#### **CHAPTER 15**

#### Metric Change Effects on the Sun's Gravity, Earth's Interior Isotopic Decay Rates and on Earth's Geological Time Table

#### 24.1 Introduction: Metric Changes and Inertia Effects

Metric changes change inertia and therefore mass. In that regard recall the  $1+\epsilon/2+\Delta\epsilon/2$  masses in the  $g_{oo}$  metric component for example.

- 1) The rate of energy output or power produced in the sun goes as T<sup>17</sup>. But the sun's mass determines directly the temperature T that can be sustained and therefore power output. Thus the power output from the sun is very sensitive to mass changes. Thus these metric changes effect the power output from the sun. The solar contant determines the climate on the earth.
- 2) The rate of radioactive decay has a exponential dependence on the potential barrier that must be tunneled through. But this potential height has a dependence on the nuclei mass. The nuclei mass is also dependent on the metric change so the rate of radioactive decay is strongly dependent on metric change. This rate of radioactive decay determines interior heating within the earth and therefore the rate of volcanism and tectonic activity inside the earth.

The detailed calculations for both radioactive decay dependence on potential barrier height and solar output dependence on  $T^{17}$  are given elsewhere.

*"Evidence for Correlation Between Nuclear Decay Rates and Earth Sun Distance"* Jere Jenkins atXiv.(0808.3283v1 [astro-ph] 25 Aug 2008

Prediction of solar flares 39 hours ahead by change in rate of decay of Chlorine 36 Half life of 301,000 years. Beta emitter, Jenkins, University of Kentucky School of Engineering Aug.2012, Fischback at Purdue University.

Since 2006 has seen annual pattern radioactive decay rate change..

Note that the metric change causes the flare and causes the rate of radioactive decay to change.

#### 15.2 As the Metric Expands the Metric Quantization Jump Boundaries Must Move

 $\sqrt{1 + \varepsilon + \Delta \varepsilon} \approx 1 + \varepsilon/2 + \Delta \varepsilon/2$ 

As the metric expands the metric quantization jump boundaries must move. Thus there must be a periodic rapid decrease in the ambient metric coefficients. In that regard recall just the quantization of the  $\Delta\epsilon$  red shift in units of observed 71km/sec. That  $\Delta\epsilon$  and  $\epsilon$  lead to a 71km/sec and  $(\epsilon/\Delta\epsilon)75$ km/sec =v<sub>q</sub> =73450km/s quantization of the red shift(calculation above).  $c/v_q$ =13billion/x leads to x=3.1million (for the  $\Delta\epsilon$  substitution) and for the  $\epsilon/2$  substitution we get 310million year interval in time between major metric changes(actual 290mY) along with the above object C 1/3 split.

#### 15.3 Metric Change and Inertia

Recall the Gamow factor  $1/\theta^2 = \exp(-2\pi Z_1 Z_2 e^2/(hv))$  in the Coulomb barrier transmission coefficient. T=4/(4 $\theta$ 2+(1/(4 $\theta$ <sup>2</sup>+(1/4 $\theta$ <sup>2</sup>)<sup>2</sup>cos<sup>2</sup>L +4sin<sup>2</sup>L) reaching maximum value (cosL=0) at L=(2n+1)\pi/2, J=(n+<sup>1</sup>/<sub>2</sub>)h with the J condition the same as for bound states. Changes in mass

imply changes in electron speed v inside the nucleon (since this ultrarelativistic v is the source of the mass of the nucleon. See ch.2) and nucleus and so imply changes in transmission coefficients T. Thus changes in mass effect nuclear decay rates in the earth (changing rates of volcanism) and the mass of the sun and therefore the rate of energy release from the sun. Orbits of satellites and other objects don't appear to change in these metric change events since both mass and r change (in  $v^2=GM/r$ ) proportionally since  $dr'^2=dr^2/(1-r_H/r)$ ;  $r_H=2e^2/m_ec^2$  so effectively r is getting bigger since  $m_e$  is getting larger. Also spectra don't change since the fine structure constant does not change (except cosmologically). Thus the chemistry doesn't change either. Note in section 23.8 (the Casimir effect implication) that changes in the gravity for massive objects cause metric changes in the surrounding region. This gave us the metric quantization of section 23.5 but on a far smaller scale it also can change the rate of alpha particle decay. Thus 24.8 planetary gravity effect also should change Geiger counter click rates and also rates of radioactive decay in the earth and therefore effect volcanism rates.

The epsilon changes in delta epsilon increments and stellar spectra don't change except in each spectral line being shifted from the standpoint of a distant astronomical observer. The reason for these energy levels is thus analogous to the Raman spectrum in the CO molecule.

Recall the Gibbs overshoot phenomena in equation 223.1 and 23.2. So for example the rate of thermonuclear reactions in the sun and radioactive decay in the earth change, etc. must change radically at these times (especially at the Gibbs overshoot times, cooling AND heating Gibbs jump is 100,000 years in duration. The 2n+1 sequence goes as 1,3,5,7,... (for n=0,1,2,...). Thus the first and most important jump is from 1T to 3T and so we have these two cycles on top of each other with the other frequencies are attenuated much more.. Passage of this phenomena through the 100kly diameter galaxies should attenuate the higher frequencies. It might be possible to see consequences of these 3 harmonic apart individual cycles. Thus due to this frequency cutoff (the small scale  $\Delta \varepsilon$  structures) in the Fourier expansion of E making it not exactly a square wave, it was not heterodyned to the highest frequencies). This should produce this 100ky Gibbs jump major climate and volcanic Gibbs phenomena heating and cooling double catastrophe changes on the earth (and other planets) at those time intervals (especially the larger ( $\varepsilon$  itself which gives a ~290My ~13gYX $\varepsilon$  using above g<sub>rr</sub> analysis). This would occur at 544my. See Figure 24-1. The shorter 2.8my cycle appears as a *square wave* of this form:

^ 0my 3my warm 5.6my 9my warm temp \_\_\_\_\_ cold \_\_\_\_ | \_\_\_\_ cold \_\_\_\_ |

#### **15.4 Geological Time Table Summary**

In part III Ch.19 Frobenius series solution close to the  $r_H$  we found that for a single horizon there was a  $\psi$ =constant solution (Recall we used the other  $\psi$ s to get the hyperons eigenvalues). But also given C→0 inside such a constant solution there is the  $\delta$ z=-1,0 solution with its infinite number of Fourier sine wave super-positions. (see eq.2)

So inside  $r_H$  when our metric expands with that r=roe<sup>kt</sup> expansion our level metric components must be square waves (Sum\_k((sin(2pi(2k-1)ft)/(2k-1))) when the metric jumps occur. The frequencies are cut off by the average wave number of the galaxies (~1/100,000Lyears) since the wave passing through them is attenuated (by them). The background is quantized at the cosmological fractal scale with these  $\psi$  s so the Gamow factor governing nuclear decay is effected. So we have a 100,000 year Gibbs over shoot and undershoot (mass extinctions and continuing small scale oscillation (100ky ice ages). The Gibbs overshoots and undershoots 270MY apart ( $\varepsilon$  rotational object B oscillation) give the hot and cold mass extinctions, eg. Permian Jurassic. The  $\Delta \varepsilon$  given the 2.5My low amplitude Gamow factor amplitude change causing those island chain effect in the Pacific Ocean and Atlantic (eg. Maui arose about 2.5 MY before Oahu.)



**Geological Time Table Equation** (i.e., history of the earth equation) from 23.1 Here again we have with  $2\pi/\omega_{\varepsilon}=290$ my,  $2\pi/\omega_{\Delta\varepsilon}=3$ my stair step jumps in giving the red shifts. Also in our equation we have a 100ky Gibbs overshoot. We give evidence for each of these

#### jumps.

Note: Large meteoric impact effects (e.g., 63my) are not included here.

#### 15.5 100ky Gibbs OverShoot

Metric change pulses of period shorter than 100,000 LY are scattered by galaxies which are on average of that size (in analogy to Mie scattering). This attenuates higher frequency contributions to the spin flip square wave (eq. 22.1) and thus gives the square wave a 100,000 year Gibb's overshoot and oscillation on the top of the square wave. Note this same scattering effect will result in higher frequency scattering resulting in higher frequency gravity waves scattering into a noisy background. This should result in these gravitational wave detectors detecting only a noisy background (unless they are turned on for more than 100,000 years). It is also well known that the earth's orbital Milankovitch cycles are not sufficient magnitude to explain this strong 100,000 year periodicity of the ice ages. There are other stronger Milankovitch cycles *ignored* simply because they don't fit to that periodicity of the ice ages (see: wikipedia/ Milankovitch cycles/problems).

That big  $\varepsilon$  metric change effect also effects gravity, causing the gravity of the sun and earth to change effecting the rate of radioactive decay in the earth and thermonuclear reactions in the sun. That big epsilon metric change effect occurs about every 290my and one is due in about 36my. The Gibbs phenomena associated with this effect has been geologically measured and has terms that are cutoff at about 100,000 years making the Gibbs overshoot about 100ky long.2km of

ice covering the earth for 100ky and 100ky years of heating causing a near extinction of life at the Permian Jurassic boundary. But a Gibbs overshoot has smaller oscillations of about the same period associated with it .Thus these smaller 100ky gravitational oscillations are occurring right now. Thus a 100,000 year cycle in heating and cooling should be in evidence, the cycle of the ice ages! The summed wavefunctions are due to perturbations due to rotational and oscillational boundary conditions at the horizon boundary. Thus cosmologically there is a stair step in the metric change giving the quantized red shift and locally all we see is that 3my pulse with that Gibbs effect 100ky oscillation due to that 100ky up and down spike.

# This forms the very convincing evidence for the 100ky Gibbs overshoot and cycle sequence

#### 15.6 290my and 544my Increment Square Wave Jumps

There is a great deal of observational evidence for these metric jumps. (here on earth and give more volcanism on Venus and liquid water and volcanism on Mars). Venus had a volcanic event that covered the planet circa 544myo jump, the lava lobes on top of Mars volcanoes are roughly 290my apart in age and perhaps are the periods heating of water flow (and associated layers of sediment) also and at a half period 254MY ago at the Permian-Jurassic boundary which was also a Gibb's double catastrophe. Have such changes occurred in the past? , the 544myo to 245myo square wave pump gave rise to the carboniferous, a long warm period.

Large scale double extinctions did occur at the 544 million (Precambrian-Cambrian boundary and 254 million (Permian-Jurassic boundary, also less researched events occurred at the 2X290my intervals of Mesoproterozoic-Neoproterozic (900my) and Paleooproterozic-Mesoproterozoic (1600my boundary). Recent research have found a 1.7 byo event and a 1.4 byo event. 1704myo and 1416myo are 254myo with multiples of 290my added to them. at 900myo there was the metazoan divergence, at 1400myo there was a granite intrusion (more volcanism) in death valley rocks,

Some recent quotes from the literature:

At about 1.4 billion years ago, the metamorphic complex was injected with dikes and larger blobs of granitic magma." ...in death valley rocks

#### "Early Metazoan Divergence Was About 830 Million Years Ago"

They arrived at a protostome-deuterostome divergence time of **830mya**..." ", then swung back to the conventional figure of **600 million years**."

#### 15.7 On Mars there is Hint Of Heating And Water Flow 544million years Ago

"The largest of the channels engraved into Mars within the past 500 million years belong to the 600-mile-long (1,000 kilometer) Marte Vallis system. Probing Marte Vallis could offer hints on a time otherwise thought of as cold and dry. However, Marte Vallis lies in Elysium Planitia, an expanse of plains along the Martian equator. This area is the youngest volcanic region on Mars, and massive volcanism throughout the past several hundred million years has covered most of its surface with lava, burying evidence of its recent history, including..."

# This forms the very convincing $\varepsilon$ cycle sequence(Upper portion of figure 6 above): 254my ago, 544my ago, 834my ago, 1124 my ago, 1414my ago, and 1704 my ago.

Next we note that unconformities seem to match  $\varepsilon$  metric change events.for example in the Grand Canyon (GC):

Unconformity	Time	Formation Name			
245MY	Kaibab formation (GC) Grey limestone, sandstone, siltstone				
(top layer)	Gypsum, chert	· · · ·			
	Also 256MY Toroweap formation with grey limestone, chert				
<b>544</b> MY	Bottom of Tonto	Group (GC)	(bottom layer)		
1050MY	Top of Unkar gro	oup (GC)	· · · ·		
Middle Protero	zoic				
1260MY	Bottom of Unkar	group(GC)			
1660MY	Vishnu Formatic	on (bottom of GC)			

Note approximate multiples of 270MY metric change time intervals for these unconformities. This appears to occur elsewhere also. For example the Rain Valley and Concha formations in the Hoachuca Mountains of Ar are equivalent respectively to the Kaibab and Toroweap Grand Canyon (GC) formations. The Kaibab formation also (deeply) underlies the Quartzite Ar area.

Unconformity information obtained from Arizona Geology map.

Note that the Grand Canyon bottom of the Tonto group to Kaibab formation constitutes a 270my metric quantization time period (for  $\varepsilon$ ) and **it does subdivide into about 100 units** (much smaller ones come after that),which is that  $\Delta \varepsilon$  quantization (object C). Also the 270my time shrinks to 200my by 1by years so that the great walls and larger structures associated with  $\varepsilon$  270my metric quantization largely disappear on larger spatial scales than about 2by light years. The vibrational mode of object B and A does create a another antinode at 6by however.

#### Geology Unconformity & 270MY Metric Change Cycles

Change in the nuclear tunneling potential due to  $\varepsilon$  metric jump (mentioned above) again implies a variation in heat generation through radioactive decay in the earth's mantle and core and therefore changes in plate tectonic activity in the crust. In that regard there is strong evidence the 270 MY ε metric change cycle generates 270MY cycle of geological unconformities. In that regard for a large scale unconformity with flat land mass to form an entire flat land mass had to have risen pretty rapidly (~100kY Gibbs phenomena jump) out of the ocean (due to metric change in this case). Once it has risen it doesn't erode much because it is flat (steep mountains rapidly erode, these flat geographies do not). At the next metric change, a long time later, it may drop back down below the ocean and sediments will continue coming in from surrounding rivers, and the cycle repeats itself. So we see a flat rock layer, then a deep set of much younger rock strata over it (hence the unconformity), For example the mid North American continent rose several miles out of the sea in the late Permian  $\varepsilon$  metric change. The (formerly sea floor limestone) region was nearly flat so very little erosion occurred after it rose above sea level causing the appearance of a geological unconformity when the next subsidence metric change occurred and once again sediment started accumulating. Energy rises continuously and so jumps at k $\in \sqrt{(L(L+1))}$  intervals=1, 1.73. So those square wave jumps should occur at these time intervals.

#### Note approximate multiples of 270MY metric change time intervals for these

**unconformities**. This appears to occur elsewhere also. For example the Rain Valley and Concha formations in the Hoachuca Mountains of Ar are equivalent respectively to the Kaibab and Toroweap Grand Canyon (GC) formations. The Kaibab formation also (deeply) underlies the Quartzite Ar area.

Unconformity data obtained from State of Arizona geology map.

#### 15.8 2.8my and 5.6my Metric Increment Square Wave Jumps

We note that from just above 5.6my it was cooler, from just over 3my to 5.5my is warmer. After just over 3my it was cooler again. Here is that quote from the article

"from 10 million to 5.6 million years ago, cyclic glaciation was highly active in the Northern hemisphere and glaciation was suppressed between 5.5 million and 3.5 million years ago.".. Of course we are back to the glaciation once again after 3my, we just came out of an ice age for example so the past 3my has been a cold period.

Recall metric jumps would increase radioactive decay and therefore volcanism. In that regard recall that the Pacific Plate carries the Hawaiian islands north-north west toward the subduction zone next to the Aleutian islands.. Thus the Hawaiian islands are like puffs of smoke carried by a strong wind (here the Pacific Plate) as are several other island groups (and underwater seamount groups as well) in the Pacific Ocean and in the Atlantic. You need to see a echo location (sonar) map of the Pacific ocean floor to see just how dominant a geographical phenomena these island and seamount chains are in the Pacific basin.

Thus there is an interesting possibility here. It is that if you are looking at the Hawaiian islands you are looking at 3 million year interval major eruptions and thus increased heating in the earth, which incidentally would be a result of such a metric jump.

*Thus each island* (in the Hawaiian islands) *represents a specific metric change* occurrence. Thus Oahu (that contains Pearl Harbor) would be the 2.8 million years old metric change, Mona Loa (the big island) the most recent and Kauai the 5.6 my change. Thus this may be evidence in itself of that 3 my metric jump effect.

Kaui island (of the Hawaiian islands) formed at the 5.6myo jump, Ohau at the 3myo jump, glaciation was decreased at the top of the 5.6-3my warm part square wave. At the 3myo jump there came about a separate human species (homo sapiens),

# This forms the very convincing $\Delta \epsilon$ sequence (lower inset of figure 6 above): 2.8my ago, 5.6my ago,...

Thus apparently from the above geological evidence metric change *really is a square wave*! The movement of plates has caused the formation and break-up of continents over time,

#### 270my Metric Quantization Jumps and Continental Splitting And Resultant Drift

Note these 2.5my metric quantization  $\Delta \epsilon$  jumps. and the resulting formation of the Hawaiian island chain? But the 100X volcanic activity of the 270my metric quantization e jumps had to have caused far larger volcanic effects than those 2.5my jumps. It had to have caused the continents to split apart for example due to increased volcanism along the mid Atlantic ridge in the case of the supercontinent Pangea split.

For example supercontinent Columbia or Nuna formed between 2by and 1.8by years ago and broke up 1.5by to 1.3by years ago (consistent with the 270my metric jump time) Supercontinent

Rodina formed 1by years ago and broke up into eight continents 600my ago and is also consistent with that time interval. The Pangea break up dates (found from undersea magnetic stripe mapping) to at least the beginning of the Jurassic. The Siberian traps also date from near the Permian Triassic transition time. Pangea broke up into Laurasia (later North America and Europe) and Gondwana.

Note the  $\varepsilon$  metric quantization pulse completely destabilizes this mantle convection cell morphology so that every other time (of a metric quantization pulse) the convection cell can rotate the other direction leading to continents eventually colliding again. Also the East Pacific Rise, etc.. volcanism constraints how far the North-South American continents can move west due to mid Atlantic ridge volcanism.

#### References

#### **500my sound waves**(ripples)

http://www.space.com/scienceastronomy/aas\_universe\_structure\_050111.html

#### 3my cycle. 57<sup>th</sup> harmonic wave

more info on your perseus mega cluster http://chandra.harvard.edu/photo/2000/perseus/more.html http://antwrp.gsfc.nasa.gov/apod/ap000615.html http://antwrp.gsfc.nasa.gov/apod/ap030912.html

*3,000,000 year event coinciding with* a **climate change in Africa 2,800,000 years ago**. http://cnn.netscape.cnn.com/news/package.jsp?name=fte/stardust/stardust&floc=wn-np

#### Major biological event at 5.5myo

with previous evidence that chimps and human ancestors diverged from a common ancestor about 5.5 million years ago."

#### http://www.sciscoop.com/story/2004/10/11/6174/2171

And, palaeoclimatologists are agreed that **5.6 myo** is a key date in cyclical glaciation.

#### Major biological event at 5.6 myo

The researchers found chimp lice and human lice diverged roughly 5.6 million years ago, consistent with previous evidence that chimps and human ancestors diverged from a common ancestor about 5.5 million years ago."

http://www.sciscoop.com/story/2004/10/11/6174/2171

#### Hawaiian islands formed at **3my** time intervals of volcanism (Ohau at 3my)

"The island of Kauai is the oldest of the eight major Hawaiian islands and was formed by a single shield volcano approximately 5.6 million years ago (Stearns 1985)."

http://www.epa.gov/fedrgstr/EPA-SPECIES/1997/December/Day-05/e31839.htm

http://policy.fws.gov/library/00fr2348.html

#### Square wave evidence for heating and cooling at 3my time intervals

, for one simple reason: from 10 million to 5.6 million years ago, cyclic glaciation was highly active in the Northern hemisphere and glaciation was suppressed between 5.5 million and 3.5 million years ago

http://www.nature.com/cgitaf/DynaPage.taf?file=/nature/journal/v411/n6834/full/411142a0\_r.ht ml&filetype=&dynoptions=

#### 830my major biological event

Charles Lyle meeting, paleontological society of London, 5 June 2002 Xun Gu's abstract: "Early Metazoan Divergence was about 830 Million Years Ago.

#### Major geological event 1.4byo

. At about 1.4 billion years ago, the metamorphic complex was injected with dikes and larger blobs of granitic magma." http://vulcan.wr.usgs.gov/LivingWith/VolcanicPast/Places/volcanic\_past\_death\_valley.html

And, palaeoclimatologists are agreed that 5.6 myo is a key date in cyclical glaciation.

#### GIBBS ring of 100,000ky from 254my event

"Again, what causes the earth's orbit to vary from <u>fairly circular to more elliptical</u> <u><GravInductEMWave.html></u> every 100,000 years? I believe the root cause is variations in gravity."

http://www.grandunification.com/hypertext/Earths\_100,000\_yr\_cycle.html

Gravity change linked to ice age cycles!

State of Arizona geology map used for unconformity information.

#### 16 Metric Quantized Stable Quantum States

In part 1 derived the chiral nature of the ambient metric (that Fiegenbaum point difference with the -sqrt2 led to that result). Also equation 13 is a function of spin 1/2 ep and dep states and exhibits this chirality. So at the ground state metric quantization appears to the 2X singlet nonchiral state thereby canceling out the chirality (so most galaxies have the 200km/sec instead of 100km/sec, most stars smaller than sun have 2km/sec, mesocyclones have 20m/sec instead of 10m/sec.) The singlet state is a lower energy vacuum state and is nonchiral!!!

For more dense states the jumps are larger, here 4X still preserving that chirality cancellation. Recall from the first part the result of mixing the states:

 $i\varepsilon e^{-(\Delta\varepsilon/\varepsilon)} = i\varepsilon (1 - (\Delta\varepsilon/\varepsilon) + \Delta\varepsilon^2/\varepsilon^2 - \Delta\varepsilon^3/\varepsilon^3 - ..)$ (13)

Note from equation 13 that the metric quantization mixed state is:

$$(|\varepsilon\rangle+|\Delta\varepsilon\rangle)/\sqrt{2}\equiv|QM\rangle,$$

But  $\varepsilon$  is a Fermionic state and  $\Delta \varepsilon$  is a Fermionic state.

with the  $|QM\rangle$  the singlet  $\uparrow\downarrow$  state with double the values of v.

Recall the S states in QM are filled stable states, as well are the p states with their chemically stable Nobel gases.

So the most stable |QM> state is

100km/sec	-> 200km/sec	(majority of galaxy halos)	$\uparrow \downarrow S$ state
1km/sec	-> 2km/sec	(the sun's equator)	$\uparrow \downarrow S$ state
10m/sec	-> <b>20</b> m/sec	(Mesocyclonic and other)	$\uparrow \downarrow S$ state

10m/sec  $\rightarrow$  20m/sec (Mesocyclonic and other..) |  $\downarrow$  S state So the spin 2 metric background metric has a spin ½ component that cancels in most cases to a singlet and so allows classical General Relativity (GR) theory to

work.

But spin2 means another "pedestal" of stability  $\uparrow\uparrow\uparrow\uparrow$  implied by GR itself so that 4(100km/sec) is yet another stable level, See DIII QDB tokomak result below.

#### 16.1 Laboratory Evidence For Metric Quantization

Recall the 1 km/sec metric quantization (eq.13) observed in many physical situations (see below). Here we have an electric arc in which the intensity as a

function of energy is measured.



Recall the 1km/sec represent stability regions. We quote from the paper:

"In as much as the current stabilizes the arc, it can be assumed that the energy distribution of the ions is connected with the instabilities of the arc"

The same can be said for the "stabilities of the arc".

Maximum speed of LS was 1km/sec. LS is brass.



Note you have the same separation in velocities for both zinc(Zn) and silver(Ag). But silver and zinc have different energy levels and so clearly this 1km/sec effect is not associated with their energy levels. This 1km/sec difference is something more universal. we also see a 100km/sec effect in tokomaks but less distinctly..

You probably are wondering why you can't observe metric quantization in your room for example given that it is also a grand canonical ensemble. The reason is that the next lower metric quantization speed is 20m/sec which for liquid helium4 gives us 0.065K which is difficult to observe (room temperature is around 300K). Helium4 is the only material still liquid at these temperatures and so it can still be in a grand canonical ensemble. Solar Wind Metric Quantization

Solar wind metric quantization looks just like the plasma arc metric quantization. The escape velocity from the sun is 617.5km/sec. escape velocity from the sun if starting out from the earth is 617.5-42.1=575.4km/sec. metric quantization is dominated by 400km/sec which can't make it (which is the origin of the corona.) So we should start seeing solar wind at about at earth at about 800-575.4=224.6km/sec.



#### 16.3 Metric Quantization In A Tokomak Plasma

Some people have asked me why no one has seen metric quantization in the laboratory. Well, they have and they simply don't realize what they are looking at.

For example I was wondering whether N100km/sec metric quantization might be used to create stability in a man made plasma. After all metric quantization plays a big role in the sun.

My metric quantization will only work in a isothermal plasma with ion speeds of N100km/sec, where N is an integer. But I have heard of 4X100km/sec=300km/sec=1keV proton (ion) temperature in the ITB Internal Transport Barrier (L mode +ITB at the QHmode high plasma density edge where this metric quantization isothermal plasma might be located) in the high density region. So that 4X100km/sec layer of plasma *is the actual transport barrier* in the newly discovered Internal Transport Barrier ITB phenomena. These ITBs are considered to be the next frontier in Tokamak fusion physics since they are a promising source of stability in plasmas. The ITER in Europe is to be designed around the ITB. So plasma physicists may have already stumbled on to metric quantization stability (ie., that ITB caused by that 4X100km/sec) and not even realized it! The edge pedestal of 4X100km/sec provides the Internal Transport Barrier plasma. This edge pedestal is where the stability source is in this new type of plasma.

QDB REGIME OBTAINED USING COUNTER-NBI — COMBINES ITBS WITH ELM-FREE QUIESCENT H-MODE EDGE



#### 16.4 Metric Quantization In A Tokomak Plasma

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=1keV Deuterium temperature in the ITB Internal Transport Barrier (L mode +ITB at the QHmode high plasma density edge where this metric quantization isothermal plasma might be located) in the high density region. So that **3**X100km/sec layer of plasma *is the actual transport barrier* in the newly discovered Internal Transport Barrier ITB phenomena. These ITBs are considered to be the next frontier in Tokamak fusion physics since they are a promising source of stability in plasmas. The ITER in Europe is to be designed around the ITB. So plasma physicists may have already stumbled on to metric quantization stability (ie., that ITB caused by that **3**X100km/sec) and not even realized it!

To obtain a stable metric quantized plasma over the entire volume of the Tokomak interior you need to extend the vertical part of the transformer coil (inside the torus) several meters vertically, make it much longer, to obtain the long tube 511 stability effect. See Gaussian pillbox illustrations below for the reason. You also need to tune the plasma for 800km/sec. This should give a stable plasma and the breakeven fusion in the largest machines.

#### **2mm/sec Metric Quantization**

Also at a local creek I found a ripple area that had a distinct signature of the 2mm/sec surface vortex. The clear sky vortex shadow on the creek bottom was caused by the Schlieren effect and I could extrapolate to the vortex speed just before the (vortex) collapse: it could not been far off from that 2mm/sec theoretical estimate.

There is another metric quantization at  $20\mu$ m/sec by the way.

#### 16.5 Metric Quantization And The Calculation Of G

A recent Physics Today article said that the value of Newton's gravitational constant G is currently only known to **3** significant figures (somewhere between **6.672** and **6.676** X10<sup>-11</sup> Nm<sup>2</sup>/kg<sup>2</sup>), really no significant advance in accuracy beyond what Cavendish himself measured in the 1700s and a typical experimental error the students would have gotten in one of the many physics labs I used to teach! The problem is not in the experiments themselves which are

accurate to around 20ppm-40ppm (even given torsion calculation uncertainties). The problem is in the spread of the results of these several very accurate, precise experiments.

Metric quantization is the problem here especially with the experiments that require a moving oscillating torsion bar to measure the torsion constant, where we can then have a grand canonical ensemble with nonzero chemical potential (as in Saturn's rings), the requirement for that metric quantization to effect relative speeds (eg.,2mm/sec or  $20\mu$ m/sec metric quantization) will stabilize a speed that might be different for different experimental apparatus and therefore cause large errors in the torsion constant calculation and therefore the G calculation. The new experiments, with no such motion requirement (e.g.,floating the balls in mercury), will probably finally nail down the gravitational constant.

### 16.6 Theory Behind Galaxy Halo, Stellar Equatorial, Corona, Tachocline Speed Quantization

Here we introduce a generally covariant generalization of the Dirac equation (new pde)  $\sqrt{g_{\mu\mu}\gamma^{\mu}\partial\psi/\partial x_{\mu}} = (\omega/c)\psi$  that does not require gauges (eq.1.9, Ch.1, www.davidmaker.com). Solve this new pde with local background metric  $g_{00} = e^{i\Delta\epsilon}$ . From particle mass considerations  $\epsilon = .06$ ,  $\Delta\epsilon = .00058$  ((1a), Ch.2) in the exponent of  $g_{00}$ . These three values 1,  $\epsilon$ ,  $\Delta\epsilon$  are responsible for the masses of the three free leptons in that lepton equation (the new pde). Here the  $\Delta\epsilon$  perturbative contribution (to the  $\epsilon$  term) in metric coefficient  $g_{00}$  levels off to the quantized value  $e^{i\Delta\epsilon}$  in the galaxy halos and for stellar equatorial velocities

#### 16.7 Bode's Law

Recall we have done a lot with that object B N100km/sec metric quantization: the corona, tachocline, galaxy halo, main sequence O,B, A stars.. But what about that 1km/sec object D metric quantization?

The solar differential rotation is initiated with that 1km/sec. It causes those He304 Gibbs jumps in the sun and the associated X class flare clumps.

Note by the way that metric quantization doesn't happen without

several degrees of freedom as in a the turbulent axis symmetric proto nebula 4.5BY years ago. It could be that

Titus Bode's Law for planets (only Neptune does not obey Bode's law)

might also be the result of the 1km/sec object C metric quantization

Planet	speed	Delta speed
••		
Jupiter	13km/sec	4km/sec (Jup->Sat)
Saturn	9.57km/sec	
Uranus	6.76km/sec	3km/sec (Sat->Uran)
skip		2km/sec (Uran->Plut)
Pluto	4.71km/sec	

If we used our koo=goo with goo=1-2GM/c<sup>2</sup>r and  $mv^2/r=GMm/r^2$  method out far beyond the sun we have the problem of Jupiter perturbing all the other planetary orbits into ellipses and messing up the metric quantization.

### The only planet it should only work on then is Jupiter itself which is at 13km/sec so it does work.

#### 

\*After Pluto delta<1km/sec and so Oort cloud type chaos. For example

Eris and makemak are in highly eccentric orbits that don't obey Bode's law,.etc. Even the 2 to 1 resonances of the Galilean moons of Jupiter exhibit those 2km/sec,3km/sec differences, making those orbits doubly stable!. In the asteroid belt Ceres has a 1km/sec difference between perihileon and aphelion and Vesta has 3 km/sec difference between perihelion and aphelion.

My fractal theory has outside objects (outside our own  $10^{11}$ LY wide object A) B and C create a quantization of the metric *in*side object A. The result is that dynamic systems with high degrees of freedom have velocity quanitization. For object B the velocities go as

100km/sec,200km/sec,..etc.

For object C it is 1km/sec,2km/sec,3km/sec,... I noted earlier that galaxy halos and O,B,A stars exhibit those 100km/sec,200km/sec effect, Thus sun G,K,M stars exhibit the 1km/sec,2km/sec, effect which is the basis for my solar differential rotation model. are here.

#### **D** Ring Metric Quantization

My fractal theory has outside objects (outside our own  $10^{11}$ LY wide object A) B and C create a quantization of the metric *in*side object A. Recall I have given presentations on this subject at scientific gatherings and you have helped with that galaxy halo data. The result is that dynamic systems with high degrees of freedom have velocity quantization. For object B the velocities go as 100km/sec,200km/sec,300km/sec,...etc.

For object C it is 1km/sec,2km/sec,3km/sec,.. I noted earlier that galaxy halos and O,B,A stars exhibit the100km/sec,200km/sec effect, Thus sun G,K,M stars exhibit the

1km/sec,2km/sec, effect which is the basis for my solar differential rotation model.

Anyway, that effect is inside Bode's law, the random motion of comets in the Oort cloud (they hit earth a lot by the way because of that)..

But you should also see the 1km/sec velocity quantization effect in Saturn's rings as well. The shepherding moons complicate this, making the rings more complicated than that equally space ringlets at 1km/sec speed differences. The question comes to mind whether there was some part of the Saturn's rings that did not have a Shepherding moon, you then **should see those equally space ringlets!!** You might even see two levels of metric quantization! The main reason for that curious record player like appearance of Saturn's rings should be this 1km/sec metric

#### quantization effect.



For circular motion in the rings: Centripetal Force  $=mv^2/r=GMm/r^2$ . So  $v_1^2=GM/r_1$ ;  $v_2^2=GM/r_2$ . For example we take the outer and inner edge of each ring band:

**D Ring,** 40 Ringlets Can't go any lower sqrt( $6.67X10^{-11} 5.68X10^{26}/6690000$ )=23800m/sec= inner edge speed sqrt( $6.67X10^{-11} 5.68X10^{26}/74658000$ )=22530m/sec=outer edge speed 23800-22530=1.27km/sec≈1km/sec, 1270/35= 20m/sec between ringlets. Next smaller metric quantization.

C Ring, 84 Ringlets

 $sqrt(6.67X10^{-11} 5.68X10^{26}/92000000)=20293m/sec$   $sqrt(6.67X10^{-11} 5.68X10^{26}/74658000)=22530m/sec$  22539-20293=2234m/sec **2**X1km/sec metric quantization speed.  $\approx$ 1km/sec 2234/84=20m/sec. between ringlets. Next smaller metric quantization

**B** Ring, Ringlets chaotic

 $sqrt(6.67X10^{-11} 5.68X10^{26}/9200000)=20293m/sec$   $sqrt(6.67X10^{-11} 5.68X10^{26}/122170000)=17610m/sec$  20293-17610=2683m/sec=3X894.4m/sec metric quantization speed.  $894m/sec\approx1km/sec$ 

Resonance with Titan causes gaps and chaos in rings

A Ring, Ringlets chaotic. Beyond the Roche division the rings caused by individual moons.

sqrt(6.67X10<sup>-11</sup> 5.68X10<sup>26</sup>/122170000)=17610m/sec

sqrt(6.67X10<sup>-11</sup> 5.68X10<sup>26</sup>/139380000)=16487/sec

17610-16487= 1123m/sec metric quantization speed.

1123m/sec≈1km/sec

#### **Other Examples Of Metric Quantization**

Recall that metric quantization of 100km/sec,1km/sec, 20m/sec,2m/sec,2mm/sec etc. See equation 13 attachment for a first principles derivation of metric quantization. The effects get weaker the smaller the speed. Anyway, I discovered some more metric quantization results. For example:Total angular momentum of earth moon system=MVR\_earth + mvr\_moon=  $(Me)ve(re)+(mm)(vm)(rm)=1X476X6.4X10^{6}+.012(2pi4X10^{8}/(27X24X3600)4X10^{8}=1(1000)re=1(1km/sec)re$ 

Thus if the moon was combined with the earth again, kept the same total angular momentum, the equator of the combined earth and moon planet would rotate at 1km/sec., our metric quantization speed. Thus the moon and earth formed in the same local nebula and so should then have roughly the same composition. Apparently some time in the past a 1km/sec (metric quantized) rotating earth was grazed by a large object (actually this grazing idea is also the mainstream view) with the result that the moon material was pulled off earth. This explains why the isotope ratios found on the moon (eg., in the Apollo program samples) roughly match those found on earth but not on many comets and asteroids.

I found that in neutron stars all 6 P states (recall Ch. 3 discussion of P states at r=rH) exist in layers of 1km/sec metric quantization. So the outer layer of a 12km radius =r of a mature, slowed down neutron star has a rate of rotation of 6km/sec. and so a period of T=11sec (2pir/T=v). Note that none of the 2500 neutron stars has a period of rotation of greater than 11sec and they do bunch up around 10sec=T. Thus neutron stars in a way behave like Nobel gases, which are also stable because all 6 P states are filled.

I may have found an example of that 2mm/sec metric quantization in a creek. There was a region on a clear day near noon with strong Schlieren on the creek bottom.

Some vortex edges all of nearly the same size were clearly visible in a ripple area. As they disappeared I noticed a speeding up to about 4mm/sec near the center. So the conservation of angular momentum would imply a 2mm/sec rotation near the edge. Need a larger statistical sample here of course.

The strong Schlieran effect made this observation possible. It would be cool if I had discovered that 2mm/sec metric quantization.

The 20m/sec metric quantization between the ringlets of Saturn. There may be yet another 20m/sec example of metric quantization closer to home. See below.

Recall from equation 13 (first attachment) there are those 100km/sec  $\Delta\epsilon$ , 1km/sec and 20m/sec metric quantization speeds. Recall from above that 20km/sec speed in those Saturn ringlets as a higher order term in my equation 13 for mixed states (i.e., grand canonical ensembles with nonzero chemical potential). Recall in equation 13 of the first attachment (section 1G of book) the 10meter/sec .  $\Delta\epsilon^{3}/\epsilon^{2}$  metric quantization term.

In that regard from a recent 'Physics Today' article on tornado formation (1)

"On tornado outbreak days, the wind shear can be so severe that the winds can vary by as much as 20m/sec within the lowest 1 km". Also there is the statement in that article that for a supercell updraft, the vertical component of the vorticity, is on the order of  $10^{-2}/s$ "

 $\nabla Xv$ =curlv=2w=.01. So w=.01/2=.005=v/r. If **v=20m**.sec then r=20/.005=4km =approximate supercell radius (attachment image) If v=10m/sec the r=10/.005=2km.

Also in the below VORTEX2 Doppler data (below figure) the WHOLE right side and half the smaller left side exhibits a **20m/sec** speed (the tornado is at coordinates (0,0)).

That 20m/sec value certainly has nontrivial implications for tornado formation.

(1) What We Know and Don't Know About Tornado Formation" Physics Today, Sept.2014



To induce this effect we also require that 511kV rotator oscillator axial (z) force result of equation 23.9 since that is what provides the vertical pulse inducing the vorticity. So this object has to be at a high voltage as is the case in thunderstorms and given observations of a bright coronas deep inside the vortex of tornados. Also it has to be oscillating, in that regard recall the 'ground thumping' that gives tornados their characteristic seismic signature that has even been used to locate their positions.

By the way the (above) tornado 20m/s metric quantization occurs in the accompanying mesocyclones (the huge cloud just above the tornado) and not in the vortex itself: can't get to 1000m/s with terrestrial air.

## 16.9 Hufnegal Model of Atmospheric Turbulence 5/7 Standard Implementation Requires ~20m/sec

The H-V model has a very simple form:

 $C_n^2(z) = 8.148X10^{-26} U^2 z^{-10} exp(-Z) + 2.7X10^{-16} exp(-z/1.5) + C_n^2(0) exp(-10z)$ 

with Z the height AGL in kilometers. Second, the H-V model features a standard implementation, the so-called H-V 5/7 model, for which integrated  $\rho_0$  and  $\theta_0$  yield the *typical*  $\rho_0$ =5cm and  $\theta_0$ =7µrad values commonly assumed for nighttime conditions in the field of astronomy (hence, the 5/7). These results, assuming a vertical path integration, and propagation wavelength  $\lambda$ =.5µm,  $C_n^2(0)$ =1.7X10<sup>-2/3</sup> m, and U=21m/s. For many nighttime astronomical observation conditions, these results are indeed typical.

Note the metric quantization U=21m/sec when the atmosphere is least perturbed by solar radiance.

#### 16.10 Kolmogorov's theory of convection and metric quantization:

 $\delta u(r)=u(x+r)-u(x)$  is the difference in velocity u. Given scaling exponent  $\beta$  we have  $\delta u(\lambda r)$  has the same statistics as  $(\lambda^{\beta})\delta u(r)$ .  $\beta$  is independent of scale. So turbulence is fractal!! Also Kolmogorov found that  $\eta = (\nu/\text{energy})^{\frac{1}{4}}$  energy dissipation takes place on scales on the order of  $\eta$  with energy the energy dissipation,  $\nu$  the viscosity.

My fractal metric quantization turns on at a  $\lambda^{\beta}$ =100 and  $\beta$ =n/3, where n is the KMQ metric quantization quantum number.  $\delta u(r)$ =100N(.001)m/sec when in that Kolmogorov convection state as well So when "GOING GREEN" v=40m/se, 80m/sec ,  $\eta$  is high, vortices are larger and so green light from the sun is preferentially Rayleigh scattered and the sky has a green tint! This only happens near dry lines, where the Reynolds number and Gibbs free energy is high, and so only happens during tornado outbreaks.

You could call it the KMQ state or the "Going Green" metric quantization state!



Note here we have preserved the Gauss's law form of the inverse square law.

#### **The Other Metric Quantization Speeds**

Previously we have focused on those 100km/sec, 1km/sec, 20m/sec metric quantization speeds. But there are those 2mm/sec metric quantizations as well (see equation 13 of section 1 for a first principles derivation of these values).

Also at a local creek I found a ripple area that had a distinct signature of the 2mm/sec surface vortex. The clear sky vortex shadow on the creek bottom was caused by the Schlieren effect and I could extrapolate to the vortex speed just before the (vortex) collapse: it could not been far off from that 2mm/sec theoretical estimate. (by the way the (above) tornado 20m/s metric quantization occurs in the accompanying mesocyclones (the huge cloud just above the tornado) and not in the vortex itself: can't get to 1000m/s with terrestrial air I am afraid).

To do precise speed estimation need a metronome or large digital clock display and ruler placed at the correct distance in the field of view of a video of these two phenomena.

#### 16.10 Red's Law Of Metric Quantization

$(1/\pi)^{2n}$ =veloc	ity amplitude of	f metric quantization					
$(1/\pi)^{-2n}$ =time interval of metric quantization							
n=0,1,2,3							
velocity: n=	=1 v=20m/sec;.	n=2 v=1km/sec;	n=3 v=	=100km/sec,	n=4 v=c/3		
time interv n=	=1 100ky	n=2 2.5my;	n=3	270my	n=4 4by		

phenomena: cold cyclesPacific volcanic cyclesMass extinctionsDustphenomenaringletsrings, sun convection zonegreat wallFaint blue galaxies HDFphenomenaice ageschaotic Oort cloudgalaxy halo speedsFaint red dots HDFO,B,A rot, , coronal temp.



HDF =Hubble Deep Field

In the most detailed Cassini image of Saturn, there are 5 narrow rings, 8 2X widely spaced rings in the D ring: there are few shepherding moons here, the Roche limit will pull apart just about any big object here, *You see two levels of metric quantization in the D ring*. What an awesome sight, metric quantization in the raw, as explicit as it could be!!!

The speed of each consecutive inner ringlet increases by that 1km/sec (the outer D ring has 2km/sec metric quantization) of object C quantized metric value that also created Bode's law and the rotation of the sun's equator.

Also the velocity difference between perihelion and aphelion for the earth is .98km/sec very close to the metric quantization value, the key to its orbital stability, just as with those rings. This explains why there was enough time for life to establish itself on earth, so explains why we are here.



20m/sec (ringlet) metric quantization.

20m/sec ringlet quantization



**1 km/sec** differences be outer edge of D to C; C to B and B to A.



#### Close up Of Ringlets (20m/sec Metric Quantization

In a close up image of these small ringlets, visible in image, it is noted that There appears to be no new subdivisions implying 20m/sec is the smallest metric quantization (after the 100km/sec, 1km/sec) and no smaller metric quantization exists. The neutron 2P ½ state electron at the poles of the 3 particles of the 2P3/2 state would have a plate interaction directly on it. So this 20 m/sec must be caused by a more distant electron in orbit around this proton. Thus we are in a isolated hydrogen atom in interstellar space. Give dark shadow, main concentration, 1 unit, then the light empty region is 1/4.



This 20m/sec metric quantization appears to be as small as it gets There is nothing but this 1 and also 1/4 quantized metric information in this ringlet data implying that object D is a electron in a hydrogen atom in interstellar space. This metric quantization appears to be caused by the groundstate and first excited Rydberg state hydrogen atom energies  $1/n^2$ : so 1 and 1/4 times the Rydberg number. This is nonmolecular hydrogen and also an excited state of hydrogen in interstellar space implying it is in a active star forming region or ionized gas region between galaxy clusters containing many black holes.

Thus this next larger scale fractal universe (or Reimann surface) is a mature but not extremely old universe, perhaps 6 billion years old in their years. In our years it would be  ${\sim}10^{10}\,{\rm X}10^{40}$  =10 $^{50}\,$  years old making the next higher scale fractal object bigger than that one have an equivalent age of  $10^{100}\,$  of our years, one google years old!

#### Appendix C

Recall the galaxy halo and O.B.A star 100km/sec (object B) and note the D ring 1km/sec, C ring 2km/sec and B ring 3km/sec (object C) implying a kind of Pauli exclusion principle to these metric quantization states. But note also a new ringlet 20m/sec metric quantization. caused by the Milky Way Galaxy gravity and/or object D.

20 m

4

Recall I found that a combination of the Jupiter movement in going from perihelion to aphelion (10m/sec) and Saturn 2X effect (10m/sec) is  $\sim 20m/sec$  to get the solar cycle.

Apparently the stability of Jupiter's and Saturn's orbits and therefore the **solar cycle** itself also **depends on that (20m/sec) metric quantization!** 

#### **16.10** Laboratory Metric Quantization

#### In Plasmas

N100km/sec metric quantization might be used to create stability in a man made plasma. After all metric quantization plays a big role in the sun.

My metric quantization will only work in a isothermal plasma with ion speeds of N100km/sec, where N is an integer. But there is a 3X100km/sec=300km/sec=1keV Deuterium temperature in the ITB Internal Transport Barrier (L mode +ITB at the QHmode high plasma density edge where this metric quantization isothermal plasma might be located) in the high density region. These ITBs are considered to be the next frontier in Tokamak fusion physics since they are a promising source of stability in plasmas. So plasma physicists may have already stumbled on to metric quantization stability (ie., that ITB caused by that 3X100km/sec) and not even realized it! Metric Quantization And The Calculation Of G

The most recent Physics Today magazine says that the value of Newton's gravitational constant G is currently only known to **3** significant figures (somewhere between **6.672** and **6.676** X10<sup>-11</sup> Nm<sup>2</sup>/kg<sup>2</sup>), really no significant advance beyond what Cavendish himself measured in the 1700s and a typical experimental error the students would have gotten in one of the many physics labs I used to teach! The problem is not in the experiments themselves which are accurate to around 20ppm-40ppm (even given torsion calculation uncertainties). The problem is in the spread of the results of these several very accurate, precise experiments.

In my view metric quantization is the problem here especially with the experiments that require a moving oscillating torsion bar to measure the torsion constant, where we can then have a grand canonical ensemble with nonzero chemical potential (as in Saturn's rings), the requirement for for that metric quantization to effect relative speeds and here mess up the torsion constant calculation and therefore the G calculation. The new experiments, with no such motion requirement (e.g.,floating the balls in mercury), will probably finally nail down the gravitational constant. Note that these pendulum speeds are far less than 20m/sec and so must be responding to much smaller metric quantization sources than object B, object C, object D and the Milky Way galaxy. The Sun and earth are the next likely candidates for even smaller metric quantization speeds, where we even go to the *continuum limit* (eg.,what about your desk?