# Cauchy completeness and physics

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**Abstract** All mathematicians know that the real numbers (ie .rationals & irrationals) can be constructed from Cauchy completeness i.e. real# sets as rational Cauchy sequence limits. So all we did here is show we postulated real#0 by using it to derive a associated rational Cauchy sequence. We did this because that same postulate (of real#0) math *also* implies fundamental theoretical physics. See "Results" & Summary.

Recall $1\equiv 1+0$ and (*list*) $\mathbf{0}\equiv 0X0, 1\equiv 1X1$ *defined* as **z=zz**: the simplest algebraic definition of **0** and 1 So

**Postulate** *real* number **0** (so real1) *if* **z'=0** and **z'=1** is substituted (plugged) into z'=z'z'+C **eq1** results in *some* C=0 constant(ie δC=0). Thus

•Plug in **z=0**=$z_o$=z'in **eq1.**To find ***all* C** substitute z' on left (**eq1**)into right z'z' repeatedly andget iteration $z_{N+1}=z_Nz_N-C$. Constraint **δC=0** requires we reject the Cs for which $-\delta C=\delta(z_{N+1}-z_Nz_N)=\delta(\infty-\infty)\neq 0$. The Cs that are left over define the **Mandelbrot set** $C_M$=C with asubset C=0,fractal scales $\delta z'=10^{40N}\delta z$,N=integer These fractal scales having their own δz then perturb that **z=1** so put z=**1**+δz in **eq.1** to get δz+δzδz=C (3) Define N≤0 as 'observable'fractal scales. Thus define the'observer'fractal scales as N≥1 implying |δz|>>1 Then solve equation 3 as a quadratic equation so $\delta z=(-1\pm\sqrt{1+4C})/2$=dr+idt if C≤ -¼ (complex) (4) Note the Mandelbrot set iteration (ie., $z_{N+1}=z_Nz_N-C$) for this δC=0 *extremum* C=-¼ is a rational number Cauchy sequence -¼, -3/16, -55/256, ...,**0** thereby proving the hypothesis of our above postulated *real#0* math and so also **real1** *since* **1**=1+0≡1∪real#0.

•Plug in **z=1** in z'=1+δz in **eq1**, So **δC=0**= (eq1 implies eq3)=δ(δz+δzδz)=δδz(1)+δδz(δz)+(δz)δδz= (observer |δz|>>1) ≈δ(δzδz)=0=(plug in eq.4) =δ[(dr+idt)(dr+idt)] = $\delta[(dr^2-dt^2)+i(drdt+dtdr)]=0$ (5)

=2D δ[(Minkowski metric, c=1)+i(Clifford algebra→eq.7a)] (≡Dirac eq)

Factor real eq.5 $\delta(dr^2-dt^2)=\delta[(dr+dt)(dr-dt)]=0=[[\delta(dr+dt)](dr-dt)]+[(dr+dt)[\delta(dr-dt)]]=0$ (6)

so -dr+dt=ds,-dr-dt=ds≡$ds_1$(→±**e**) Squaring&eq.5 gives circle.in e,v (dr,dt) 2nd,3rdquadrants (7)

& dr+dt=ds, dr-dt=ds, dr±dt=0, light cone (→ν,$\bar{\nu}$) in same (dr,dt) plane 1st,4thquadrants (8)

& dr+dt=0,dr-dt=0 so dr=dt=0 defines vacuum (while eq.4 derives space-time) (9)

Those quadrants give *positive* scalar drdt in eq.7 (if *not* vacuum) so imply the eq.5 *non* infinite extremum imaginary≡drdt+dtdr=0≡$\gamma^i dr\gamma^j dt+\gamma^j dt\gamma^i dr=(\gamma^i\gamma^j+\gamma^j\gamma^i)drdt$ so $(\gamma^i\gamma^j+\gamma^j\gamma^i)=0$, i≠j (from real eq5 $\gamma^i\gamma^i=1$) (7a) Thus from eqs5,7a: $ds^2=dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$ Note how eq5 and $C_M$ just fall (pop) out of eq.1, amazing! (These quadrants in e,v plane *illustrate* the 4 Boson SM 4 rotation extreme math of ref.1, perturbed eq.7)

•**Both z=0,z=1** together (in eq1. Use orthogonality to get (2D+2Dcurved space)). Thus (z=1)+(z=0)= $(dx_1+idx_2)+(dx_3+idx_4)$≡dr+idt given $dr^2-dt^2=(\gamma^r dr+i\gamma^t dt)^2$ *if* $dr^2\equiv dx^2+dy^2+dz^2$ (3D orthogonality) so that $\gamma^r dr\equiv\gamma^x dx+\gamma^y dy+\gamma^z dz$, $\gamma^i\gamma^j+\gamma^j\gamma^i=0$, i≠j,$(\gamma^i)^2=1$, rewritten ($\kappa_{ii}$ from N=0 $C_M$ perturbation of N=1, eqs 7,13) as $(\gamma^x\sqrt{\kappa_{xx}}dx+\gamma^y\sqrt{\kappa_{yy}}dy+\gamma^z\sqrt{\kappa_{zz}}dz+\gamma^t\sqrt{\kappa_{tt}}idt)^2=\kappa_{xx}dx^2+\kappa_{yy}dy^2+\kappa_{zz}dz^2-\kappa_{tt}dt^2=ds^2$. Multiply both sides by $1/ds^2$ and $\delta z^2\equiv\psi^2$ use circle $-i\partial\delta z/\partial r=(dr/ds)\delta z$ inside brackets( ) get 4D QM $\gamma^\mu(\sqrt{\kappa_{\mu\mu}})\partial\psi/\partial x_\mu=(\omega/c)\psi$≡Newpde for e,*v*, $\kappa_{oo}=1-r_H/r=1/\kappa_{rr}$, $r_H=e^2X10^{40N}/m$ (**N**=. -1,0,1.,).So $\kappa_{\mu\nu}$ carries the covariance & **Postulate** 1→**Newpde**

**Results:** of (merely plugging z'=0,z'=1 into eq.1) **postulate1**: (1) backups: davidmaker.com

Newpde: **N**=0,stable $r=r_H$ composite(part II) 3e $2P_{3/2}$ is baryons(QCD not required), SM is the extreme of 4 e,v quadrant rotations. **N**=-1 is GR. Expansion stage of **N**=1 scale $\delta z'=\delta z e^{iwt}$ Dirac eq zitterbewegung oscillation is the cosmological expansion, **N**=0 the 3rd order Taylor expansion component(1) of $\sqrt{\kappa_{rr}}$ gets the anomalous gyromagnetic ratio so don't need the renormalization infinities. So we get the physics here

Math: We use that **1**+c≡1∪c to define above *list-define* (ring-field) algebra and note again that iteration gives a Cauchy sequence limit of real# eigenvalues, so we get the rel# math as well with no new axioms.

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

•So the *simplest idea imaginable* 1 implies all *fundamental math-physics.* no more, no less(eg simply 4D)

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

Reminder: *Real#0* math postulaties literally nothing(0) (except **real1** *since* 1=1+0≡1∪real#0.)
The algebraic *definition of 1* (*and* 0) is z=zz (note z= **0,1**) *if* C=0 in the below definition:

Summary: This
Theory is 1 The rest is a (rel#1) definition.

**Theory** Real#1 **definition**

**Postulate 1** is defined algebraically if z=1 and z=0 (plugged) into z=zz+C eq1
gives *some* C=0 constant(ie δC=0) So

plug (δC=0 &) **z=0** into **eql** iteration(to get ***all*** C) get 2D(complex) **Mandelbrot** set $C_M$=C (fractal scale N)
(This iteration also results in a rational Cauchy sequence confirming 0,1 is a real# comes from above 0,'1' definition)
plug (δC=0 &) **z=1** into **eql** get 2D **Dirac** equation ((N=1)≡'observer' perturbing N=0 "observables")
combine **both** 2D+2D=4D **Newpde** using $(dx_1+idx_2)_{z=0}+(dx3+idx_4)_{z=1}$=dr+idt & dr 3D orthogonalization
therefore
(So we get all of physics and *list-define* algebra and Real#math(1 such $C_M$ iteration is rational Cauchy)
**postulate 1→ Newpde** **everything** that is physical, no more, no less. See backups at davidmaker.com eg.,in 'introduction'
Ultimate Occam's razor postulate 1 so ultimate physics theory, we completely understand the universe.