Cauchy completeness and physics

David Maker

Abstract It is well known to all mathematicians 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".

The simplest algebraic definition of 1 (and **0**) is **z=zz**. So our hypothesis is that we

Postulated *real* number 1 if z=**1** and **z=0** are substituted (plugged) into $z'=z'z'+C$ **eq1**

results in *some* C=0 constant(ie $\delta C=0$). 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 $z_{N+1}=z_N z_N - C$. Constraint $\boldsymbol{\delta C=0}$ requires we reject the Cs for which $-\delta C=\delta(z_{N+1}-z_N z_N)=\delta(\infty-\infty)\neq 0$. 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 $\delta z+\delta z\delta z=C$ (3) Define N≤0 as 'observable'fractal scales. Thus define the'observer'fractal scales as N≥1 implying $|\delta z|>>1$ Then solve equation 3 as a quadratic equation so $\delta z=(-1\pm\sqrt{1+4C})/2=dr+idt$ if $C<-¼$ (complex) (4) Mandelbrot set iteration for this $\delta C=0$ *extremum* C=-¼ is a rational# Cauchy seq. -¼, -3/16, -55/256, .,0 *confirming our hypothesis of our above postulated real#0* math and so of real#**1**=1+0≡1U0 qed

•Plug in **z=1** in z'=1+δz in **eq1**, So $\boldsymbol{\delta C=0}$= (eq1 implies eq3)=$\delta(\delta z+\delta z\delta z)=\delta\delta z(1)+\delta\delta z(\delta z)+(\delta z)\delta\delta z$= (observer $|\delta z|>>1$) $\approx\delta(\delta z\delta z)=0$=(plug in eq.4) $=\delta[(dr+idt)(dr+idt)]=\delta[(dr^2-dt^2)+i(drdt+dtdr)]=0$ (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 $-dr+dt=ds,-dr-dt=ds\equiv ds_1$(→±**e**) Squaring&eq.5 gives circle.in e,v (dr,dt) 2nd,3rd quadrants (7)

& dr+dt=ds, dr-dt=ds, dr±dt=0, light cone (→ν,$\bar{\nu}$) in same (dr,dt) plane 1st,4th quadrants (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≡$drdt+dtdr=0\equiv\gamma^i dr\gamma^j dt+\gamma^j dt\gamma^i dr=(\gamma^i\gamma^j+\gamma^j\gamma^i)drdt$ 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 are used to *illustrate* the 4 Boson SM 4 rotation extreme math of eq.12)

•**Both z=0,z=1** together (in eq1. Use orthogonality to get (2D+2Dcurved space)). Thus (z=1)+(z=0)= $(dx_1+idx_2)+(dx_3+idx_4)\equiv dr+idt$ 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 $\gamma^r dr\equiv\gamma^x dx+\gamma^y dy+\gamma^z dz$, $\gamma^j\gamma^i+\gamma^j\gamma^i=0$, 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 $\gamma^\mu(\sqrt{\kappa_{\mu\mu}})\partial\psi/\partial x_\mu=(\omega/c)\psi\equiv$Newpde for e,ν, $\kappa_{oo}=1-r_H/r=1/\kappa_{rr}$, $r_H=e^2X10^{40N}/m$ (**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 $\delta z'=\delta ze^{i\omega t}$ Dirac eq zitterbewegung oscillation is the cosmological expansion, the 3rd order Taylor expansion component(1) of $\sqrt{\kappa_{oo}}$ 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: The algebraic *definition of 1* 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 $\delta C=0$)

So can plug ($\delta C=0$ &) **z=0** into **eq1** iteration (to get ***all*** C) get 2D (complex) **Mandelbrot** set $C_M=C$ (fractal scale N)

(this iteration also results in a Cauchy sequence confirming 1 is a real# comes from our above '1' definition.)

plug ($\delta C=0$ &) **z=1** into **eq1** get 2D **Dirac** equation ((N=1) ≡ 'observer') perturbing N=0 (z=1) "observables"

combine **both** 2D+2D=4D **Newpde** using $(dx_1+idx_2)_{z=0}+(dx_3+idx_4)_{z=1}$ = dr+idt & dr 3D orthogonalization

therefore

postulate 1 → Newpde

(So we get all of physics and 1+C→1∪ algebra and Real#math (1 such C_M iteration is Cauchy) **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, So understand universe completely