1/\sqrt{(\kappa_{00})} - 1 = [1/\sqrt{(1-\Delta\epsilon/(1-\epsilon)-r_H/r)}] - 1 = [1/\sqrt{(\Delta\epsilon/(1-\epsilon))}] - 1$. $E_t = E + E = 2/\sqrt{(\Delta\epsilon/(1-\epsilon))} = W^+$ mass.

$E_t = E - E$ gives E&M that also interacts weakly with weak force.

IIIrd $\rightarrow$ IV quadrant rotation is the W^- . Do the math and get a Proca equation again.

$E = 1/\sqrt{(\kappa_{00})} - 1 = [1/\sqrt{(1-\Delta\epsilon/(1-\epsilon)-r_H/r)}] - 1 = [1/\sqrt{(\Delta\epsilon/(1-\epsilon))}] - 1$. $E_t = E + E = 2/\sqrt{(\Delta\epsilon/(1-\epsilon))} = W^-$ mass.

$E_t = E - E$ gives E&M that also interacts weakly with weak force.

II $\rightarrow$ III quadrant rotation is the Z_0 . Do the math and get a Proca equation. C_M charge cancelation. B14 gives $1/(1+\epsilon)$ gives 0 charge since $\epsilon \rightarrow 1$ to case 1 in appendix C2.

$E = 1/\sqrt{(\kappa_{00})} - 1 = [1/\sqrt{(1-\Delta\epsilon/(1+\epsilon)-r_H/r)}] - 1 = [1/\sqrt{(\Delta\epsilon/(1+\epsilon))}] - 1$. $E_t = E + E = 2/\sqrt{(\Delta\epsilon/(1+\epsilon))} - 1 = Z_0$ mass.

$E_t = E - E$ gives E&M that also interacts weakly with weak force. Seen in small left handed polarization rotation of light. Recall that $\Delta\epsilon = .00058$. If contracted to $r=r_H$ by this singlet state contraction then for the two $\pm$ leptons ($10^{-18}m$). From eq.B10: $2\mu\gamma(1/(1\pm\epsilon)) = 2\mu 917(1/(1\pm\epsilon)) =$

$$E = \frac{2m_p}{\sqrt{1-\Delta\epsilon-\frac{r_H}{r}}} \left(\frac{1}{1\pm\epsilon} \right) = \frac{2m_p}{\sqrt{1-\Delta\epsilon-\frac{r_H}{r_H}}} \left(\frac{1}{1\pm\epsilon} \right) = \frac{2m_p}{\sqrt{\Delta\epsilon}} \left(\frac{1}{1\pm\epsilon} \right) = 85 \left(\frac{1}{1\pm\epsilon} \right) = Z_0, W^\pm \text{ as our IV quadrant}$$

to Ist quadrant rotation Proca equation showed us. Z_0 or $W = 85 \frac{1}{1\pm\epsilon}$ negative ϵ means charged.

Positive ϵ is neutral as shown in case 1 and case 2 of ch.8 part II.

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

$E=1/\sqrt{\kappa_{00}}-1=[1/\sqrt{(1-\Delta\epsilon/(1+\epsilon))}]-1=\Delta\epsilon/(1+\epsilon)$. Because of the $\pm$ - square root $E=E+-E$ so E rest mass is 0 or $\Delta\epsilon=(2\Delta\epsilon)/2$ reduced mass.

Note we get SM particles out of composite e, ν using required eq.16 rotations.

In these eq.16 axis to axis 4 rotations (getting the 4 Bosons: W^+, W^-, Z^0, γ) we have a short cut way of deriving the Standard Model of particle physics (SM): **The ultimate reality check!!!**

C6 Object B Effect On Inertial Frame Dragging (from appendix B)

The fractal implications are that we are inside a cosmological positron inside a proton $2P_{3/2}$ state at $r=r_H$ state. The cosmological object (electron) we are inside of is a positron and call it object A which orbits electron object B with a given distant 3^{rd} object C. Object B is responsible for the mass of the electron since it's frame dragging creates that Kerr metric $(a/r)^2=m_e c^2$ (B2) result used in eq.A4. So Newpde ground state $m_e c^2 \equiv \langle H_e \rangle$ is the fundamental Hamiltonian eigenvalue defining idea for composite $e, \nu, r=r_H$ implying Fermi 4 point $E = \int \psi^\dagger H \psi dV = \int \psi^\dagger \psi H dV = \int \psi^\dagger \psi G$ Recall for composite e, ν all interactions occur inside r_H $(4\pi/3)\lambda^3 = V_{rH}$. $\frac{1}{V^{1/2}} = \psi_e = \psi_3 \frac{1}{V^{1/2}} =$

$$\psi_\nu = \psi_4 \text{ so } 4pt \iiint_0^{r_H} \psi_1 \psi_2 \psi_3 \psi_4 dV = 2G \iiint_0^{r_H} \psi_1 \psi_2 \frac{1}{V^{1/2}} \frac{1}{V^{1/2}} V \\ \equiv \iiint_0^{r_H} \psi_1 \psi_2 G \equiv \iiint_0^{r_H} \psi_1 \psi_2 (2m_e c^2) dV_{rH} = \iiint_0^{r_H} \psi_1 (2m_e c^2) \psi_2 dV_{rH} \quad (A8)$$

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

$$\Sigma((\gamma^\mu \sqrt{\kappa_{\mu\mu}} dx_\mu) - i\kappa)(\gamma^\nu \sqrt{\kappa_{\nu\nu}} dx_\nu + i\kappa)\chi = \Sigma((\gamma^\mu \sqrt{\kappa_{\mu\mu}} dx_\mu) - i\kappa)\psi \text{ so } \frac{1}{2}(1 \pm \gamma^5)\psi = \chi. \quad (C9)$$

In that regard the expectation value of γ^5 is speed and varies with $e^{i3\phi/2}$ in the trifolium. The spin $1/2$ decay proton $S_{1/2} \propto e^{i\phi/2} \equiv \psi_1$, the original ortho $2P_{1/2}$ particle is chiral $\chi = \psi_2 \equiv \frac{1}{2}(1 - \gamma^5)\psi = \frac{1}{2}(1 - \gamma^5 e^{i3\phi/2})\psi$. Initial $2P_{1/2}$ electron ψ is constant. Start with initial ortho state χ . These γ^5 terms then modify equation A8 to read $= \iiint_0^{r_H} \psi_1 \psi_2 (2m_e c^2) dV_{rH} = \iint \psi_{S1/2}^* (2m_e c^2 V_{rH}) \chi dV_\phi =$
 $K \int \langle e^{i\frac{\phi}{2}} [\Delta\epsilon V_{rH}] (1 - \gamma^5 e^{i\frac{3}{2}\phi}) \psi \rangle d\phi = K G_F \int \langle e^{i\phi/2} - \gamma^5 i e^{i(4/2)\phi} \rangle d\phi = K G_F \left(\frac{2e^{i\phi}}{i} \Big|_0^{2\pi+C} - \frac{2\gamma^5 e^{i4\phi}}{i4} \Big|_0^{2\pi+C} \right) = k(1/4 + i\gamma^5) = k(.225 + i\gamma^5 0.974) = k(\cos 13^\circ + i\gamma^5 \sin 13^\circ)$ **deriving the 13° Cabbibo angle.** With previously mentioned CP result(direct evidence of fractal universe) get CKM matrix

C7 Object C Effect on Inertial Frame Dragging and G_F found by using eq.C8 again (N=1 ambient cosmological metric)

Review of $2P_{3/2}$ Next higher fractal scale ($X10^{40}$), cosmological scale. Recall from B2 $m_e c^2 = \Delta\epsilon$ is the energy gap for object B vibrational stable eigenstates of composite $3e$ (vibrational perturbation r is the only variable in Frobenius solution, partII Ch.8,9,10) proton. Object B puts out (from our frame of reference) a simple transverse Lorentz transformation from the LOS, a scalar effect really. In contrast object C is not moving transverse so uses the entire Lorentz transformation matrix, is a more complicated tensor effect, so not necessarily just a repeated E&M. Observer in object A. $\Delta m_e c^2$ gap=object C scissors eigenstates. is what we see at object A but $\Delta m_e c^2$ gets boosted by γ by rotation into the object B direction.(to compare with the object B $m_e c^2$ gap).

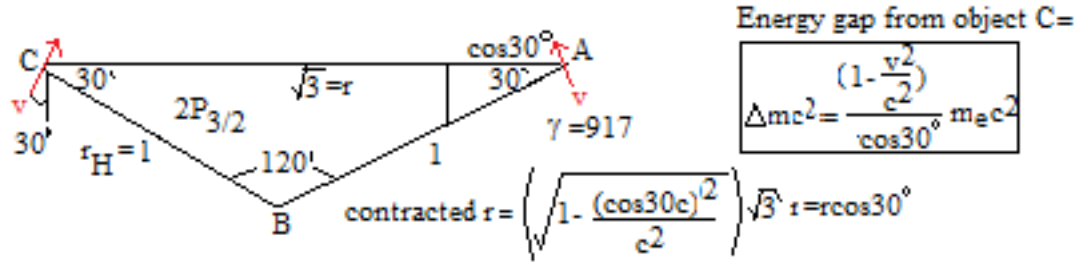


fig7

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

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

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

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

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

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

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

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

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

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

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

$$\Delta m_e c^2 = \frac{\beta m_e c^2}{\beta \cos 30^\circ \gamma^2} = \frac{\left(1 - \frac{v^2}{c^2}\right) m_e c^2}{\cos 30^\circ} \quad (C10)$$

allowing us to finally compare the energy gap caused by object C ($\Delta m_e c^2$) to the energy gap caused by object B ($m_e c^2$. C8). So to summarize $\Delta E = (m_e c^2 / ((\cos 30^\circ) 917^2)) = m_e c^2 / 728000$. So the energy gap caused by object C is $\Delta E = (m_e c^2 / ((\cos 30^\circ) 917^2)) = m_e c^2 / 728000$. The weak interaction thereby provides the ΔE perturbation ($\int \psi^* \Delta E \psi dV$) inside of r_H creating those Frobenius series (partII) $r \neq 0$ states, for example in the unstable equilibrium $2P_{1/2}$ electrons m_e . so in the context of those e, v rotations giving W and Z_0 .. The G can be written for E&M decay as

$(2mc^2)XVr_H = 2mc^2 [(4/3)\pi r_H^3]$. But object C Hamiltonian is a higher ranked tensor than (uniform scalar object Bs) so because this added object C rotational motion is eq.A9 Fermi 4 point it is entirely different than a mere 'weak' E&M. So for weak decay from equation A8 it is $G_F = (2mc^2/728,000)Vr_H = G_F = 1.4 \times 10^{-62} \text{ J-m}^3 = 9 \times 10^{-4} \text{ MeV-F}^3$ **the strength of the Fermi 4pt weak interaction constant** which is the coupling constant for the Fermi 4 point weak interaction integral. Note $2mc^2/729,000 = 1.19 \times 10^{-19} \text{ J}$. So $\Delta E = 1.19 \times 10^{-19} / 1.6 \times 10^{-19} = .7 \text{ eV}$ which $\pm$ that r perturbation (instability) states in the Frobenius solution (partII) and so weak decay. is our ΔE gap for the weak interaction (from operator H) inside the Fermi 4pt. integral for G_F .

The perturbation r in the Frobenius solution is caused by this ΔH in $(\int \psi^* \Delta H \psi dV)$ with available phase space $\psi^* = \psi_p \psi_e \psi_\nu$ for $\psi = \psi_N$ decay where ψ_e and ψ_ν are from the eq.5 factorization created phase space. The neutrino adds a $e^2(0)$ to the set of $e^2 10^{40N}$ electron solutions to Newpde r_H with electron charge $\pm e$ and intrinsic angular momentum conservation laws $S=1/2$ holding for both e and ν .

The neutrino mass increases with nonisotropic homogenous space-time (C8 and our direction of motion here) whereas that Kerr metric $(a/r)^2$ term (B2) in general is isotropic and homogenous and so only effects the electron mass.

C8 NONhomogeneous and NONisotropic Space-Time

Recall 2D $N=1$ and that 2D $N=0$ (perturbation) orientations are not creatable so we have $2D+2D=4D$ degrees of freedom. But this is all still embedded in the same complex (2D) plane. So this theory is still complex 2D Z then. Recall the $\kappa_{\mu\nu} = g_{\mu\nu}$ metrics (and so R_{ij} and R) were generated in section 1.

In that regard for 2D for a homogenous and isotropic g_{ij} we have identically $R_{\mu\mu} - 1/2 g_{\mu\mu} R = 0 \equiv \text{source} = G_{00}$ since in 2D $R_{\mu\mu} = 1/2 g_{\mu\mu} R$ identically (Weinberg, pp.394) with $\mu=0, 1 \dots$ Note the 0 ($=E_{\text{total}}$ the energy density source) and we have thereby proven the existence of a net zero energy density vacuum. Thus our 2D **theory implies the vacuum is really a vacuum!** It is then the result of the fractal and 2D nature of space time!

A ultrarelativistic electron is essentially a transverse wave 2D object (eg., the $2P_{1/2}$ electron in the neutron). In a isotropic homogenous space time $G_{00}=0$. Also from sect.2 eqs. 7 and 8 (9) occupy the same complex 2D plane. So eqs. 7 and 8 is $G_{00} = E_e + \sigma \cdot p_r = 0$ so $E_e = -\sigma \cdot p_r$. So given the negative sign in the above relation the **neutrino chirality is left handed**. But if the space time is not isotropic and homogenous then G_{00} is not zero and so the **neutrino gains mass** (These two ν masses cancel out in the IV $\rightarrow$ I rotation of C4 γ)

C9 Derivation of the Standard Electroweak Model from Newpde but with No Free parameters

Since we have now derived M_W , M_Z and their associated Proca equations, and Dirac equations for m_τ, m_μ, m_e etc., and G, G_F, k_e^2 Maxwell's equations, etc. we can now write down the usual Lagrangian densities that implies these results. In the formulation $M_Z = M_W / \cos\theta_W$ you can find the Weinberg angle θ_W , $g \sin\theta_W = e$, $g' \cos\theta_W = e$; solve for g and g', etc., We will have thereby derived the standard model from first principles (i.e., postulate 0). **It no longer contains free parameters.**

Note $C_M = -1.75$ pt really is the U(1) charge and equation 16 rotation is on the complex plane so it really implies SU(2) (C1) with the sect.1.2 2D eqs. 7+8+9 = $G_{00} = E_e + \sigma \cdot p_r = 0$ gets the left handedness. Recall the genius of the SM is getting all those properties (of γ, Z_0, W^+, W^-) from

SU(2)XU(1)_L so we really have completely derived the standard electroweak model from eq.16 which comes out of the Newpde given we even found the magnitude of its input parameters (eg., G_F (appendix C7), Cabbibo angle C6).

Appendix M (for underlying math)

M1) **D=5 if using N=-1, and N=0, N=1 contributions in same $R_{ij}=0$**

Note the N=-1 (GR) is yet another δz perturbation of N=0 δz perturbation of N=1 observer thereby adding, if these scales share the same time coordinate, at least 1 independent parameter tiny (wrapped up) N=-1 fractal scale dimension added to our $\delta z + (dx_1 + i dx_2) + (dx_3 + i dx_4)$ (4+1) explaining why Kaluza Klein 5D $R_{ij}=0$ works so well: GR is really 5D if N=0 E&M included with N=-1 as in Reissner Nordstrom.

M2) Alternative ways of adding 2D+2D→4D

Recall from section 1 that adding the N=0 fractal scale 2D δz perturbation to N=1 eq.7 2D gives curved space 4D. So $(dx_1 + i dx_2) + (dx_3 + i dx_4) \equiv dr + i dt$ given (eqs 5, 7a) $dr^2 - dt^2 = (\gamma^r dr + i \gamma^t dt)^2$ if $dr^2 \equiv dx^2 + dy^2 + dz^2$ (3D orthogonality) so that $\gamma^r dr \equiv \gamma^x dx + \gamma^y dy + \gamma^z dz$, $\gamma^i \gamma^j + \gamma^j \gamma^i = 0$, $i \neq j$, $(\gamma^i)^2 = 1$, rewritten (with curved space $\kappa_{\mu\nu}$ eq. 14-17)

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

But there are alternatives to this 3D orthogonalization method. For example satisfying this 4D Clifford algebra and complex orthogonalization requirement is a special case of any 2 $x_i x_j$ in eq.3 (directly from postulate1): Imposing orthogonality thereby creates 6 pairs of eqs.3&5. So each particle carries around it's own $dr + i dt$ complex coordinates with them on their world lines. Alternatively this 2D $dr + i dt$ is a 'hologram' 'illuminated' by a modulated $dr^2 + dt^2 = ds^2$ 'circle' wave (as 2nd derivative wave equation operators from eq.11 circle) since 4Degrees of freedom are imbedded on a 2D (dr, dt) surface here, with observed coherent superposition output as eq.16 solutions. A more direct way is to simply write the 4Degrees of freedom on the 2D surface as $dr + i dt = (dr_1 + i dt_1) + (dr_2 + i dt_2) = (dr_1, \omega dt_2), (dr_2, i dt_2) = (x, y, z, i dt)$ where $\omega dt \equiv dz$ is the z direction spin $1/2$ component ω (angular velocity) axial vector of the Newpde lepton (eqs.7-9); which we get anyway from lepton equation Newpde. Also see M4.

*M4

Origin Of Mathematics is postulate0

Abstract I have derived both mathematics and physics from first principles (ie So we finally understand how it all works!). Nobody else has done that. $z = zz + C$ is the key & first principle=0 given the algebraic properties defining 0 (ie $0=0X0, 1=1X1, 1=1+0$, sect.1) imply $z = zz + C$ (C constant thus $\delta C = 0$ real# derivative sect.2) which then implies Mandelbrot set and Dirac eq (5).

1) Algebraic Properties of 0: $0=0X0, 1=1X1$ (defining symbol $zz=z$ for $z=0$ or $z=1$) and $1=1+0$ defining symbol $z=zz+C$ eq1 if some $C=0$. A **Real number** is defined as the limit of a rational Cauchy sequence that must double here as the unique iteration $z_{N+1} \equiv z_N z_N + C$ if some $C=0$ since we then get $z = zz + C$ for $z_0=0, 1$ so can **Postulate0** as $z_0=0, (1)=z$ (eg. some $C=0$ at origin in fig1)

1a) Theorems from Postulate0 eq1: $1=1X1=1X(1+0) \equiv 1X1 + 1X0 = 1+0$. After 4 such ()definitions get $zz_N + zz_M \equiv z(z_N + z_M)$ & $(a+b)(c+d) \equiv ac + ad + bc + bd$ **distributive law** implying $1X0=0$, (so $z \neq 0$ or $z=1$) then $1Xz=z$ so (for $z=1$) $1 \equiv z/z$ so $1/z$ (new symbol $/$) case of the **multiplicative inverse** for fields. $\delta C=0$ defines $C_1 - C_2 = 0$ so **ring additive inverse**. zz_N **Associativity** $z_M=0$: so $e \equiv bc$ then

$abc=a(e)$; $ab \equiv f$ then $abc=(f)c$ so $(ab)c=a(bc)$. z_N+z_M **associativity** so $z=1$. So **postulate0** ($z_0=0$) generates real# mathematics (for big C too). So plug ansatz $z=1+\delta z$ into **eq1** get $\delta z+\delta z\delta z=C$ (3)

$$\text{So (for } -1/4 > C) \frac{-1 \pm \sqrt{1^2 + 4C}}{2} \delta z \equiv dr$$

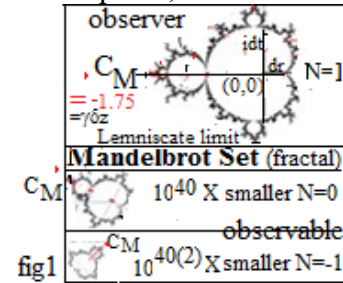
2) C is Constant (Thus we must plug **eq1** $\delta z+\delta z\delta z=C$ (and its iteration $z_{N+1}-z_N z_N=C$) into $\delta C=0$)

2a) Plugging the eq1 rel iteration ($z_{N+1}-z_N z_N=C$) into δC implying $\delta C=\delta(z_{N+1}-z_N z_N)=\delta(\infty-\infty) \neq 0$ for some C. The Cs that result *instead* in finite z_{∞} s (so $\delta C=0$) define the **Mandelbrot set C** in fig1. The lemniscate circles sum projection(11) to the fig1 $dr \approx dR$ axis is continuous as required

by the derivative in $\delta C \equiv (\partial C / \partial R) dR = 0$ at $C=C_M = C_{M(N=1)} 10^{xN}$ where $\frac{\partial C}{\partial C_M} \frac{\partial C_M}{\partial x} \frac{\partial x}{\partial R} = 0$ extremum

$\frac{\partial x}{\partial R} = 0$ lemniscate scale jump xN is at $(\frac{\partial C}{\partial C_M} = 0) C_M = -1.75$ ($N=1$) with the largest $x \approx 40$. The

$N < 0$ eq11 $\omega, k = \text{"observables"}$ (in fig1) come from eq11 $\delta z = dse^{i(kr-\omega t)}$ that must also multiply eq20



For example for $N=1$ huge δz fractal scale fig1 $\delta z \gg \delta z$ since we always 'observe' tiny $N=0$ 'observables' such as photon electron-atomic scale $\Delta \omega$ interactions So extreme solve $\delta C=0$ so are the only zoompoints (pulling out fig1 lemniscates) <http://www.youtube.com/watch?v=0jGaio87u3A> continuous lemniscates'

2b) Plugging eq1 directly into $\delta C=0$ is also required. So given $N=1$ eq1 and thus eqs 3,4

$$\delta C = \delta(\delta z + \delta z \delta z) = \delta \delta z + 2(\delta \delta z) \delta z \approx \delta(\delta z \delta z) = \delta((dr + idt)^2) = \delta[(dr^2 - dt^2) + i(dr dt + dt dr)] = 0 = \quad (5)$$

Minkowski metric + **Clifford algebra** $\equiv$ **Dirac equation** (See eq7a γ^μ derivation from eq5.). But

($N=0$, 2D) $\delta \delta z$ must be small but not zero so it *automatically* provides 2 extra degrees of freedom for the ($N=1$, 2D) independent Dirac dr implying 2D Dirac + 2D Mandelbrot = 4D Dirac

$$\text{Newpde} \equiv \gamma^\mu (\sqrt{\kappa_{\mu\mu}}) \partial \psi / \partial x_\mu = (\omega/c) \psi \text{ for } v, e; \quad \kappa_{00} = e^{i(2\Delta\varepsilon/(1-2\varepsilon))} - r_H/r, \quad \kappa_{rr} = 1/(1+2\Delta\varepsilon - r_H/r); \quad r_H = C_M/\xi =$$

$$e^2 X 10^{40N}/m \text{ (fractal jumps } N = -1, 0, 1, \dots) \quad 1 > \varepsilon \equiv \mu > \Delta\varepsilon = m_e \text{ (appendix A, B, C, fig2). Postulate0}$$

means *real 0 exists* (causing the newpde to have *real* eigenvalue operators). Thus **a number**

dr/ds "exists" if it's also a *real* eigenvalue on the eigenfunction ψ of the Newpde. davidmaker

3) completeness and choice are immediately proven

Also note our postulate of 0 with that **eq1** (ie $z=zz+C$) provides the important mathematical concepts of "**Completeness**" ($\min(zz-z) > 0$) given $((-1.75)^2 - (-1.75)) = 4.81 > 0$) for the $-C$ domain

(sect.2, $C \leq 0$) of $(-1.75, 0)$ and "**choice**" (since the single "choice" function is " $z=zz+C$ ") which

are intriguingly NOT axioms anymore here! Also *counting* the zoom trifurcations (real eigenvalue counters in the Mandelbrot set given sect.2 Dirac eq result of a plugin) replaces

Peano's counting axioms (math induction).

Parenthesis (0,1) multiplication definition $zz_N + zz_M \equiv z(z_N + z_M)$ cases

Case1 let $z_M=0$. So in $aXbXc$ can define $e=bXc$ then $aXbXc=a(e)$; $aXb=f$ then $aXbXc=(f)c$. So $a(bXc)=(aXb)c$ **associativity**. Use $z=1$ in above for addition so that $a+b+c=(a+b)+c=a+(b+c)$

Case2 z_M might not be zero. Also use only 1 and 0 in those sect1a calculations (so not $1+1=2$) so the **distributivity** law needs only 4 cases $(1+0)(1+0)$, $(0+1)(0+1)$, $(0+1)(1+0)$, $(1+0)(0+1)$

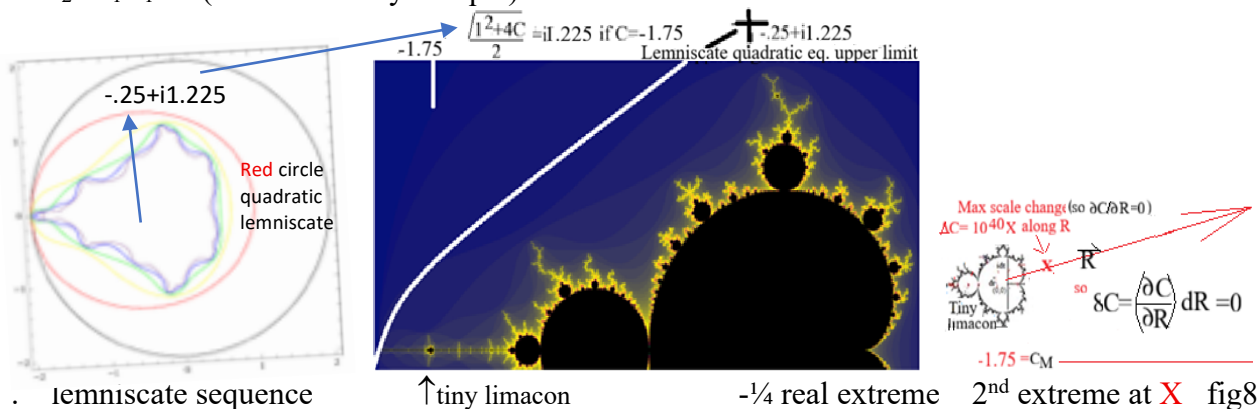
eg $1=1X1=(0+1)(1+0)=(1)(1+0)=1(1+0)=1X1+1X0=1+1X0=1$. So $1X0=0$ (with $1X1=1$ then $1Xz=z$). Also no need to assume multiplication commutativity so allowing Clifford algebra.

Conclusion If you can straighten out mathematics (eg., one simple axiom0 gets everything) you will also straighten out theoretical physics.

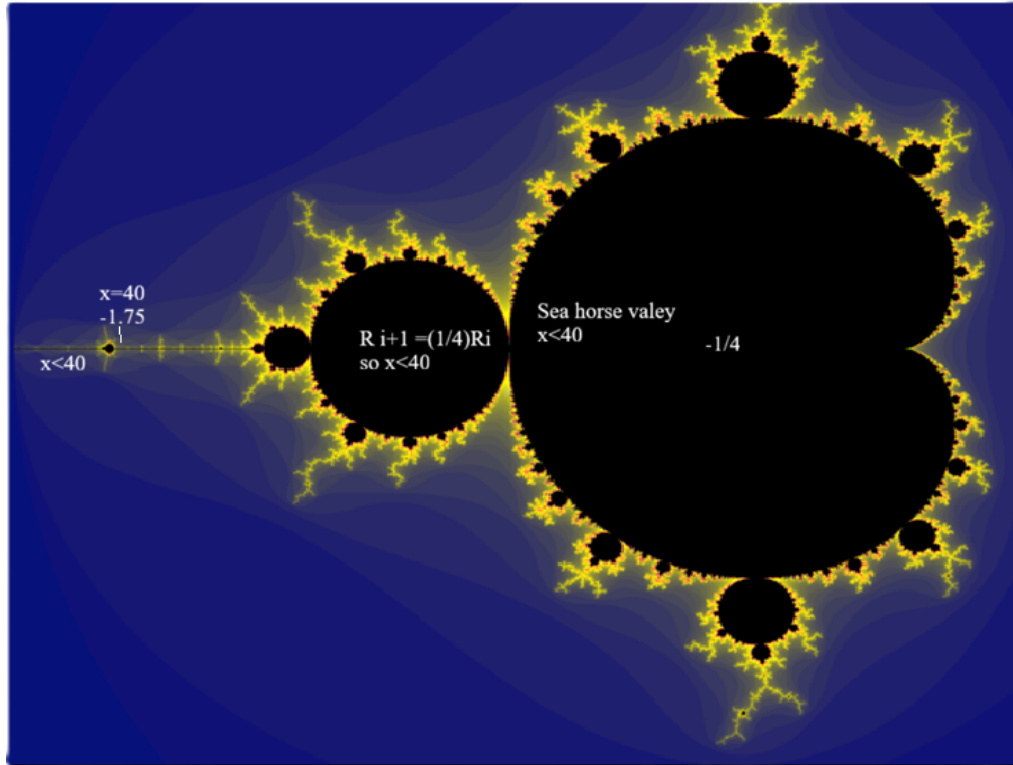
M5 Lemniscates required in dr,dt zoom: <http://www.youtube.com/watch?v=0jGaio87u3A>

The fig1 Lemniscate (as a function of adding continuous circles left fig8) is continuous(13) (horizontal snowman like figure) only along dr. So these δz fields of real numbers allow us to define the general case of ϵ, δ arbitrarily small (so both rational and irrational ie **real**) in the limit definition of the Newton quotient derivative $= \lim_{h \rightarrow 0} \frac{f(x+h)-f(x)}{h} = \frac{df(x)}{dx}$ so we can write $\delta C \equiv \left(\frac{\partial C}{\partial r}\right) dr = 0$ thus **implying the requirement that C really is a constant** (ie $\partial C/\partial R=0$) as the postulate demands. So to define $\delta C=0$ we *must* pull *only* the lemniscates (that look like those reclining snowmen of fig1) out of the zoom thereby **causing this zoom process to give us mathematically rigorous results!** By zooming at $C_M=-1.75$ we **observe** fractal $10^{40N}X$ scale jumps allowing lemniscate rotation (back to that $N=1$ orientation) and so not effecting that continuity of this lemniscate structure. So one $10^{40}X$ zoom is enough.

To find the **-1.75 lower boundary from these lemniscate iterations** reverse engineer on $N=1$ the lemniscates down to the second circle iteration where the 2nd circle C_n is not $0=C_0$ creating our fundamental lemniscate quadratic equation border containing point $(-.25, i1.225)$ on that 1st extremum upper boundary. We must use that quadratic equation for that boundary because it is just as fundamental as eqs.1 & 3 are and so also has its own solutions like they do. We could have even postulated this circle equation instead of equation 1. Recall the lemniscate iteration(11) sequence is $C_{N+1}=C_N C_N + C$. $C=C_1=dr^2+dt^2$, $C_0=0$. So that quadratic circle equation is $C_2=C_1 C_1 + C$ (Note similarity to eq.1.). To find the smallest boundaries we first write



lemniscate sequence $\uparrow$ tiny limaçon $-1/4$ real extreme 2nd extreme at **X** fig8
 So extreme $(-1.75, -1/4)$ solve $\text{real} \delta C=0$. So we can only zoom at those two points. For example for the 2nd extreme (for $\partial C/\partial R=0$) at **X** $= -1.75$ zoom along some lemniscate radial R direction near dr axis (tiny limaçon) filament <http://www.youtube.com/watch?v=0jGaio87u3A> (right fig8) to get the extreme maxima $10^{40N}X C_M$ scaling. In contrast the zoom at $-1/4$ gets the useless continuum. Alternatively to the above analytical solution, we note by inspection of the real axis of the Mandelbrot set (http) that the extremum $x=40$ (in $C=C_M 10^{40N}$) really is at $r=-1.75$ below:



$\delta C = (\partial C / \partial R) dR = 0 = d(C_M 10^{xN})$. $C = C_M$ is the postulated constant C . Along the real dr line $x < 40$ except at $R = -1.75$, $x = 40$. So lower bound $R = -1.75$, upper bound $R = -1/4$ fig9.

Contrast with mainstream mathematics: Note here “sets” $\{x\}$ are these lists (written out as $1+1+1+\dots$) and numbers the “elements 1 ” $\in$ of these sets. The many ring and field axioms are replaced with “lists as *definitions* of these symbols”. The *real* part of the definition of 0 (in terms of the algebra of 0) then becomes the only axiom of the “existence” of these numbers (as the real eigenvalues of the Newpde electron eigenfunction).