A Generally Covariant Generalization of the Dirac equation that does not require gauges(Newpde)

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

So over the past 100 years people have had to try to make up for that mistake by adding adhoc convoluted gauge force after gauge force until 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 fundamental theoretical physics being made,.. forever.

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

References

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

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

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

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

(4) Here $\kappa_{oo}=1-r_H/r=1/\kappa_{rr}$, $r_H=(2e^2)(10^{40N})/(mc^2)$. The **N**=..**-1,0,1**,.. applies to the Nth Fiegenbaum point self-similar fractal scale. Newpde from Occam's razor *optimized* **postulate**1:

z=zz is the algebraic definition of **1** and adding (small) constant C is trivial in z+C=zz, $\delta C=0$ (1)

A Substitute $z=1+\delta z$ into equation 1 and get 2D Dirac equations for e,ν (sect.1.1).

B Substitute left side z into right side zz repeatedly in equation 1and get the 2D Mandelbrot set

A,**B** together gives 4D Newpde. So **Postulate**1→**Newpde**

(5) For **N=0** the third order Taylor expansion term of $\sqrt{\kappa_{\nu u}}$ gives the Lamb shift and anomalous gyromagnetic ratio (without the renormalization and infinities(6))

For **N=-1** (i.e.,e^2X10^{-40}) $\kappa_{\mu\nu}$ is then the Schwarzschild metric $g_{\mu\nu}$; so we just derived General Relativity and the gravity coupling *from* Quantum Mechanics(QM) in one line. So κ_{uv} even provides the general covariance of the Newpde. Eq 2a (ref.7) *even* provides us space-time r,t

For **N=1** (so $r<r_C$) Newpde zitterbewegung expansion stage explains the universe expansion.

For **N=1** zitterbewegung harmonic coordinates *and* Minkowski metric submanifold (after long time expansion) gets De Sitter ambient metric we observe astronomically(B1).

For **N=0** $r=r_H$ composite 3e is the baryons and composite e,ν is the Standard electroweak Model Bosons(append.A). We derived Quantum Mechanics (QM,Newpde) for *all* N fractal scales!(B3)

For **N=1** for example the QM large wavelength psi's provide the explanation for the **large stellar speeds** v in the halos (eg.,Witten's 'fuzzy'theory). Just set $\kappa_{oo}=g_{oo}$ in the halo, solve for constant v

For **N=1** there is a ambient fractal self similar (S=½) cosmological Kerr metric *Newpde* rotation so with off diagonal $dtd\phi$ cross term T violation that **then causes** the (given CPT) **CP violation** and (the selfsimilar S=½ spin axis) also puts a weak dipole on the cbr sky (thus the 'axis of evil')

For **N=0** (Eqs.2-5, ref.7) 2D $R_{oo}-(1/2)g_{oo}R=G_{oo}=+H_e+H_\nu$ giving $\sigma*p=H_\nu$ a negative sign and so **left handed chirality** to ν for maximally symmetric space (MS) time since then for 2D $G_{oo}=0$. If not MS, as in a nonzero gravity gradient, H_ν (**neutrino**) thereby **gains** G_{oo}, i.e., **mass.**

References (continued)

6) Need infinities if flat space Dirac equation. For flat space $\partial g_{ik}/\partial x^j=\mathbf{0}$ as a limit. Then must take $g^{km}=1/0=\infty$ to get finite Christoffel symbol $\Gamma^m_{ij}\equiv(g^{km}/2)(\partial g_{ik}/\partial x^j+\partial g_{jk}/\partial x^i-\partial g_{ij}/\partial x^k)$ $=(1/\mathbf{0})(\mathbf{0})=$*un*defined but still implying *non*zero acceleration on the left side of the geodesic equation: $\frac{d^2x^\mu}{ds^2}=-\Gamma^\mu_{\nu\lambda}\frac{dx^\nu}{ds}\frac{dx^\lambda}{ds}$ So we need infinite fields for flat space. Thus QED requires (many such) infinities. But we have in general curved space $g_{ij}=\kappa_{ij}$ in the New pde so do not require that anything be infinite and yet we still obtain for the third order Taylor expansion term of $\sqrt{\kappa_{\mu\nu}}$ the Lamb shift and anomalous gyromagnetic ratio correction (sect.1.2).

7)Derivation of Newpde: **Physics of self similar fractal scales**

We can do this using the Occam's razor *optimized* **postulate** 1. For example z=zz is the algebraic definition of 1 and adding constant C is trivial in

$$z+C=zz,\ \delta C=0 \qquad \textbf{(1)}$$

A Substitute z=1+δz into **equation 1**, get δz+δzδz-C=0 (or δ(δz+δzδz)=0) (2)

We asume C has a constant density. Solve eq.2 and in-general get $\delta z=\frac{-1\pm\sqrt{1+4C}}{2}$,

C<<-¼, so **BIG-C** so big δz for **(**for random time t) complex solution δz=dr+idt (3)

Big δz so δz<<δzδz (and δδz≈0) in eq.2. So $\delta(\delta z+\delta z\delta z)\approx\delta(\delta z\delta z)=(dr^2-dr^2+i(drdt+dtdr))=0$ (4)

and take real Minkowski and imaginary component Clifford algebra which for negative and positive dr,dt imply *non*infinite extremum $drdt+dtdr=0=\gamma^i dr\gamma^j dt+\gamma^j dt\gamma^i dr=(\gamma^i\gamma^j+\gamma^j\gamma^i)drdt=0$ (5)

Given that Clifford algebra we get, after factoring $dr^2-dr^2=ds^2$, 2D Dirac equations for e,v.(δz≡ψ)

B Substitute left side z into right side zz repeatedly in **equation 1** and thereby get the **Mandelbrot set** iteration (with its well known 10^{40N}X fractal selfsimilar **N**=.,.-1,0,1,..scale jumps at Fiegenbaum point C_M 2D nonflat extremum δz'). C is not uniform density here.

Notes: **Big -C case** allows random t and so Hamiltonians H (i.e.,***physics***)

Real eigenvalues of H require the (**Mandelbrot set** subset) Cauchy sequence, sect.2.3.

Big **γ** (in (1/γ)δz) boost means small C≈δz>>δzδz (so δ(δz')=0) and so no more quadratic equation but we still keep our complex δz and so dt. Small C is z=zz **postulate** 1.

A,B together (and the γ boost**)** gives: **Newpde** $\gamma^\mu\sqrt{(\kappa_{\mu\mu})}\partial\psi/\partial x_\mu=(\omega/c)\psi$ for e,*v*

with $\kappa_{oo}=1-r_H/r=1/\kappa_{rr}$, $r_H=(2e^2)(10^{40N})/(mc^2)$ Summary: **Postulate1→Newpde**

8) **ring of truth:** Equation1 bears a striking resemblance to the **Mandelbrot** set iteration formula and *yet* puts out as imaginary & real components the **Dirac** eqs. for e,*v*. They are connected! (also via Newpde). So we thereafter just do that big γ boost that gets small δz≈C and so zz=z so postulate1 (γ boost also gets the numerical outputs of the Newpde such as that mc^2)

Note this is the first Ockam's razor *optimized* (i.e., postulate1) method of deriving theoretical physics (We figured it out! Appen.A8), not that ~100 postulates, assumptions, >23 free parameters mess (So where do those many postulates come from?). Furthermore, this New pde Nth fractal scale approach is clearly the path to breakthrough physics and generates correct physical constants as we saw in reference 5.

I Summary: Algebra Details of the two substitutions (A,B):

1.1 (Simply **postulate** 1. But z=zz is the algebraic definition of 1 and adding constant C (or K) is trivial in:) zz=z+C, δC=0 **(1)**

A Substitute z=1+δz into **eq.1**, get δz+δzδz=C (2) (or δ(δz+δzδz)=0) with in general (for $\delta z=\frac{-1\pm\sqrt{1+4C}}{2}$, **C<<-¼**, so**Big-C** and so big δz for random time t complex solution δz=dr+idt (2a)
Big δz so, δz<<δzδz,. δδz=0 So from eq.2,2a δ((δz+δzδz)≈δ(δzδz)=(dr^2-dr^2+i(drdt+dtdr))=0 (2b) and take real Minkowski and imaginary component Clifford algebra which for negative and positive dr,dt the *non*infinite extremum drdt+dtdr=0= $\gamma^i dr\gamma^j dt+\gamma^j dt\gamma^i dr=(\gamma^i\gamma^j+\gamma^j\gamma^i)drdt$ =0 (3)
Factor dr^2-dt^2 =ds^2 eg., δ[(dr+dt)(dr-dt)]=0=[[δ(dr+dt)](dr-dt)]+[(dr+dt)[δ(dr-dt)]] and solve to get: (ds ≡ proper time invariant.)

(→±**e**) dr+dt=ds, dr-dt=ds ≡ds_1 for +ds→ I, IV quadrants (4)
(→light cone ***ν***) dr+dt=ds, dr=-dt, for +ds→ II quadrant (5)
" " dr-dt=ds, dr=dt, " " III quadrant (6)
(→vacuum) dr=dt, dr=-dt so dt=0=dr (7)

We square eq.4 ds_1^2=(dr+dt)(dr+dt) =[dr^2+dt^2] +(drdt+dtdr) ≡ds^2+ds_3=ds_1^2. Since ds_3 (is max or min) and ds^2 (from eq.4) are invariant then so is **Circle** ds^2=dr^2+dt^2 =ds_1^2-ds_3. Note this separate ds is a minimum at 45° and so Circle≡δz=$dse^{i\theta}$=$dse^{i(\Delta\theta+\theta o)}$= $dse^{i((\cos\theta dr+\sin\theta dt)/(ds)+\theta o)}$, θ_o=45°.We define k≡dr/ds, ω≡dt/ds, sinθ≡r, cosθ≡t. $dse^{i45°}$≡ds'. So take the global ordinary dr derivative (since flat space) of 'Circle' $\frac{\partial\left(dse'^{i\left(\frac{rdr}{ds}+\frac{tdt}{ds}\right)}\right)}{\partial r}=i\frac{dr}{ds}\delta z$ so $\frac{\partial\left(dse^{i(rk+wt)}\right)}{\partial r}=ik\delta z,\ k\delta z=-i\frac{\partial\delta z}{\partial r}$ (8
Cancel that $e^{i45°}$ coefficient then multiply both sides of eq.8 by ħ and define δz≡ψ, p≡ħk. Eq.8 then implies (Hermitian) operator ħk **observable***s* formalism(QM). See next paragraph for real k part, (also appendix B3). Eqs 4,5,6,8 and eq.3 Clifford algebra imply 2D Dirac equations for e,*ν*.
Needed Big -C to have random t and Hamiltonians (***observability***)

B Substitute left side z into right side zz repeatedly of **eq.1** to get a Mandelbrot set iteration (for small C limit **eq.1** cases z≈1,0). The right side extremum Cauchy seq. iteration defines **real** k (dr/ds eigenvalues) in eq.8**.** It's left side small drdt (eq.3, δ(drdt)=0) extremum is the fractal Fiegenbaum pt.=C_M Mandelbulb δz'. Note certain Cs have a higher density here so *perturbations*
A&B Big γ (1/γ)δz boost means small C≈δz>>δzδz and so no more quadratic equation but still keeps our complex δz and so dt. So we must Fitzgerald contract (boost=γ) δz to get small C and so z=zz and the **postulate** of 1. So then boost C_M as in δz'=C=C_M/γ=C_M/ξ=r_H so ξ_1 (defining mass) *must be big*. For z=1 in z=1+δz, δz is small and so in C_M=ξδz, **ξ_1 *is* big** and so we got z=zz and the **postulate** of 1**.** But for z=0, δz is big so ξ_o is small and in δC_M=δξδz+ξδδz=0 then since δδz=0 then δξ small so ξ_o is both stable and small (≡electron). On small scales δz >>δzδz so in eq.2 |δz|≈C=constant so can only perturb eq.4 at 45°using (dr-δz')+(dt+δz')≡dr'+dt'=ds (9) since ds=|δz|=C. Define κ_{rr}≡(dr/dr')^2= (dr/(dr-(C_M/ξ_1)))^2=1/(1-r_H/r)^2 =A_1/(1-r_H/r) +A_2/(1-r_H/r)^2 r≡dr. The A_I term can be split off from RN (as in classic GR) and so κ_{rr}≈1/[1-((C_M/ξ_1)r))] . So we have: ds^2= $\kappa_{rr}dr'^2+\kappa_{oo}dt'^2$ +..(10). Note from eq.3 dr'dt'= $\sqrt{\kappa_{rr}}dr\sqrt{\kappa_{oo}}dt$ =drdt so $\kappa_{rr}=1/\kappa_{oo}$ so given that 2D perturbation we get curved space 4D. For 4D our eq.3 Cliffordalgebra then implies $(\gamma^x\sqrt{\kappa_{xx}}dx+\gamma^y\sqrt{\kappa_{yy}}dy+\gamma^z\sqrt{\kappa_{zz}}dz+\gamma^t\sqrt{\kappa_{tt}}idt)^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$. Multiplying the bracketed term by 1/ds &δz then eq 8 implies 4D **Newpde** $\gamma^\mu(\sqrt{\kappa_{\mu\mu}})\partial\psi/\partial x_\mu=(\omega/c)\psi$ for e,*ν* (11) (covariant derivative still ordinary since ψ (complex) scalar). Therefore **postulate1→Newpde**

Small C boost gets z=zz (so postulate 1) but also gets the ***numerical value* of Large ξ_1**
For that stable z=0 the only way to get stable large ξ (required by that small C boost) is with the Newpde composite 3e $2P_{3/2}$ at $r=r_H$ state (partII davidmaker.com). So *stability* $(dt'^2=(1-r_H/r)dt^2)$ clocks stop at $r=r_H$ The *two positron motion* and h/2e quantization of flux BA then gives us the exact proton mass m_p as a reduced mass for the associated Hund rule $\tau\equiv 2S_{1/2}, 1S_{1/2}\equiv\mu$ states (so $\tau+\mu=\xi_1$, $m_p=\xi_1/2$). We rewrite this in the Kerr metric formalism with the 3rd mass also reversing the pair annihilation (Thus virtual pair creation inside the r_H volume given $\sigma=\pi r_H^2\approx(1/20)$barns) and reducing the inertial frame dragging due to the spin½ ξ_1 thereby adding a Kerr metric $-(a/r)^2$ angular momentum operator in $\kappa_{oo}=1-(a/r)^2-r_H/r=\xi_1+\xi_o-C_M/(\xi_o r)=\tau+\mu+m_e-2e^2/(\xi_o r)=$ $\mathbf{1+\varepsilon+\Delta\varepsilon+2e^2/(\xi_0 r)=\kappa_{oo}}$ (Fiegenbaum pt. C_M defines charge e^2.). Divide by $\xi_1=1+\varepsilon$ to normalize for only free electron $\Delta\varepsilon$ energy (Needed for the following two electron applications in eqs.15,16) asymptotic local flat space and thereby finally getting back to that initial requirement for that free particle z=1, *large* ξ_1 case: $\kappa_{oo}=1-\xi_o/(1+\varepsilon)-C_M/(\xi_1 r)=1+\Delta\varepsilon/(1+\varepsilon)-2e^2/(2m_p r)$ (12)
also giving us the *numerical value* of that **large ξ_1** ($=2m_p$). With τ normalized to $\tau=1$ with the Newpde ground state e mass then $\Delta\varepsilon=m_e=.0005799$ with $\varepsilon=\mu=.06$. (12a)