

Part IIIA

11.1 metric quantization from bridging condition $\kappa_{00} = g_{00}$.

Review from part I: Summary: Postulate 0 \rightarrow Newpde

Concept: Ultimate Occam's razor theory postulate(0) implies ultimate math-physics theory.

Introduction All QM physicists know about *Lorentz* covariant(9) Dirac equation *real* eigenvalues. All mathematicians know that the limit of a Cauchy sequence of rational numbers is a Cauchy *real* number. So here we simply **postulated** " $z = zz + C$ eq1 implies *real#0*" (C constant so $\delta C = 0$, $z = zz$ needed for the multiplicative properties of 0. See math* appendix M3) implying a rational Cauchy *sequence* with limit 0 thereby doubling as an *iteration* of eq1 in $\delta C = 0$ that gives the (fractal)Mandelbrot set. Also plugging eq1 directly into $\delta C = 0$ gives the Dirac eq. and so fractal(scales $10^{40N} \times C_{M=N=0}$, fig1) *real* eigenvalues of a *generally* covariant Dirac Newpde that does not require gauges: clearly a major discovery as shown in fig2.

* Plugging $1 = 1 + 0$ consecutively into $1 = 1 \times 1$ thereby *defines* ring relation $0 \times 1 = 0$ and $0 \times 0 = 0$ so list 1×1 -**define** symbol $z = zz$ gives the *multiplicative properties of 0* such as $1 \times 0 = 0$ $+C$ is needed for the *addition* of constants (so $\delta C = 0$) in the ring-field such as $1 = 1 + 0$ in $z = zz + C$ eq1. The rest of list number-**define** symbol replacement of ring-field axioms with single simple axiom postulate0 is in appendix M3.

Summary: So **postulate0** (ie " $z = zz + C$ eq1 implies *real#0*") also derives mathematics such as δC so we can plug $z = 1 + \delta z$ into eq1 and get $\delta z + \delta z \delta z = C$ (3) so that $\frac{-1 \pm \sqrt{1^2 + 4C}}{2} = \delta z = dr \pm i dt$ (4) for $C < -1/4$. So C is complex. But the definition of *real0* $\equiv z_0$ implies that Cauchy sequence "iteration" so requires

I **Plugging** the eq1 rel *iteration* ($z_{N+1} - z_N z_N = C$) into $\delta C = 0$ implies $\delta C = \delta(z_{N+1} - z_N z_N) = \delta(\infty - \infty) \neq 0$ for some C. The Cs that result instead in finite z_{∞} s (so $\delta C = 0$) define the **Mandelbrot set** in fig1 whose lemniscate continuity (11) along $dr \approx dR$ is required by the derivative in $\delta C \equiv (\partial C / \partial R) dR = 0$ with its max extremum jump at $C_M = -1.75$ (at <http://www.youtube.com/watch?v=0jGai087u3A>) where there is the (new Mandelbrot set lemniscate fractal scale fig1 shapes $C = C_M 10^{xN}$ with C_M that postulated constant) $0 = (\partial C / \partial r)(dr) = dC_M 10^{40N}$ largest x given that elsewhere $x < 40$ (M5). Eg for huge Nth fractal scale $|\delta z| \gg 1/4$. So extreme $-1/4, -1.75$ solve $\delta C = 0$. Thus our rational Cauchy sequence is iteration $z_{N+1} - z_N z_N = C = -1/4, -3/16, -55/256, \dots 0$. So **0** is a *real* number M1

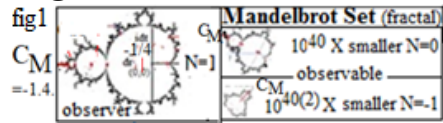
II **Plugging eq1** directly into $\delta C = 0$ is also required. So given eq1 and thus equations 3,4 $\delta C = \delta(\delta z + \delta z \delta z) = \delta \delta z (1) + 2(\delta z \delta \delta z) \approx \delta(\delta z \delta z) = \delta((dr + i dt)^2) = \delta[(dr^2 - dt^2) + i(dr dt + dt dr)] = 0 =$ (5) **Minkowski metric** + **Clifford algebra** \equiv **Dirac equation** (See eq7a γ^μ derivation from eq5.). But (N=0, 2D) $\delta \delta z 1$ 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 **Newpde** $\equiv \gamma^\mu (\sqrt{\kappa_{\mu\mu}}) \partial \psi / \partial x_\mu = (\omega/c) \psi$ for v, e ; $\kappa_{00} = e^{(2\Delta\varepsilon/(1-2\varepsilon))} r_H/r$, $\kappa_{rr} = 1/(1+2\Delta\varepsilon r_H/r)$; $r_H = C_M/\xi = e^2 \times 10^{40N}/m$ (fractal jumps $N = -1, 0, 1, \dots$) $\Delta\varepsilon \equiv m_e, e = m$ are zero if no object B (appendix B, C).

Metric Quantization

Unified field

If the universe is fractal then the quantization on the subatomic scale should repeat on the cosmological scale, hence the (N=1 (and N=-1) fractal scale gravity fig1)) metric quantization. Mathematically we get this 10^{40N} fractalness from the Mandelbrot set (fig1 at C_M) coming directly out of our postulate0.

Single field but observed from different frames of reference



lemniscate <http://www.youtube.com/watch?v=0jGai087u3A>

$e^{i(-\varepsilon+\Delta\varepsilon)^2}$ 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 (So we have a TOE.).

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 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. Therefore for this metric quantization to occur we require a grand canonical ensemble with nonzero chemical potential in a uniform space-time.

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

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

$$g_{00}=\kappa_{00}$$

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

$$\cos(2\Delta\varepsilon/(1-2\varepsilon))=\text{rel } e^{i2\Delta\varepsilon/(1-2\varepsilon)} =1-(2\Delta\varepsilon/(1-2\varepsilon))^2/2+.. \text{ so } g_{00}=1-2GM/c^2r=1-$$

$$2(v/c)^2=\text{Rel } \kappa_{00} =1-(2\Delta\varepsilon/(1-2\varepsilon))^2/2 \text{ so } 2\Delta\varepsilon/(1-2\varepsilon))/2=v/c. \text{ So}$$

$$c2\Delta\varepsilon/(1-2\varepsilon))/2=v=3 \times 10^8 \cdot (0.00058)/((2) \cdot 88)=98\text{km/sec} \approx \mathbf{100\text{km/sec}}$$

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

$$[\varepsilon 2\Delta\varepsilon/(\varepsilon+2\Delta\varepsilon)]=c[2\Delta\varepsilon/(1+\Delta\varepsilon/\varepsilon)]/2=c[2\Delta\varepsilon+\Delta\varepsilon^2/\varepsilon+...2\Delta\varepsilon^{N+1}/\varepsilon^{N+1}]/2=\Sigma v_N. \text{ Note each term in this expansion is itself a (mixed state) operator } v_N=[2\Delta\varepsilon^{N+1}/(2\varepsilon^N)]c \quad \text{A11}$$

$(\Delta\varepsilon)^m$ 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. From eq. A11 for example $v=\mathbf{m100^N km/sec}$. $m=2, N=1$ here (Local arm). In part III we list hundreds of examples of A11 partIII fig4 metric quantization: (sun: 1, 2km/sec, galaxy halos $m100\text{km/sec}$ 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 partIII, 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 4MyLY wide region $100X$ smaller, the next metric quantization down. Globulars next($100X$ smaller) and stellar neighborhoods next ($100X$ smaller) and planets ($100X$ smaller), then moons ($100X$ smaller) ,etc. So in fig4 A11 gets all the rest! Even supernova rings at high enough resolution (beads split at least at 1987a) are ~ 100 antinodes

When the black hole gets too big dv/dt gets small and so the pairing interaction gets small and the superconductivity ceases and so spherical symmetry returns and the spiral galaxy turns into an elliptical galaxy as is happening right now in the Whirlpool galaxy (NGC5194).

For metric quantization we require a grand canonical ensemble with nonzero chemical potential.

11.2 Introduction to the asymptotic implications of κ_{00} in the galactic plane

It is amazing that we get a quantized speed for halo velocities *that is also the correct one which* neither MOND **nor** any dark matter theory can account for. These other theories are light years from explaining this result!!!

Example N100 halo speeds:

Milky way 200km/sec

M31 300km/sec

NGC3351 $V=200\text{km/sec}$

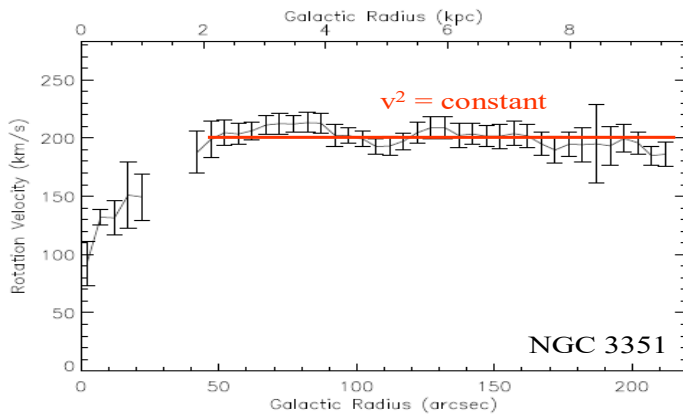


fig.3

NGC 3031 rotation curve is consistent with flat trending galaxy halos, at 200km/sec, NGC 3198 rotation curve is consistent 100+100/2, NGC 2903 at 200, NGC2841 at 300 km/sec consistent, NGC 3521 is consistent at 200km/sec, NGC 4826 is consistent with 100+100/2, NGC 5055 consistent at drop off 200?, NGC 6946 consistent for THINGS survey., NGC 7331 is consistent at 200+100/2, NGC 7793 consistent with 100 (but should not count since still in hub). If the rings are heavier than the hub then the metric quantization will be between the rings which will be twice the COM speed. (see 2X50 cases). ϵ cannot be normalized out inside a proton giving us our **Newpde** composite 3e particle physics. Note in the two cases (of charge and neutral in partII) the ϵ is not normalized out. PartII (half my book) is on this subject

11.3 From eq.4.13 In halo $\kappa_{00}=g_{00}$ For outside r_H .

For a grand canonical ensemble with nonzero chemical potential, as occurs in the halo of the galaxy, section 11.1 metric quantization implies that $g_{00}=\kappa_{00}$ holds. From equation 4.13 also because of object B $\kappa_{00}=e^{i(m_e+\mu)}=e^{i(\Delta\epsilon+\epsilon)}$, $\Delta\epsilon=m_e=.000058$ is the electron mass (as a fraction of the Tauon mass eq.18.) which is the component in the resulting m_e, μ operator sequence.

review

From equation D9 $\kappa_{00}=e^{i(\Delta\epsilon+\epsilon)}$ in the halo of the galaxy. Also for r big the charged ϵ gets normalized out since there are infrequent (big) ϵ jumps in those regions so $\kappa_{00}=e^{i(\Delta\epsilon+\epsilon)/(1-2\epsilon)}$ (but (but more rapid jumps in high gradient regions). Recall also from equation 4.13 that in the halo of the galaxy also: $g_{00}=\kappa_{00}$.

So in the halo of the galaxy $e^{i(\Delta\epsilon+\epsilon)/(1-2\epsilon)} = \kappa_{00} = g_{00} = 1 - 2GM/(c^2 r) = \text{Re}[\kappa_{00}] = \cos[\Delta\epsilon + \epsilon] = 1 - [\Delta\epsilon + \epsilon]^2/2 = 1 - [(\Delta\epsilon + \epsilon)^2/(\Delta\epsilon + \Delta\epsilon)]^2/2 = 1 - [(\Delta\epsilon^2 + \epsilon^2 + 2\epsilon\Delta\epsilon)/(\Delta\epsilon + \epsilon)]^2/2$. The $\Delta\epsilon^2$ is small so just take the mixed state cross term $v = c[\epsilon\Delta\epsilon/(\epsilon + \Delta\epsilon)]/2 = c[\Delta\epsilon/(1 + \Delta\epsilon/\epsilon)]/2 = c[\Delta\epsilon + \Delta\epsilon^2/\epsilon + \dots \Delta\epsilon^{N+1}/\epsilon^N + \dots]/2 = \sum v_N$. Note each term in this expansion is itself a (mixed state) operator and we assume that division of each of these terms by $1 - 2\epsilon$ as above. So there isn't just one v in the large gradient 2nd case so in equation 1 just above we can take $v_N = [\Delta\epsilon^{N+1}/(2\epsilon^N)]c = (.00058^{N+1})/(2(.06)^N)c$ (11.2)
 $v_N = \dots 1\text{mm/sec}(N=4), 10\text{cm/sec}(N=3), 10\text{m/sec}(N=2), 1\text{km/sec}(N=1), 100\text{km/sec}(N=0)$.

So these speeds arise from mixed metric quantization states $\epsilon\Delta\epsilon$ operating on the Newpde ψ . In classical thermodynamics they are Grand Canonical ensembles with nonzero chemical potential (1). If there is zero mixing, so zero chemical potential, these mixed states $\epsilon\Delta\epsilon$ do not exist and so these v s do not apply (so classical ballistic trajectories then apply). Recall also that metric quantization equation $g_{00} = \kappa_{00}$ implies that in equation 11.2 $\Delta\epsilon (= .000058 = \epsilon)$ gives a speed of $n100\text{km/sec}$ (for $N=0$ in eq.11.2) and $\epsilon = .06 = \mu$ is a speed of $20,000\text{km/sec}$ which is our rotation speed around the center of the universe. $1 = \tau$ gives a rotation speed of c at the time of the mercuron (with very low radial velocity)

Note the $N=0$ case in eq.11.2: $v = n\Delta\epsilon c / (2(1 - 2\epsilon)) = n(.00058)3 \times 10^8 / [2(1 - 2(.06))] = n98,860\text{m/sec} = n \times (98.86)\text{km/sec} \approx n100\text{km/sec}$. So in the galaxy halos we have $v = 100\text{km/sec}, 200\text{km/sec}$, thereby replacing the need for dark matter (to explain these high speeds).

If the rings are heavier than the hub then the metric quantization is between the sides of the rings, twice the COM speed and so still an integer multiple of 50km/sec .

(1)Konstantin Batygin. Monthly Notices of the Royal Astronomical Society, Volume 475, Issue 4, 21 April 2018. He found that cosmological Schrodinger equation metric quantization actually exists in the (observational) data, a notion that is close to this fractal Newpde idea.

For metric quantization we require a grand canonical ensemble with nonzero chemical potential. 10^7 km/sec with 100 antinodes across the Mercuron, 320 around the circumference seen in CBR.

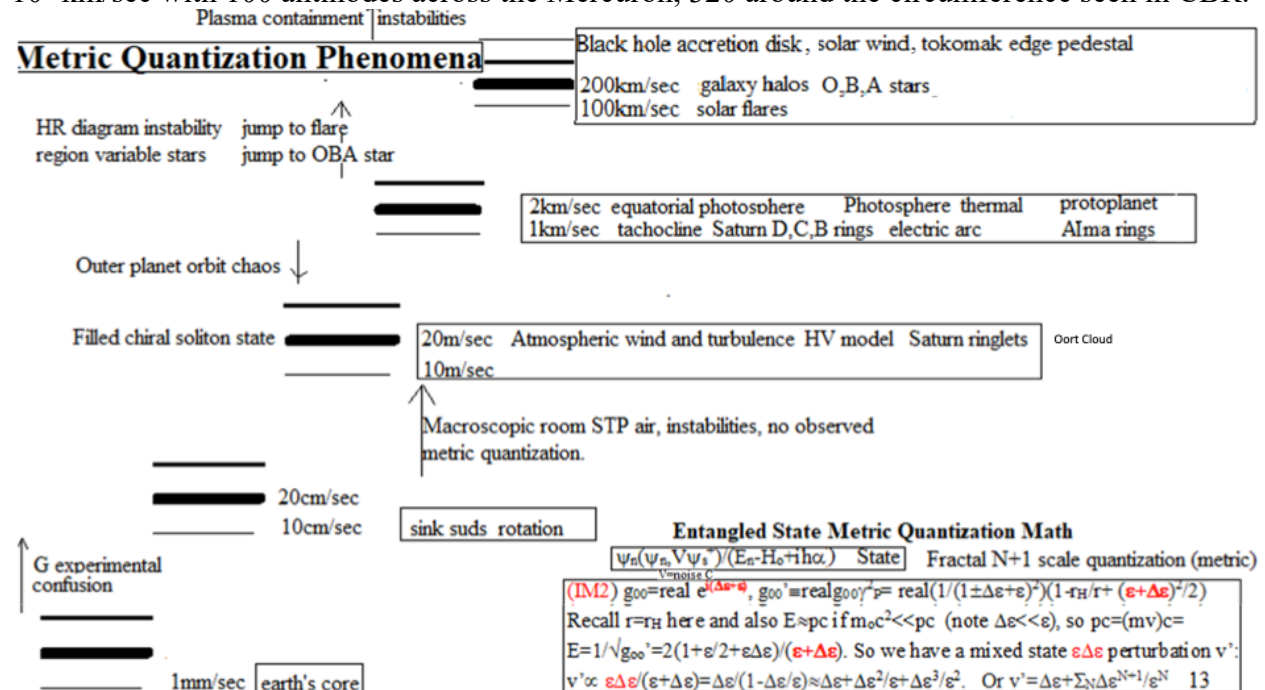


Fig.4

Solar flare model for the Big Bang (Mercuron expansion)

Recall the 100X metric quantization jump from 1km/sec at the photosphere to 100km/sec at the top of the chromosphere given its large enough energy density as with the Mercuron with its own high energy density and so Hamiltonian H. Therefore we have $n=0$ in the Ch.9 Frobenius expansion $F_{\text{groundstate}} = \sum a_n r^n = a_0 r^{-0}$ (because it is the ground state $n=0$ for the Mercuron, given it is the smallest r in eq.9.8) of the Newpde H. Therefore inside is an isotropic and homogenous space-time. Thus given the huge energy density (as at the top of the chromosphere) inside we have 100 antinodes across the Mercuron (analogous to Saturn's ringlets) and so about 360 clumps around the circumference (giving us the individual CBR clumps that are a degree wide). Given these antinode clumps this becomes a Rayleigh Taylor instability explosion and so strongly resembling the crab nebula (M1) supernova explosion with its filamentary texture and whose filament intersections are just those expanded CBR clumps.



Rayleigh Taylor Instability Paradigm M1

11.3 Oscillation of $\delta z(\equiv\psi)$ on a given fractal scale

From Newpde (eg., eq.1.13 Bjorken and Drell) $i\hbar \frac{\partial\psi}{\partial t} = \frac{\hbar c}{i} \left(\alpha_1 \frac{\partial\psi}{\partial x^1} + \alpha_2 \frac{\partial\psi}{\partial x^2} + \alpha_3 \frac{\partial\psi}{\partial x^3} \right) +$

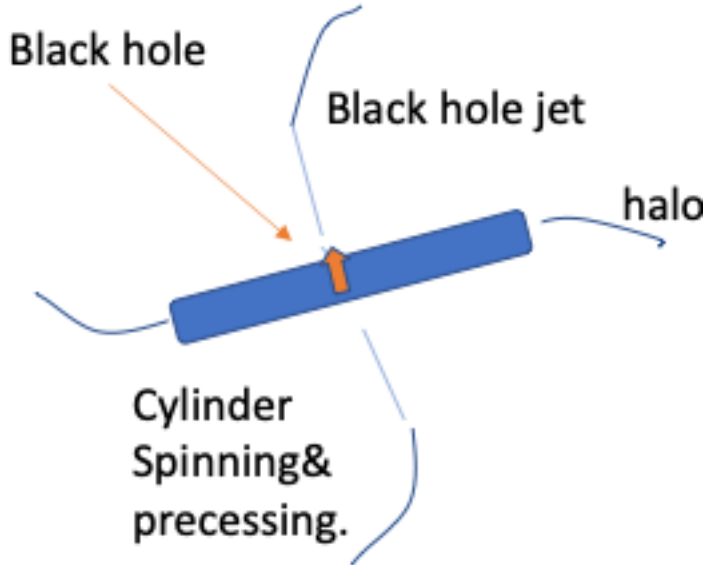
$\beta mc^2 \psi = H\psi$. For electron at rest: $i\hbar \frac{\partial\psi}{\partial t} = \beta mc^2 \psi$ so: $\delta z = \psi_r = w^r(0) e^{-i\varepsilon_r \frac{mc^2}{\hbar} t}$ $\varepsilon_r = +1,$

$r=1,2; \varepsilon_r = -1, r=3,4$): This implies an oscillation frequency of $\omega = mc^2/\hbar$, which is fractal here. So the eq.12 the 45° line has this ω oscillation as a (that eq.7-9 δz variation) rotation. On our own fractal cosmological scale we are in the expansion stage of one such oscillation. Thus the fractalness of the Newpde explains cosmology. The next higher cosmological scale is independent (but still connected by superposition of speeds implying a separation of variables result: $i\hbar \frac{\partial\psi}{\partial t} = \beta \sum_N (10^{40N} (\omega t)_{\varepsilon+\Delta\varepsilon}) \psi = \beta \sum_N (10^{40N} m_{\varepsilon+\Delta\varepsilon} c^2/\hbar) \psi$). By the way fractal scale $N=1$ the 45° small Mandelbulb chord ε (Fig6) is now, given this ω , getting smaller with time so $t \propto \varepsilon$. So cosmologically for stationary $N=1$ $\delta z = \sqrt{\kappa_{oo}} dt = e^{-i\varepsilon_r \frac{mc^2}{\hbar} t} \rightarrow e^{i(\varepsilon+\Delta\varepsilon)}$ (11.4)

With (from fig6) for electron $\Delta\varepsilon=.00058$ (11.5)

11.4 This is merely continuation of Chapter 3 on $g_{00}=\kappa_{00}$ metric quantization

They are compressed to rigid r_H and spins all point one way with the equatorial ultrarelativistic motion creating flat plate field outside geometry needed for $g_{00}=\kappa_{00}$ to hold ($Gmm/r^2 \rightarrow Gmk/r$ from Gauss' law). But if these objects gain too much mass so $r=2GM/c^2$ gets too big the outer stable horizon moves out from the object so there is then instability and the spins cease to be parallel so the plate and so the flat spiral galaxy structure must disappear giving a spherical shape (ellipticals) with their yellowish population II stars. This is the fundamental mechanism of galactic evolution. So to recap we start with a cylinder spinning and precessing:



Note solid cylinder moving as unit side view



X ray through radio wave Image of galaxy Centaurus A

Fig.1 The Milky Way 13by ago also formed the “thick” disk at 6000LY thick because 100km/sec, then a galaxy collision occurred making the galaxy heavier forming the “thin” disk 2kly thick since then halo speeds were at 200km/sec. (March 2022 “Nature”, Maosheng Xiang)

and end up with an elliptical galaxy. Eg.,the Whirlpool galaxy M51 is in transition between these two states. The two bends are where the 300km/sec ends and transitions to 200kn/sec, given a recent orientation of this galaxy due to a recent collision that also caused the increased activity.

Metric jump effects

Also the $\kappa_{oo}=1-r^2/r_H^2$ in sect.3.1 (instead of the external observer $\kappa_{oo}=1-r_H/r$) in $E=1/\sqrt{\kappa_{oo}}$ in looking outward (internal observer) at the cosmological oscillation from the inside ($r < r_H$) implies that higher mass for $N=2$ fractal scale so smaller wavelength and larger energy so larger effect. So metric jumps with longer the wavelength on our scale imply higher energy cosmological effects that $N=2$ sees what we see. So on $N=1$ fractal scale small wavelength cosmological oscillations (eg., object C $\Delta\varepsilon$ Period=2.5My) have much smaller effects than the larger wavelength oscillations (eg., ε Period=270My).

Is metric quantization possible? So does it have a Hamiltonian?

Recall eq.4.12 object B generation in the Kerr metric $((a/r)\sin\theta)^2 = \Delta\varepsilon$ with outside object B r_H $\kappa_{oo}=\varepsilon^{i\Delta\varepsilon}$ with inside $\kappa_{oo}=1-\Delta\varepsilon$. Finally in the composite 3e frame of reference $\Delta\varepsilon \rightarrow \Delta\varepsilon + \varepsilon$ for both in Eg., $\kappa_{oo}=e^{i(\varepsilon+\Delta\varepsilon)}$ outside object B.

Also recall the fractal separation of variables in the universe wave function Ψ solution to the Newpde:

From seperation of variables sect.1: $\Psi = \prod \psi_N = \dots \psi_{-1} \cdot \psi_0 \cdot \psi_1 \cdot \dots$

N is the fractal scale. Not also that New pde $\Delta\varepsilon \equiv H_{\Delta\varepsilon}$ or $\varepsilon \equiv H_\varepsilon$ $r > r_H$ have nothing to do with each other (like $H_{SHM} & H_J$) so $\Delta\varepsilon \varepsilon \psi_N = E \psi_N$ is undefined (just as $H_{SHM} * H_J$ is undefined). In contrast for $r_{(\varepsilon, \Delta\varepsilon)} e^{kt} = \psi_{N+1}$ from new pde cosmological $r_H > r$ there is a common time $t = t'$ in

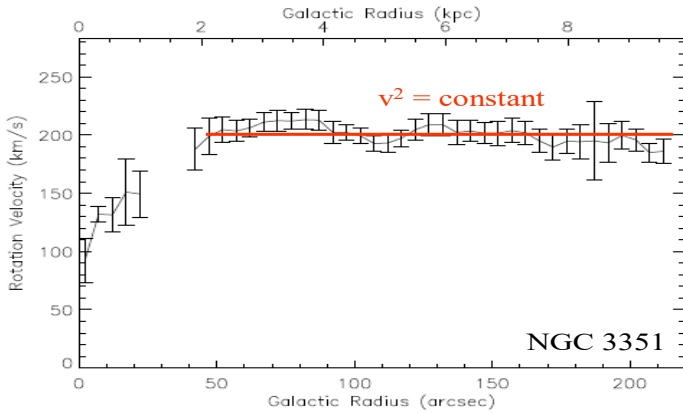
$$-i \frac{\partial \left(-i \frac{\partial \psi_{N+1}}{\partial t'} \right)}{\partial t} = \varepsilon \Delta \varepsilon \psi_{N+1}$$

on the zitterbewegung cloud radius expansion (see fig.6) $r_{\Delta\varepsilon} e^{kt} = \psi_{N+1}$ so that $\varepsilon \Delta \varepsilon \psi_{N+1}$ is defined. So $\langle i | \varepsilon \Delta \varepsilon | i \rangle$ (from $\varepsilon \Delta \varepsilon \psi_{N+1}$) is observable and $\langle i | \varepsilon \Delta \varepsilon | i \rangle$ (from $\varepsilon \Delta \varepsilon \psi_N$) is not observable.

11.5 Examples Of Case I $g_{00} = \kappa_{00}$

Still in the hub means the curve is still trending up or down. So do not count NGC 925 and NGC 2976 (still in hub). IC2574 not counted since Things didn't show its rotation curve. NGC 4736 don't count still in the hub, DD154 still in hub. NGC2366 not include since no rotation curve given. Since some error bars include $100 + 100/2$ NGC 2403 might not be an outlier.

1.
So out of 10 galaxies that must be counted only one is uncertain NGC 5055 but even that one could still (be it jumped down from it's halo 200km/sec. near the end. Andromeda does that too.)

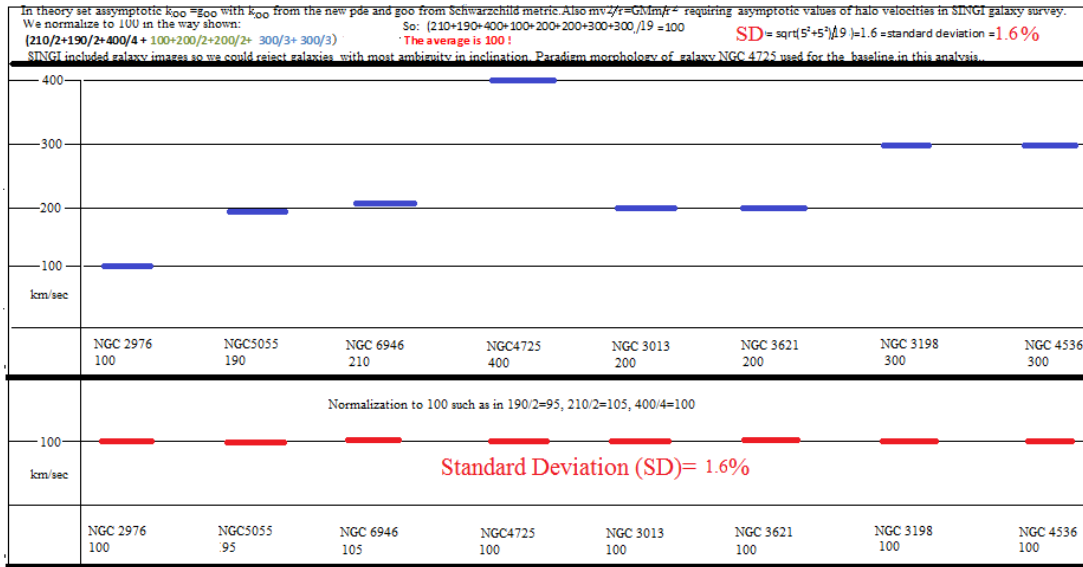


Stellar halo speed at ~200km/sec

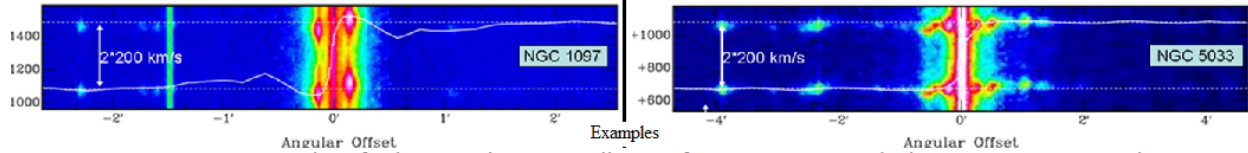
Fig.2

Metric quantization is exact.

Halo Velocity Differences From SINGI



200 km/s quantization



The differential rotation is first created (jump started) by metric quantization coming out of a new generally covariant generalization of the Dirac equation that does not require gauges (Appendix C). Metric quantization also requires that there exist a grand canonical ensemble (thus a chemical potential exchange of energy between physical systems) at some point in the formation of the system for the conservation of energy to also hold. Here we present observational evidence of velocity quantization obtained from Doppler measurements of stellar motion in the halos of galaxies and equatorial stellar velocities illustrating $100\text{km/s} = \Delta v$ quantization with most at 200km/sec . Figure A1 is a compilation of average halo velocities for various nearby galaxies showing an unambiguous metric quantization.

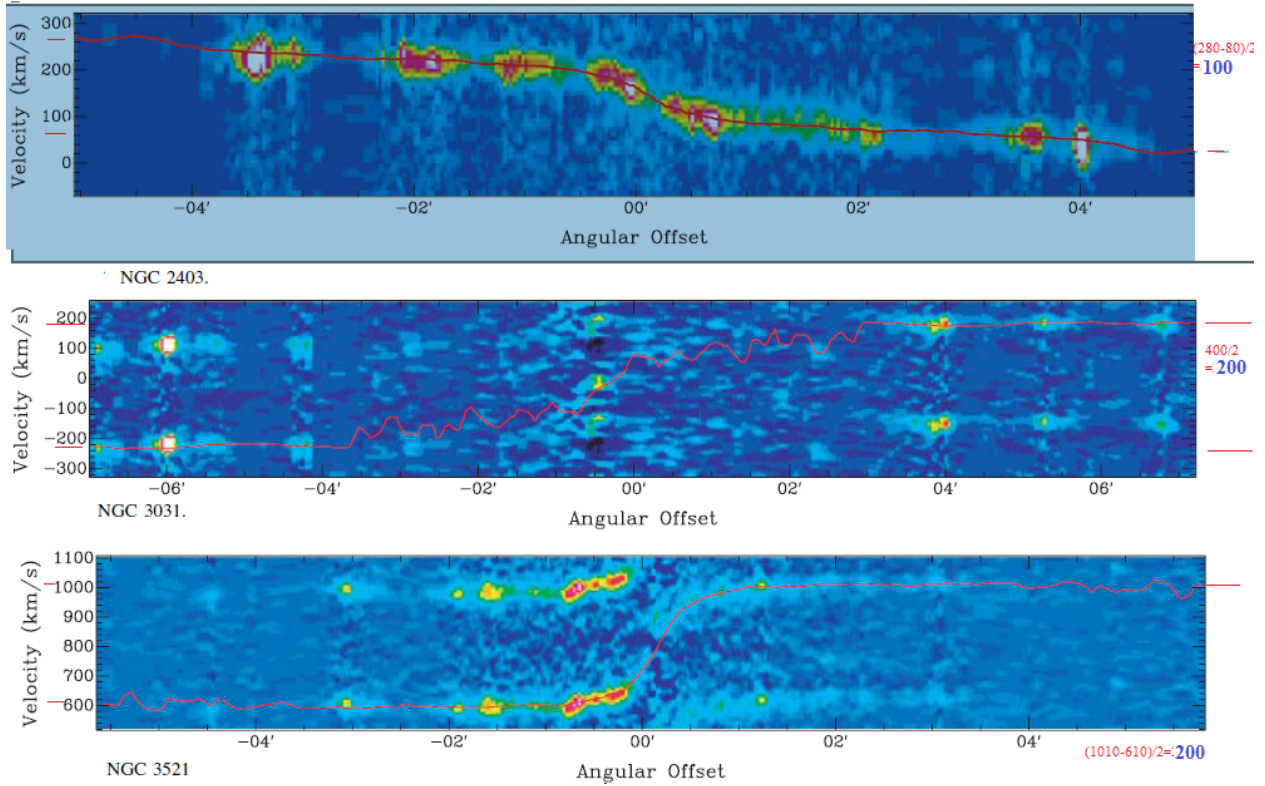


Figure A1 Velocity quantization In the Halos Of Nearby Galaxies (mostly 200km/sec)

Figure A2 is a compilation of average stellar equatorial velocities for main sequence stars also showing an unambiguous metric quantization at **200km/sec**.

Stellar Rotation Velocity For Main Sequence Stars

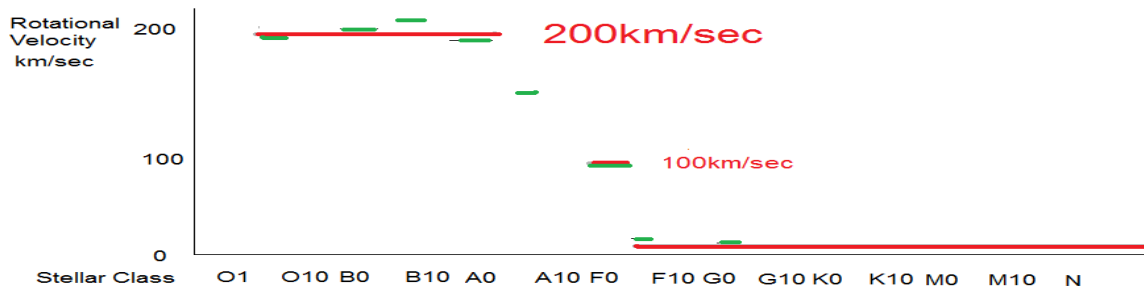
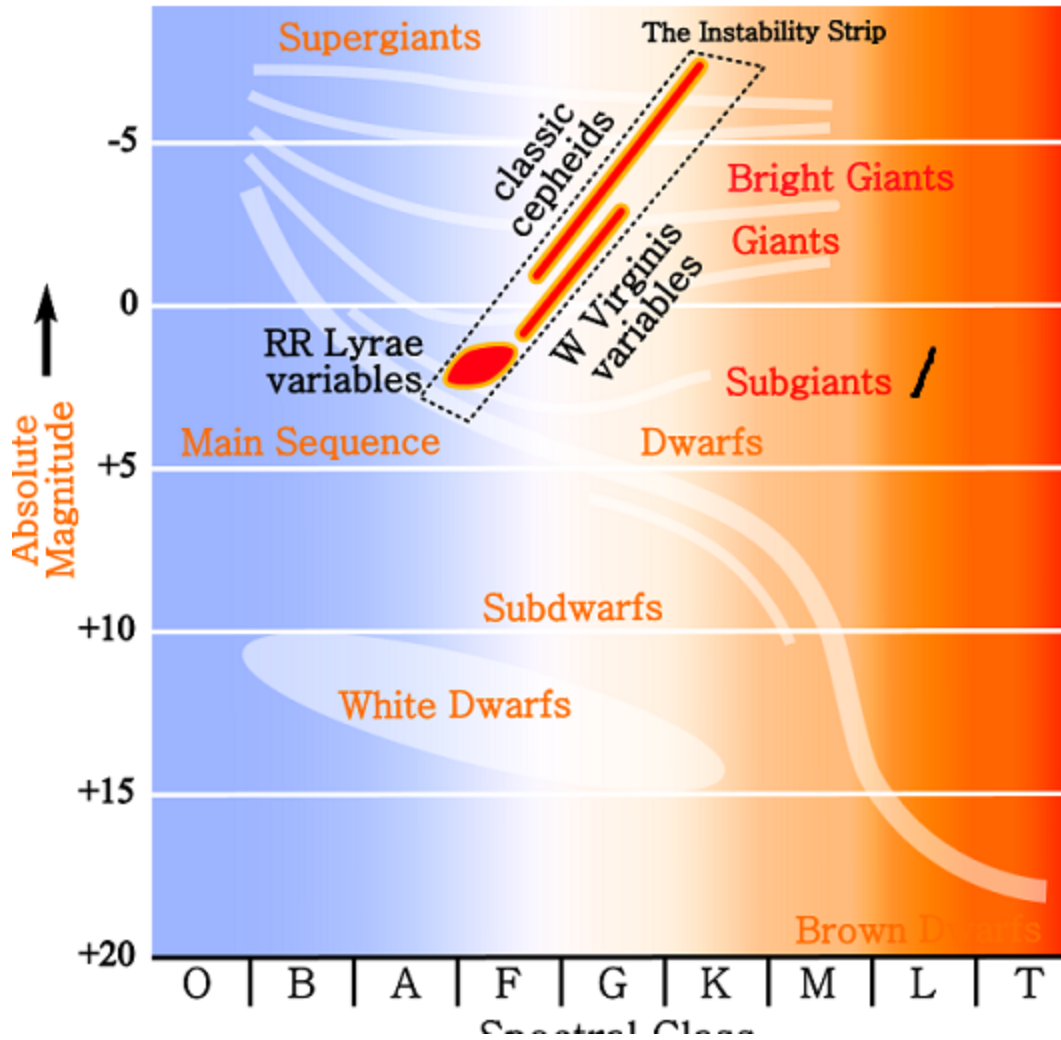


Figure A2 Velocity Quantization in O,B,A stars (mostly 200km/sec)

Note the same **200km/sec** metric quantization of stellar equatorial velocities for O, B, A stars in Figure A2 so this *metric quantization is ubiquitous* (recall also figure A1 in that regard). See appendix C for theoretical derivation of these velocity quantization values.

Recall metric quantization results in stability, Here for O, B A and G K M stars. This implies that the intermediate classes of stars should be unstable. This is the instability region of the HR diagram, see below.



Hand waving arguments about the opacity of Hell is the usual explanation for this instability. The metric quantization is clearly the reason as we see above.

There is a lower velocity metric quantization for main sequence stars F→M at about 2km/sec on the right side of the figure A2 which is what actually starts out the $\Delta v=1\text{km/sec}$ differential rotation of the sun relative to the 1km tachocline rotation. The B field component we stated was responsible for the differential rotation is instead actually then *derived* from this metric quantization effect. The motion relative to that nonhomogenous ambipolar diffusion charge layer (aka Bierman's battery) already must exist for the B field to effect the co-moving convection zone plasma. The sun is so sensitive to planetary perturbations of my double Faraday flare model because it exists in the metric quantization instability zone

Mercuron equation 4.3a:

$$\ln(r_{M+1}/r_{bb})+2=[1/(e^\mu-1)-\ln[e^\mu-1]]^2 \quad (4.3a)$$

I have graphed the Mercuron eq. radial distance vs time (i.e., muon mass). From my Mercuron equation most of that distance was traversed in the last half of the 13.7×10^9 year observed time. So the universe expanded very little in the earlier 360By allowing enough time for CBR thermalization. So acceleration = Distance/(time/2)²=

$(13.7 \times 10^9 \times 5.8 \times 10^{12} \times 1600) / ((13.7/2) \times (10^9) \times 365.25 \times 24 \times 3600)^2 = (1.27 \times 10^{26}) / ((4.3/2) \times 10^{17})^2 = 1.7 \times 10^{-10} \text{m/s}^2$ is approximately 1A/s^2 .

So ambient minimal radial acceleration all around us should lead to some physical effects which is what Milgram writes about.

$dr'^2 = g_{rr} dr^2 = (1/(1-r_H/r)) dr^2$. so dr' is very big when we are close to r_H , which is where we are right now. But the object B 6by period zitterbewegung oscillations fuzz out r_H by about 1 part in 10^5 , so $10^{-5} = \Delta r_H / r_H$. So we can move to the outside of r_H since we are expanding and r_H is stationary ($r_H = 2GM/c^2$ is invariant.) We are still just inside r_H and so the Mercuron equation still holds (It used a Laplace-Beltrami -sinhu source for R_{22} .)

11.7 Transition Matrix Elements Of Metric Quantization Mixed States

These ϵ^N are $M+1$ fractal scale quantum eigenstates every bit as much as the principle quantum number N and the Rydberg $E=R/N^2$ is for the hydrogen atom for the M th fractal scale. So each of the terms in the series represents individual (metric quantization entangled substates state jump c given entanglement perturbation V_e in $V_e / (E\epsilon_1 - E\epsilon_2)$ and also entanglement $\langle e_n | H | e_n \rangle$ probability of transition matrix from entangled state to entangled state. The $V = kC^2$ in eq.2 assumes the role of the noise (energy) V and is limited by eq.5 relativity considerations. Thus relativity puts an upper limit on noise C . Also in the entangled state cases these terms imply constant v s for a range of radii (ch.2) in a grand canonical ensemble with nonzero chemical potential. Note in section 11.2 that entangled ground state $\Delta\epsilon / (1-\epsilon)^2$ gives 100km/sec , entangled $\Delta\epsilon^2 / \epsilon$ gives 1km/sec , $\Delta\epsilon^3 / \epsilon^2$ gives 10m/sec metric quantization $\Delta\epsilon^4 / \epsilon^3$ gives 0.1m/sec . $\Delta\epsilon^5 / \epsilon^4$ 1mm/sec . Eq.4.4.12 then gives the mixed state background metric. This state mixing is analogous to the trig identity result for real valued quantum operator $\langle |O\rangle \rangle^2 = |\psi|^2 = (\cos\omega_1 t + \cos\omega_2 t)^2 = \cos^2\omega_1 t + \cos^2\omega_2 t + 2\cos\omega_1 t \cos\omega_2 t = \cos^2\omega_1 t + \cos^2\omega_2 t + 2\cos\omega_1 t \cos\omega_2 t = \cos^2\omega_1 t + \cos^2\omega_2 t + (\cos((\omega_1 - \omega_2)t) + \cos((\omega_1 + \omega_2)t))$. This generation of smaller $(\omega_1 - \omega_2)$ "beat" frequencies by entanglement represents the smaller and smaller terms in the equation 5.8 Taylor expansion since this calculation can be repeated again and again with these even smaller frequencies. The classical analog of this type of quantum entanglement is that metric quantization grand canonical ensemble with nonzero chemical potential (i.e., interconnected systems hence the mixed states) and thus implies the many metric quantization applications of part 6 of this book. Note in metric quantization that also $C \rightarrow 0$ and so these separate objects can exhibit bosonization given that $v \rightarrow 0$ in the eq.5.11 pairing interaction. So singlet states and multiples of singlet states have minimum energy. So $V_s / (E_s2 - E_s1)$ is the largest for the singlet state so transitions to these states have higher probability (so $\Delta\epsilon$ gives $2(100) \text{km/sec}$ let's say is seen more than 3×100) and even larger for two singlet states $4(100 \text{km/sec})$. Recall from that Tokomak edge effect analysis those dense plasmas are metric quantized in multiples of 400km/sec , 800km/sec , 1200km/sec .

There appeared to be jumps to those plateau speeds as you go from the outer to inner part of the plasma in the toroid.

The solar wind appears to be metric quantized too, also in units of about 400km/sec with highest solar wind speeds quoted as 800km/sec . Equation 5.8 indicates there are many rotational states of equal separation, there is the first rotational state at $\sim 100 \text{km/sec}$, and those many smaller 10km/sec entangled states.

For the rotational states the transitions are for J and so for S and L and can be handled with the Clebsch Gordon coefficients which give you the singlet and triplet states for example..

The corona arises because of a $\langle r_0 | H | en \rangle = \text{large}$ nonzero metric transition between rotation states $\langle r_0 |$ and entangled state $\langle en |$. H is the Hamiltonian which includes these vibrational and rotational states and mixed states. The $\langle r_2 | H | en \rangle$ mixed state probability is much larger than for $\langle en_0 | H | en_1 \rangle$ mixed state. For global magnetic field high energy density recombination we get flares. Locally we get 511kV rotator oscillator microflares since have high local energy density. This comes out of time dependent perturbation theory in which the first order perturbation state probability coefficients c go as

$V_e / (E_{en_1} - E_{en_2})$). So when the energy is high enough the entangled state jump c is much smaller than the rotational since V_r in $V_r / (E_{r_1} - E_{r_2})$ and so c is much larger. (local 511kV oscillator ROTATOR microflares provide the $V_r = \text{energy} = \langle H \rangle$ to the dep rotator states here making $\langle r_0 | H | en \rangle$ large. Each local microflare becomes an individual filament of the corona.

The rotation is caused by $mv^2/r = q(vXB)$ helical rotation around the B flux tube). (en is the mixed state, r_1 the first rotator state).

So the transition is into the rotational states $\langle r^2 |$, not the $\langle en_0 |$ mixed state for example. cannot occur and the solar corona actually disappears (solar min and also coronal holes).

Also from Stoke's theorem the integral over the surface S of $\text{curl } v \cdot dS / C = \text{integral of } v \cdot ds / C$

around the boundary $C \frac{\oint_C ((\nabla \times v) \cdot ds)}{c} = \oint_C v \cdot ds$. = constant comes out of $g_{00} = k_{00}$.

11.8 High Frequency Metric Quantization Jumps Here Imply Low Amplitude Jumps.

Low object B frequencies means for the Dirac zitterbewegung $r = r_0 e^{kt}$ the jumps are much higher if separated by a larger time so their amplitudes are larger. Recall the definition $2mc^2 = \hbar \omega$ so $km = \omega$. so higher frequencies in ε in $\kappa_{00} = 1 - r_H / r + \varepsilon$ in $E = 1 / \sqrt{\kappa_{00}}$ (eq.5.6) mean lower amplitude metric quantization E . So the mass energies are given by $\omega = 1$, ε or $\Delta \varepsilon$ for the mass and so the $\Delta \varepsilon$ is the lowest fundamental $\Delta \varepsilon = \omega_0$, $\varepsilon / \Delta \varepsilon = n \omega = 100 \omega_0$ harmonic antinodes across the rotator between antinodes $\varepsilon / \Delta \varepsilon$. The $\Delta \varepsilon$ is about $100 = \varepsilon / \Delta \varepsilon$ antinodes across and at the moment of the big bang were spherical Bessel function standing wave antinodes inside a sphere. They provide the nucleus for the perturbations of a Rayleigh Taylor instability $\omega^2 = (\rho_1 - \rho_2) kg / (\rho_1 + \rho_2)$ Richtmeyer Meshow. Thus the Laplacian gives us $\omega_2 = 100 X \omega_1$ producing 100 nodes in that big bang object diameter from that solution of that Ricci (Beltrami) Laplace wave equation for this third order feedback mechanism. Note we can in addition model the big bang as a core collapse supernova resulting in that Rayleigh Taylor instability (seen in the M1 supernova). These nodes give the Rayleigh Taylor instability inhomogeneity's in the explosion responsible for those filaments of galaxy clusters. Thus the Laplacian gives us $\omega_2 = 100 X \omega_1$. producing 100 nodes in that big bang object diameter from that solution of that Ricci (Beltrami) Laplace wave equation for this third order feedback mechanism of present day average radius of 280Mly assuming a present 13.7by radius universe radius. Thus there are $(4\pi/3)50^3 = 524,000$ nodes in all resulting in about 500,000 voids in the later universe (370by later).

11.8a Gamow factor G

$$G = \exp(-2Z)$$

$$Z = \text{sqrt}(2m(U-E)) / \hbar$$

The Gamow factor represents the probability of tunneling through a potential barrier.

I can derive G using the WKB approximation which I am very familiar with (ie People use G mostly for calculating alpha particle tunneling in large atomic nuclei.

Alpha particle tunneling and resulting nuclear decays are sources of nuclear energy release activity in the sun (and even in the earth in radioactive decay) for example.

In my work 'm' (in the above Z equation) is the inertial term that varies with metric "density" which varies as the universe expands (Gm^2 is the constant.).

So the Gamow factor changes and so does solar activity (implying climate change on earth) and even radioactive decay (eg., alpha decay) heating in the earth (eg., implying volcanism).

The periodic metric jumps at 2.5My and 245My provide Gibbs function overshoots with the 2.5My the (volcanic) puffs of the Pacific volcanic island chains and the 245My bce Permian-Jurassic mass extinction and massive periodic (500My) continental breakups.

More generally from the WKB approximation

$$G = \int_R^{R'} \frac{(2m(V(r)-E_0))^{1/2}}{\hbar} dr.$$
 R is the radius of the nucleus of mass number Z, R_0 is the radius at which the α particle escapes, m is the mass of the α particle, $V(r)=2(Z-2)e^2/4\pi\epsilon_0 r \equiv B/r$ is the Coulomb potential, and E_0 is the energy release in the decay. The α particle escapes the nucleus when $r=R_0$. Hence, the potential $V(R_0) = E$. If $R \ll R'$. $G \approx \left(\frac{2m}{E_0}\right)^{1/2} \frac{B \pi}{\hbar 2}$ **m is the inertial term.**

Since GM is a constant here if $mv^2/r = GMm/r^2$ if m goes down the orbital radius does not change and on balance scales if m decreases for all masses m is not observed to change. In $GMm/r^2 = mg$ g doesn't change either if m changes. The earth from perihelion to aphelion changes in speed by 2km/sec so there should be a respective change in the inertial mass term in the Gamow factor.

The **metric quantization** change changes the inertial m and so changes the Gamow factor.

A way of writing the Gamow factor for transmission for the nucleus is

$$T = \exp(-2\pi\alpha(k e^{-kr})/\beta) \quad k \propto G$$

with $\beta = v/c$, $\alpha =$ fine structure constant, and $r \approx 0$, (i.e., nuclear force analogous to thin 'glue' layer).

Thus with m going down G = Gamow factor goes down so the strength of the nuclear force goes down and tunneling increases and so half lives shorten since more particles are leaving the potential well. The interior of planets heats up (more volcanism) and stars (more luminosity). With k getting smaller too this results in a mere $\sim 1/10$ volume decrease and associated smaller atomic weight supernova output (eg., C, Si, O, not Fe, Ni at that time) makes for a dusty universe and little iron and nickel at that time. O⁺⁺ (green) could then dominate in the spectrum then. That "low clustering" implied by that early low Gamow factor bigger m smaller transmission coefficient, more frequent supernova (those red dots, even Gs could go) so more radiation repulsion so less clustering (Gravity Gm^2 was invariant).

So we also had longer light curves for early type Ia supernova so z estimation that is too big so slower expansion but yet more rapid acceleration (my own work) so a rate of acceleration that could be slowing down at this epoch.

11.9 Metric Quantization States Are Fermionic

In the equation 11.2 metric quantization states there is a mixture of ϵ and $\Delta\epsilon$ states, both Fermionic since they are both eigenstates of the new pde. As an analogy recall in atomic physics you fill the S states and fill the P states to get stable states. (eg. Nobel gases). So that means the filled singlet states are two Fermions, usually the highest energy state.. So instead of the ground state 100km/sec we have the filled state as 200km/sec for galaxy halo speeds and for O, B, A spectral class stellar speeds. . For the sun's equatorial velocity we have the filled state 2km/sec instead of the ground state 1km/sec. For a Mesocyclone and other air motion we have the filled state of 20m/sec instead of the 10m/sec ground state.

Note about 80% of the galaxies in the SINGII galaxy survey were 200km/sec, not 100km/sec. Note the sun's surface is at 2km/sec, not 1km/sec. Note the mesocyclone is at 20m/sec, not 10m/sec.

So both the theoretical eq.4.13) and the observational evidence points to the fact that these metric quantization states are Fermionic!

The implication here is there is a spin component on the ambient metric, which is singlet in most cases, nullifying the spin, allowing us to disregard this effect, in almost all cases in Einstein's equations.

Einstein's equations themselves apply to spin 2 and so four of these states implying another stable metric quantization state at 4 (eg. 400km/sec which has been seen in Tokomaks)

Also note our own Milky Way halo **2 level** of figure 3 (i.e., 2X100km/sec) background metric quantization for the $\Delta\varepsilon$ electron lends itself to the N.N.Bogdiubov quasiparticle transformation (two electron) pairing interaction discussed at the end of sect.ch.5.3. So the superconducting state might look very different in 3 level (i.e., 3X100km/sec) NGC 2841 halo for example.

Note also that small galaxies would appear anomalously heavier (giving that ~ 100 km/sec) as has recently been observed by the Stacy McGaugh group (seeing a 100 to 1 ratio of quantized metric to baryonic mass gravity effects). A violent disruption of a small galaxy (with its halo $v \sim 100$ km/sec) on collision with a larger galaxy (e.g., $v = 200$ or 300 km/sec) would occur when it transitioned to the higher quantized v causing far more rapid mergers than those purely Newtonian computer multibody simulations would imply. Also, given the radial distribution of (metric quantization) would be provided by a galaxy cluster collision analogous to an electron radiating coherent oscillatory radiation as it drops down in energy (ie., collides with) in a hydrogen atom.

The metric quantization region also exhibits self gravity (like the cosmological long 511 tubes do) and so can be in metric quantization spherical states just as an electron in a hydrogen atom can be in spherical quantum states (eg. S states).

Chapter 12 Cosmological and spacecraft Observations Of Metric Quantization

Recall the Metric quantization 1km/sec, 10m/sec, ..., 1mm/sec.

Recall metric quantization applies to grand canonical ensembles with non zero chemical potential.

(On the quantum level that would be a mixed state (eq. 11.3)). .It does not apply to a single ballistic trajectory.

Slingshot exchange of energy effect

11.3 . From eq.11.1a then $v = (\Delta\varepsilon / (1 - 2\varepsilon))c/2$ so $v/c = \text{constant}$ (part3, davidmaker.com)

Recall our mixed metric quantization $\varepsilon\Delta\varepsilon$ states classically require a grand canonical ensemble with nonzero chemical potential, ie. Exchange in energy.

But what about the in-between case of the ballistic trajectory particles just beginning to interact with the other object (ie., exchange energy) but not quite the full scale grand canonical ensemble with nonzero chemical potential as in Saturn's rings or that spark gap? A spacecraft flyby slingshot trajectory is such an in-between case. Well then, in that case we might start seeing a barely detectable (possibly not) bit of metric quantization, perhaps at 1mm/sec, 2mm/sec, 4mm/sec, ..., 13mm/sec (fig7, attachment, bottom level), anomalous speed difference from the predicted one?

The Galileo spacecraft slingshot earth flyby got an anomalous 3.92mm/sec boost and the NEAR spacecraft flyby got a 13mm/sec boost.

Also from the mainstream:

"Anomaly appears to be dependent on the ratio between the spacecraft's radial velocity and the speed of light, " i.e., $v/c = \text{constant}$.

eq.11.3 is a derivation of this result. Note from eq.11 a then $v = (\Delta\varepsilon / (1 - 2\varepsilon))c/2$ so indeed $v/c = \text{constant}$.

There is maximal chemical potential (exchange of energy) for the radial motion., let's say from the planet the slingshot is occurring at.

Earth aphelion-perihelion metric quantized speed difference

Also the difference between the aphelion and perihelion speeds of the earth is 2km/sec making the earth's orbit stable because of metric quantization. If it was not for this orbital stability of the earth there could not have been enough time to have evolved in the goldilocks zone to be human beings. Metric quantization is responsible for the human race!!! That is because the planets perturb each other's orbits continuously and the time it takes for this to lead to chaotic orbits is the (relatively short) Lyapunov limit (if not for metric quantization).

From the mainstream:

"In 1989, Jacques Laskar demonstrated that the Lyapunov timescale for the terrestrial planets was only a few million years (Myr)."

But the solar system is billions of years old!! Anyway, the existence of the human race depends on metric quantization.

Spatial and temporal metric quantization jumps sect.1.1

From that $\delta C = 0$ result of section 1 we found that one of the extremum is $\frac{\partial C}{\partial r} = 0$, $dt = \text{constant}$ so C is uniform over space at time t. So it gives simultaneous metric jump over all space (within r_H) for Newpde jumps. But the effect is that the E&M is transmitted back at us at the speed of light. So for example we see the Permian Jurassic event now happening at CfA2. Note breakup of supercontinents correlate to these metric jump times.

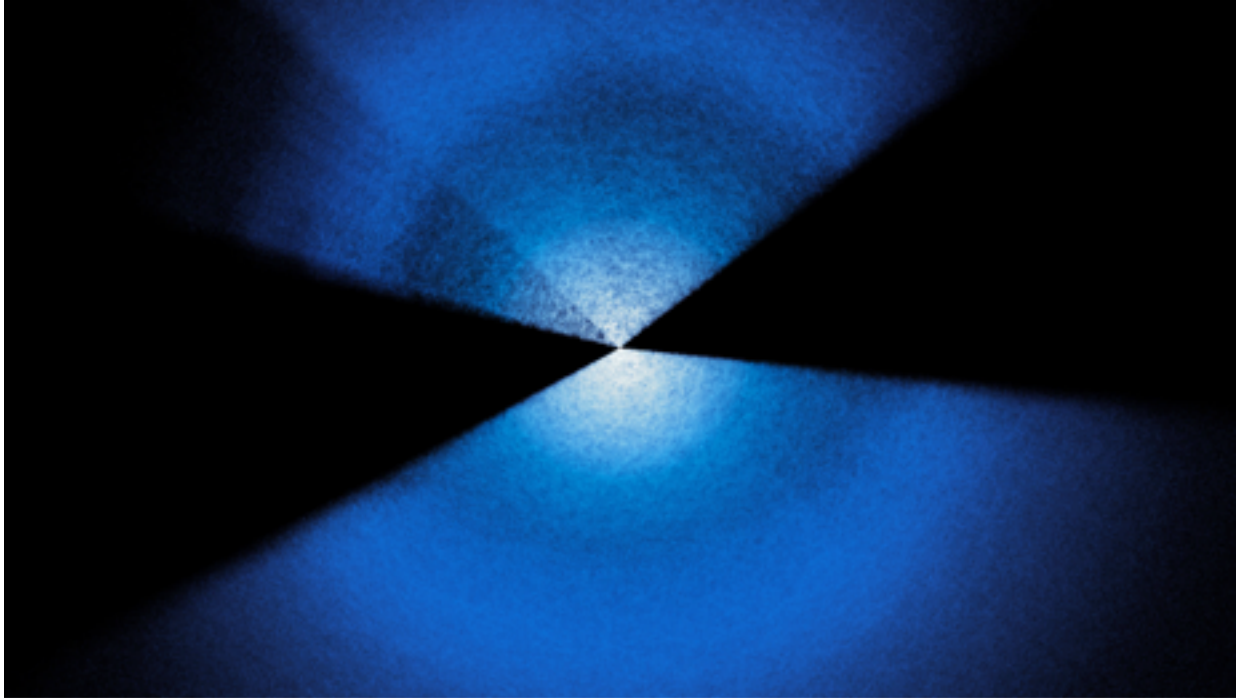
ε jumps are 270 MY apart created Permian Mesozoic event and the Pangea split.

The 250My big enchilada ε metric quantization jumps actually split the earth in two, create fissures that stretch from pole to pole (eg.,midAtlantic ridge). Dates below are of the creation of a given supercontinent, and so of a splitting of the earth.

1.8by Columba, Rodina 1.3by, Pannotia 750My, Pangea 240My

Note ~500My time separation between these events.

Recall in time dependent quantum mechanics (eg.,stability of orbitals) there are no parameters designating which part of the particle changes state, The whole particle changes it's state at once. Since the universe is fractal these cosmological state changes have to obey the same behavior.



Within about 4 millimeters of the center of the above DESI image we have this:

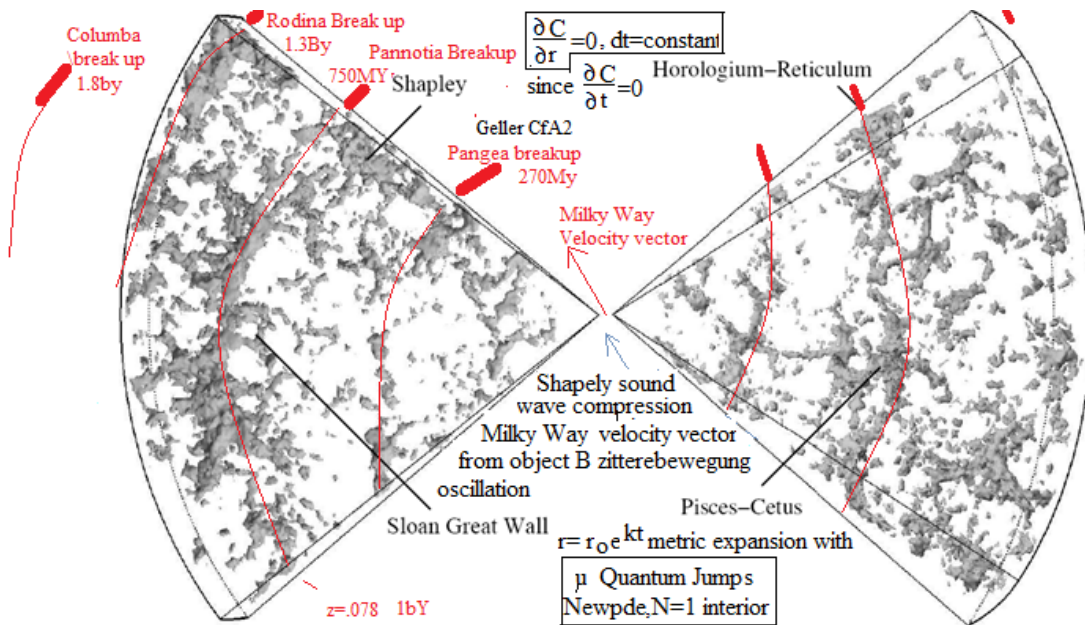
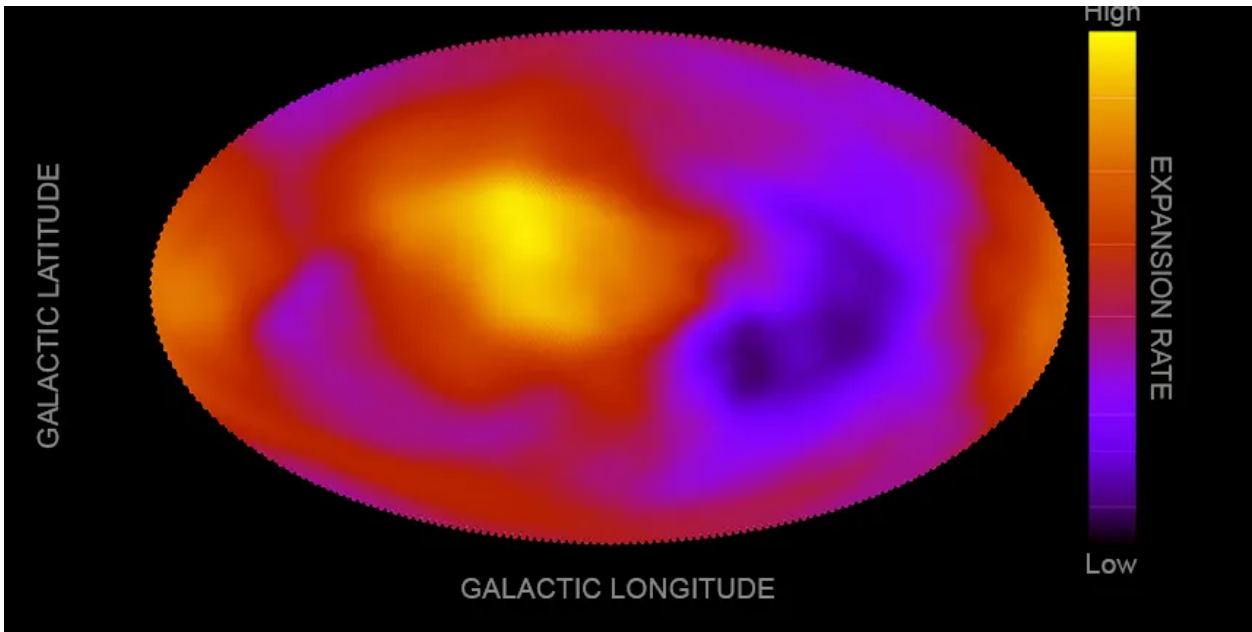
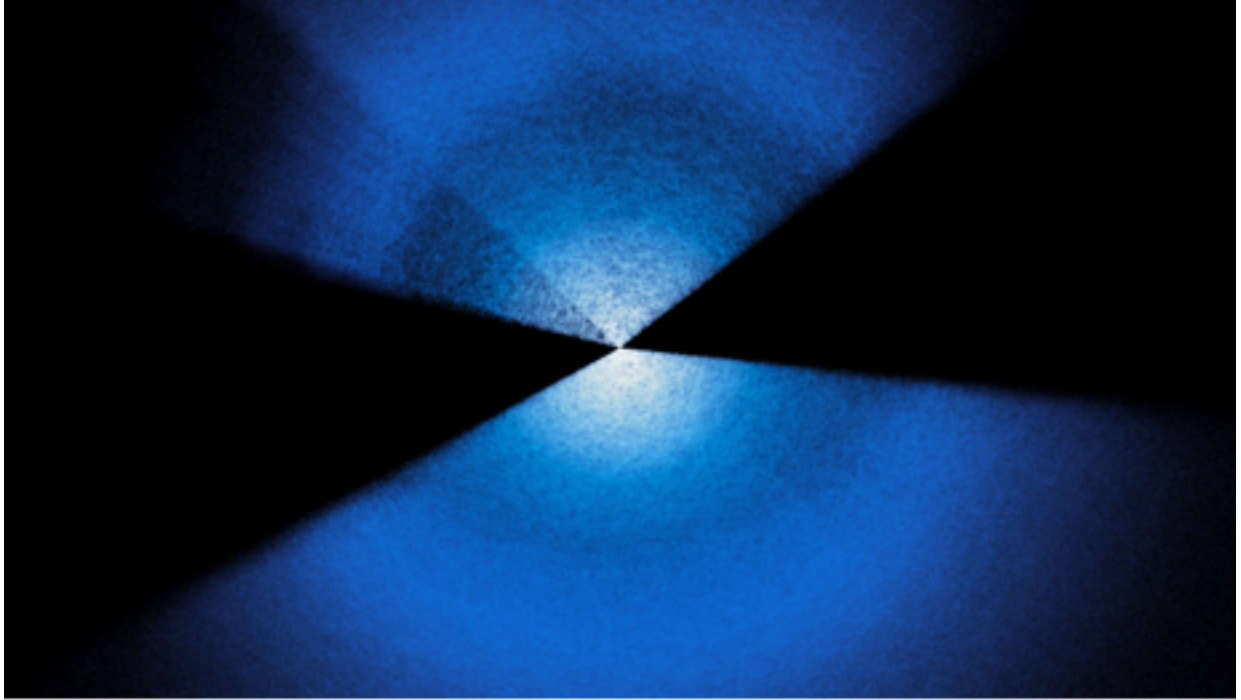


Fig1

Above are the $\frac{\partial C}{\partial r}$, dt constant $N=2$ (observable internal QMS jumps in fig 1). A QMS (quantum mechanical system) state region jumps all at once as seen by the outside fractal larger observer so it should do that for the inside (r_H) observer as well. Because of that the disturbance appears to propagate from any given point at speed c even though it actually happened simultaneously everywhere at once in the QMS. Thus we see these Sloan and Margaret Geller Great Walls that appear to be centered on our own position (corrected for our own galaxy's proper motion). But they really aren't centered here. It's just that the jump(s) occur all at once over the entire QMS.



Expansion rate difference over 180deg: implying we are not at the center of the expansion so for us it is NONisotropic.