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Review Article

MINT-Wigris Postulates

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Abstract

The new models of MINT-Wigris are based on few postulates 1.-9. which can be used for the states of energy systems. It is not necessary to use in infite dimensional Hilbert space for this. Octonians are sufficient whose coordinates carry charges and energies: color, electrical, mass charges, heat, kinetic, magnetic, rotational, electromagnetic (interaction) energies. They evolve from a black hole Horn torus which contains retracts of quarks. Beside the radius inversion at the Schwarzschild radius in 1., for speeds is postulated a Minkowski cone inversion at the speed of light. To the physics standard model with the U(1)xSU(2)xSU(3) symmetry are added finite symmetries like the CPT Klein group of the quark dihedral D 2 , the quark triangle S 3 and S 4 of the tretrahedron. There are two dimension changes in 4. through the fusion model from 6 to space xyz-coordinates which relates to the Heisenberg uncertainties and from 4 octonians which add to coordinates the above energies for measurements. The evolution of energies in 2. is followed in 3. by a nucleon dynamical model, desscribed by the SU(3) strong interaction SI rotor. It makes cyclic integrations. In a crystalized version the rgb-graviton whirl has its tip in the center of a deuteron and forms as base triple a tetrahedron as model (Figure 6) with the quarks sitting at the endpointss of its three pairwise orthogonal vectors. The new tetrahedrons discrete symmetry of order 24 factorizes through the quark dihedrals CPT Klein symmetry of order 4. Obtained are for the equivalence classes that each color charge has associated one of the coordinates, has a symmetry of the quark triangle D 3 group (similar as spin has the Pauli symmetry of SU(2) generators). The fourth member in each class is one out of six basic energies (two for POT, kinetic, rotation, magnetic, heat). Gravity is included in the different postulates. It uses in many instances projective geometry and projections. The general relativitic version in 7. is due to a central projection. Mass rescalings occur in different form: added inner frequencies to a mass at rest, its Minkowski special relativistic scaling which give group speeds for matter waves. In 6. As new measuring devies according to the Copenhagen interpretation for quantum measures are added the Gleason frames GF as spin-like orthogonal vector base triples. Their weights attached to the three vectors can be non-negative real numbers with sum > 0 or complex or quaternionic numbers. Superpositions of GF occur. In figure 8 a list of 8 tools demonstrate some GF and are more general for teaching purposes. The Fano memo shows 7 GF, but there are more, also for SU(3). SU(2) has also some GF. For waves in 8. the cylindrical helix quantization is through winding numbers. Only full windings in a circular U(1) projection are stored as energy. U(1) is a rolled Kaluza-Klein coordinate for the electromagnetic interaction symmetry. In 7. the first octonian coordinate provides a vector needle for the U(1) compasses disk. It can set units for measuring the energy coordinates and generates in discrete form numerical or energy based cyclic structures with the nth roots of unity for polar dihedrals. They relate to the SU(2) Hopf geometry in 5. with the Heegard decompositions for colliding systems. In 9. to the wave particle duality is added as third character whirls. They occur in many conic geometries for quasiparticles. This set of postulates is published under researchgate for the MINT-Wigris project. Wanted are colaboraters, especialy for producing models.

Keywords: MINT-Wigris; Quasiparticles; Hopf Geometry

There is a projective, real 6-dimensional, complex 3-dimensional vector space with the unit sphere S^5. The sphere is used as space of a fiber bundle with fiber S^1, a unit circle in a complex Riemannian plane D, stereographic closed to a unit sphere S^2 by a point at infinity ∞. The fiber bundle map projects S^5 down to a complex projective 2-dimensional space CP^2 with boundary S^2.

If S^5 is stereographic mapped onto a real, linear projective space R^5, the projective duality allows for absorbed matter in a black hole like S^5 that quarks are 1-dimensional radius inverted to an energy carrying lemniscate. In spacetime of the universe they are 3-dimensional. The radius inversion uses the complex Moebius transformation 1/z in the form $r'r = Rs^2$, Rs the Schwarzschild radius of the black hole, r>Rs (r') the quark radius in the universe (black hole). The quarks are fixed in S^5 at a singularity. A model can be a Horn torus (Figure 1). Inside HT there are fast turbulencies or speeds whose frequencies f are added to the sum of the quarks mass m in HT by $mc^2 = hf$. Speed of light c and the Planck constant h are kept from their universes values. Observable in the universe is HT as a planar D aggretion disk where absorbed matter is transformed.

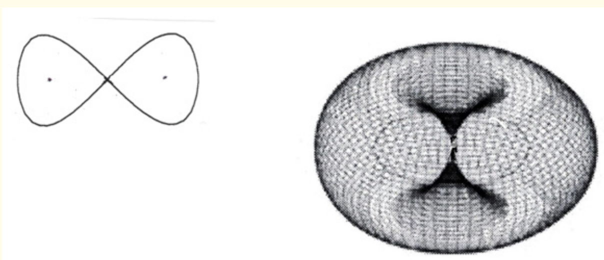

Figure 1: Lemniscate, Horn torus with a retracted vertical torus circle as point singularity.

The HT can also be generated by the collision of two galaxies and the HT can decay or explode, generating with their energy a new universe NW. Their CP^2 has then the map 1/z for inverting all inner energy to a NW with an evolution like the Feigenbaum bifurcation. The interval between such an inversion and the existence of the Planck numbers is described in the next postulates before physical laws apply to NW. The constants for temperature (Boltzmann k), electrical/magnetic e_0, μ_0, have to be set and the gravitational constant is kept with Rs. 2.

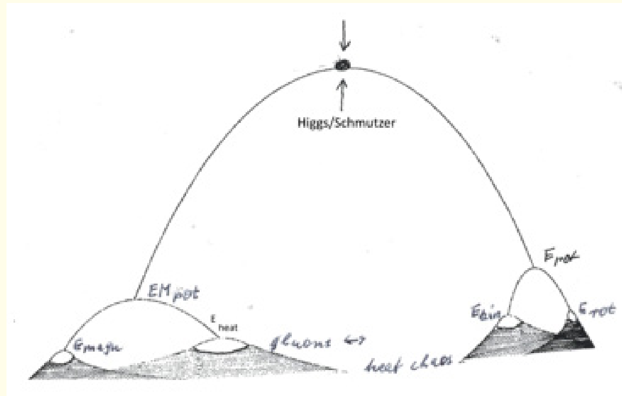

Figure 2: Feigenbaum bifurcation with heat chaos at the lower part; six energies are bifurating from HT, first POT (electrical, mass/gravity), speeds (kinetic, rotational) from mass E(pot), heat, magnetic energy from the electrical EM(pot); 8 gluons (strong interaction) bifurcate before chaos.

The complex 4-dimensional, gluon 8-dimensional SU(3) symmetry of physics has its 3 x 3-matrices for gluons generated by the Pauli spin 2x2-matrices by inserting a row and column with coefficients 0. Since the extended third Pauli matrices are linearly dependent, they generate only 2, not 3 dimensions for SU(3). As ninth color charge field quantum, *rgb*-gravitons as superposition of 3 color charges are generated. They are the carriers for a nucleon tetrahedron with 3 quarks atttached at the ends of its spin-like orthogonal base space triple. The tetrahedron symmetry for a nucleon is S_4 of order 24. It factorizes by the normal Klein CPT symmetry of order 4 to the quark triangle symmetry S_3. C,P, T are the physics operators of order 2. C introduces with the second Pauli matrix complex numbers as i with $i^2 = 1$ for NW (reversing all quantum numbers), P is a space operator which identifies for projective spaces P^n in a real vector space points p,-p to a point of P^n from lines through the origin. For gravity P^2 is essential showing for instance the circle, parabola or hyperbola orbits of comets or orbiting systems about a barycenter with mass. Time inversion T can reverse for instance normals to surfaces or speeds to an orthogonal direction, observed for instance for spin up or down. The vector changes its orientation when rotating by 360 degrees on a nonorientable Moebius strip circle in P^2.

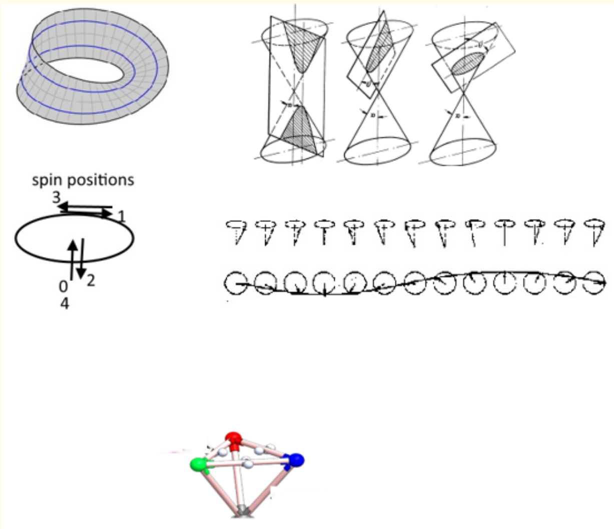

Figure 3: Moebius strip at left, Kepler conic section orbits at right, lower line spin positions at left, at right how their conic rotations generate cosine wave-like orbits of cones in time; Next figure at right a nucleon tetrahedron with 3 quarks at the upper triangles points red r, green g, blue b for the conic rgb-graviton whirls with tip at the lower point of the tetrahedron; rgb is the neutral color charge of all quarks; they are confined in the triangle by gluon exchanges, marked as small balls on the trinagles sides; the internal dynamics in nucleons is a presentation of the triangle symmetry S3 and is used for energy integrations; a video shows the pulsation which includes an rgb-graviton interaction beside the gluon exchange; POT energy (electrical, gravity potentials) are radius integrated from forces, time integrated are kinetic and rotational energy to momentum and angular momentumm, area integrated are magnetic energy fields crossing an area bounded by an electrical currents loop, heat is volume computed for entropy containing solid matter.

Generating deuteron through fusion from 2 protons, means that 3 planes located as in figure 4 at left in space with the *rgb*-gravitons tips joined in the middle change to 3 lines when a similar 360 degree Moebius strip rotation of the upper tetrahedron is performed for fusion, A neutrino and positron is decaying from an upper u-quark and left ist a neutron. The pairs of u,d quarks on an x-.y- or z-axis exchange by the weak interaction isospin such that the places of proton and neutron exchange as two nucleon states. The center can be split but the exchange couples them through a quasiparticle exciton (for instance) when they are merged into atomic kernels. The distance cannot become too large then nuclear decay occurs.

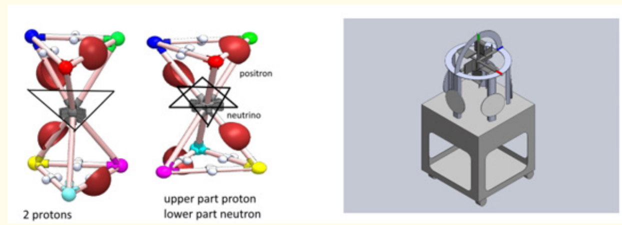

Figure 4: Fusion of 2 protons to deuteron; the ray vectors for position-momentum are at left generating a plane, at right for instance the +x or -x ray in the Heisenberg coupling; the same holds for angle-angular momentum (y-axis) and for time-energy/ frequency (z-axis); the upper quarks are for complex coordinates (z1,z2,z3) replaced by the named energies as vector rays; wheel at right.

In figure 4 the area vector pairs allow an area quantum invariance λp = h where in the right figure the Heisenberg uncertainties arise on the x-axis; this is used for differentiation, for instance of radius or x variable functions as dg(u)/du, u =x or r. Similarly time functions allow differntiation by inverse time intervals for frequencies f = 1/Δt or dg(t)/dt. For angles φ, the definition of angular momentum as real spin-like cross product means that the preservation theorem for angular momentum L = rxp, r radius of a rotational system about a center O, p its momentum, has an area A differentiation dA/dt where the differential ω = dφ/dt (= 2πf) is an angular speed. The precision motions for instance of electrons or planets arise because of this uncertainty. Area differentiation is used for magnetic induction B = dΦ/dA, Φ magnetic flow through the area A. Spin s has no fixed angle, but rotates (conic) as well as the angular momentum about a central rotation axis J = s+L. This intrroduces vector addition. The generation of an orthogonal base space triple s = (sx,sy,sz) for spin coordinate axes x, y, z is in addition replaced by their Euler angles ψ,φ,θ (figure 4 wheel, - rotations generate the axes). There transformation matrices can be used for generating the quaternionic Pauli matrices as SU(2) weak generors for spin. This doubles the complex number coordinates z to quaternion coordinates (z_1, z_2), in 2 x 2-matrix operator form as first row with the second row $(-c(z_2)\ c(z_1))$, c meaning complex conjugation.

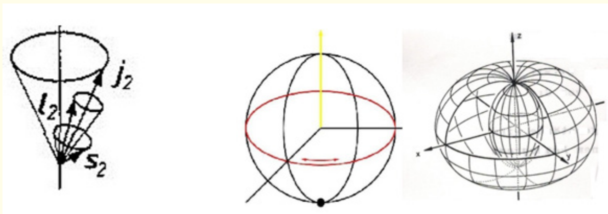

Figure 5: Precision motion of electrons in an atoms shell at left; 2D electron/positron middle figure spindle torus for neutrinos at right.

The Hopf fiber bundle map h: $S^3 \rightarrow S^2$ between unit spheres is defined by the 3 Pauli matrices. If S^2 is stereographic st mapped from ∞ aas north pole to a complex plane tangent D at the south pole, division of complex numbers is generated by st○h(z_1, z_2) = z_1/z_2 for $z_2 \neq 0$ with ∞ as projective point (1,0) deleted. The Hopf models for leptons use as well 2- as 3-dimensional shapes. The 3D cases are toroidal for electrical charged leptons and spindle tori for neutral ones (Figure 5). The S^2 case have on alatitude circle the point p charge rotation, for positron anticlockwise mpo, for the electron clockwisse cw. In their 3D presentation the leaning Hopf fiber S^1 of p on the torus rotates with torus about its central symmetry axis (figure 6). There are 2 spin-like orthogonal measuring base triples, named 145 (electrical charge), 356 (neutral leptons) with the cross product for an electrical 1 (loop-current) vector with a magnetic momentum vector, generating induction as angular momentum for the rotating loop and a similar cross product for neutral leptons which replaces magnetic momentum by momentum. There is a superposition 145 and of 356 with the spin measuring triple 123 for the spin vector with 4 in the first case and with 6 (momentum) in the second case. The change of orientation between these vectors is due to the change in the mpo or cw sense of the triples 145 or 356.

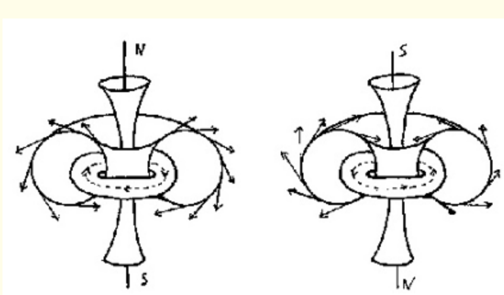

Figure 6: 3D Hopf tori with a mass core.

The quaternionic spin matrix operators for x,y,z as Pauli matrices (plus identity id) allow the magnetic dihedral group D_4 of order 8 as signed Z_4 matrices. Similar to the 6 roll mill for the SI rotor of [1] (postulate 7) there is a 4 roll mill for the WI rotor whose rolles correspond to the four points of the dihedral D_4.

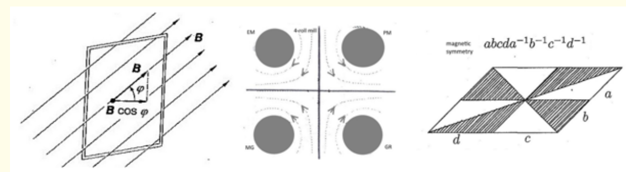

Figure 7: Loop and magnetic field at left, 4 roll mill middle, at right magnetic group.

There is a change of orientation for the E(kin) roll PM in figure 7 when compared with the 6 roll mill. The 4 roll mill is driven by two forces POT (EM,GR) and WI (MG,PM) where the third driving force strong SI (for E(heat),E(rot)) for the 6 roll mill stopped working. E(heat) is the energy for temperature. A similar model as for fusion in figure 4 (left) is available for the 4 roll mill and the magnetic group of figure 7. Two D_4 quadrangles replace the upper and lower tetrahedron parallel quark triangles. At the vertices they carry an electrical, a neutral (replacing GR/mass in figure 7) charge, a magnetic momentum, a momentum. The before mentioned D_4 quaternions are doubled to octonians by turning the upper triangle by 45 degrees (Figure 7 right). The two nucleons are replaced by a W^-,W^+ boson pair. As in figure 4 the upper leptonic D_4 list is replaced by octonian vectors for mass, frequency, the compass vector e_0 and the Kaluza-Klein rolled 7th octonian coordinate U(1), a circle. The 4 rolls can be shown by identifying in figure 7 right the indicated sides. A brezel of genus 4 is obtained. The two charge (plus magnetic momentum or momentum) orientations for their rotations on a S^2 latitude circle are reversed, using the conjugation operator. The D_4 symmetry has the order 8. An isospin GF can replace the *rgb*-graviton tetrahedron tip in figure 4. It makes the 45 degree rotation of the two quadrangles.

The weak interaction bosons as S^3 sphere allow for colliding energies as intemediate energy carrieres the decay into 2 leptons like a positron and a neutrino or 2 photons. As 3D systems they can have mass. Heegard decompostions are for the 3D geometrical decays (Figure 7). In physics, the graphs for Feynman diagrams are in use. The decay surfaces in S^3 can be tori for genus 1, 2, 3,.. or S^2 surfaces. The polar or focus point number present energy charge loctions, for leptons one electrical or neutral charge, for quarks two, a mass and electrical charge, for nucleons 3 quarks with 3 poles.

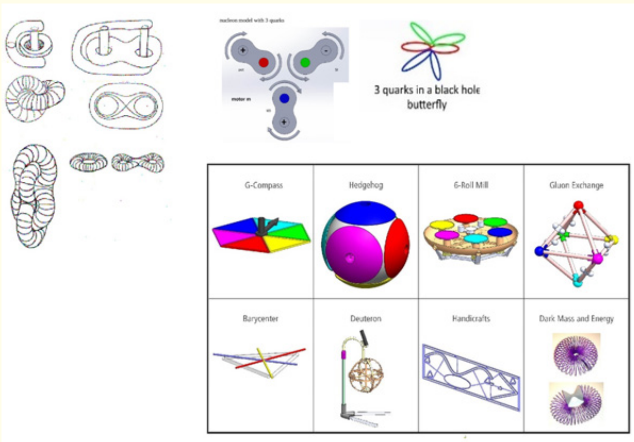

Figure 8: Heegard decompositions for leptons (genus 1) and quark brezels (genus 2) at left, 8 models at right; above them nucleon versions of genus 3.

The spin-like measuring triples GF arise as real cross products. As subspace generators, the octoninan coordinates are listed for them by indices 0, 1, 2,...,7 where 7 is also used as a rolled coordinate for exponential and complex polar coordinates exp(iφ), Octonians have another multiiplication table as the SU(3) 3 x 3-matrix generators. Both have 7 measuring Gleason operator frames GF. A Fano memo shows the octonian triples as points on the lines which present 3D subspaces for them. Energy vectors and their measuring scales are attached as well as logo figures for an associated geometrical shape. A list of some models of them are available for demonstrations in the MINT-Wigris tool bag (Figure 7 right). An input vector e_0 is drawn at left for the measure of the energy vectors units. It can be set also for fields. The vectors present as usual an initial point where the energy starts, but this can also be a scalar not being directed like mass at a barycenter. As force or speed vector the action is in the direction of the vector. For mass (or electrical charge) their (field) potentials replace vectors.The GF have as weight either a real or complex or quaternionic number which allows for the setting of 3,6 or 12 values. 12 is for the fermionic particle series, 6 is for different cylic sets with the 6^{th} roots of unities. The G-compass with a G-matrix of order 6 generates by discrete rotation the 6 color charges, 6 energies, 6 electrical charges and for neutrinos a 3-valued mass GF. The Neutrino oscillation means that this GF has quaternionic coordinates with the 4 quaternionic numbers presenting in kg a mass, a spin, angular momentum and momentum vector. The Copenhagen interpretation of quantum measures allows in time that only one coordinate is shown as measure. Here kg is oscillating stochastically in time because of the position-momentum uncertainty which is the corresponding action to the precision motion in figure 5.

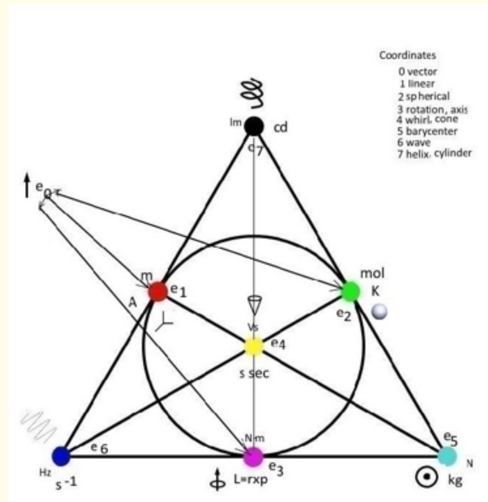

Figure 9: Fano memo.

The octonian GF are listed by the coordinates indices. Beside the spin 123 GF exists the electromagnetic GF 145, 356 for the SI rotor, 167 for the electromagnetic interaction, 246 for heat, 257 setting barycenters and Higgs (field or boson H) mass (real masses for the bosons W^-, W^+, Z^0, complex for the quarks and lepton series), 347 for rotations. For inertial mass (equal to Higgs mass) a SU(3) 156 GF can be used for mass 5, gravity potential 1 and resistance to accelerations 6 which is a cross product of 1, 5 and acts like an opposite force to the acceleration.

The generating 2 x 2-matrix G of order 6 has as first row (1 -1), as second row (1-0). it belongs toe the scaled general relativistic factor (r-Rs)/r where Rs is the Schwarzschild radius of a mass system Q (sun for instance) with a barycenter and r is its unsymmetrically measured distance |QP| while a system P orbiting about Q or a barycenter measures its distance as |PQ|= (r-Rs). A central projective computed map adds to the Minkowski spacetime metric the general relativistic cosine factor through sin β = Rs/r. For the Minkowski metric as spactime measure the G rows are interchanges and this matrix of order 2 gives the special relativistic scaling cosine factor with sin θ = v/c, v relativistic speed. The G-compass turns its needle only discrete with the 6th roots of unity. Other versions for 3 turns and cubis roots or 2, 4, 12 turns occur. Used is the 7th S^1 rolled circular octonian coordinate with the complex polar exp(iφ) function. The dihedrals and their symmetries belng to these compasses. They arise with poles on a circle as vector directions for the nth roots of unity. The number n = 0 means the rolled coordinate and no pole on S^1. It has as symmetry the identity id. One pole arises for isntance through two orthogonal colliding frequencies ahich in proportion 1:1 generate one rotating energy pole on the circle and id plus a reflection C (conjugation) as symmetry. For other frequency prportions the Lissajous figures apply. In use are the pole numbers 2,3,4,6. Maybe 8, 12 are also of use. 2 is for quarks with the Klein group CPT symmetry, 3 is for nucleons quark triangles, 6 is the figure 9 G-compass, for instance for color charges.4 can be used for the leptonic models above and 8 is of use for the magnetic group, 12 (possibly) for the fermionic series.

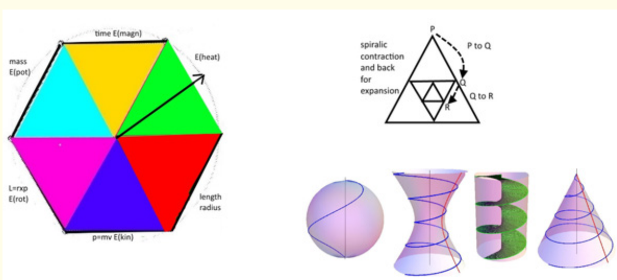

Figure 10: G-compass, at right spiralic metrical geometries for gravity having orthogonal projections.

The flow version for the compass replaces the nth roots of unities by rolls driving a flow like plasma or polymer. These roll models have been constructed in catastrophe theory. The 6 roll mill for instance is driven by 3 rotors, here called POT (electrical, mass rolls), SI (heat, rotation rolls) and WI (magentic, kinetic rolls). In a polar vectorial cap version the bounding Riemannian sphere S^2 for a nucleon/deuteron/atomic kernel model has six hemispheres for 6 energy vectors and the color charges red, green blue, and duls turquoise (mass), magenta (rotation), yellow (magnetic). For the systems energy exchange with the environment the normal central vector on the cap rotates on a Moebius strip by 360 degrees and has an input or output direction with a valve, absorbing when opened or emitting the named energy.

Figure 11: 6 roll mill, hedgehog with polar caps.

Light as electromagnetic interaction EMI arises much later in the development of a new world. It allows through spectral series the Bohr radii of electrons in anatoms shell. The probability distrbutions of elecrtons on a shell show spherical or club shape geometries and also the Hopf tori, due to their 2D or 3D Hopf geometry. Angular rotations of electrons are transformed, using quantum numbers, to rydberg/fine structure constant scalings to EMI frequencies f with the energy E = hf. As exanding helixlines on a cylinder the energy is Planck number quantized. Only full windings of a helix is stored as energy. (In conic spin shape also this natural number quantization is due to full windings on a boundng circle for the rotating spin vector.) Since in empty space the speed of EMI waves is the constant c, the gravitational general relativistic effect on them makes its redshift. The effect of double lensing when EMI waves pass a huge mass system means that in braking as reflection its linear world line it can asorbe gravitational/mass energy increasing its own energy and continue on two different directions. The opposite mirror reflection decreases its energy. The 7th octonian rolled coordinate makes cylindrical coordinate for the EMI exp function. It is observed in spacetime by its cosine projection.Its derivative is observed as speed, also for other such waves and its second derivative as EMI/wave force. The energy preservation theorem holds for both EMI and matter waves.The Schroedinger computation for the later use substitions of angular speed by energy and wave number by momentum. Also mass rescalings are necessary as observed for nulceons as wave superposition of its parts.The transfer from inner frequencies and speeds or interaction energies to mass is through mc^2 = hf. Necessary is the wave package of the systems new speed v computed by differentiation as in optics u = ∂ω/∂k by using the special relativistic mass rescalingin diffential form for getting the new special relativistic speed u = v as group speed with which the system moves on its world line.

The MINT-Wigris project adds for heat its acoustic whirl use from physics. These can be seen as harmonic oscillations, different from wave equations. Linear they are knonw as vibrating strings, not heat/phonons bound. As 2D membran oscillations the energy transport can be through phonons, transfering in matter systems momentum and energy. Phonons move only attached to matter. For their measure the volume equation pressure (for instance on a balls surface) times volume equals scaled temperature applies. For volumes, no differentials are used. Density is a quotient mass per volume. Whirls are added as a third character for energy systems. Most quasiparticles show in general a whirl character, also spin, rgb-gravitons belong to them. Geometrical shapes are conic (see the Mach cone) [1-16].

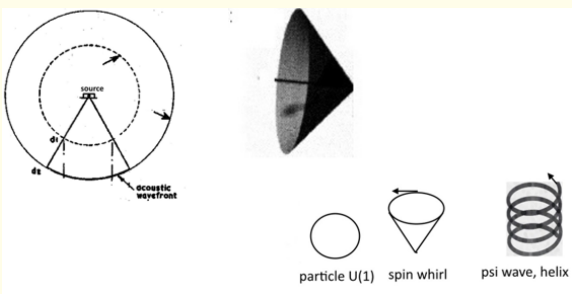

Figure 12: Acoustic conic whirls expansion; lower line circle, disks/2D spheres, volumes for local particle energy probability distribution, energy geometry for whirls, energy cylindrical exp function geometry as helix line on a cylinder.

EMI energy is quantized by E = hf where only full helix windings n in time as natural numbers are stored. There are three inversions postulated: at the Schwarzschild radius Rs of a black hole the radius inversion for instance of quark lemniscates r‘ to universes r>Rs quarks radius in $r'r = Rs^2$ (Figure 8 last of the models as Horntorus). For whirls it was set on a pinched torus surface as projective closed Minkowski cone by a circle (Figure 8 last of the models without a helix) with phonons inverted. Inverted quantized (psi waves) helix lines for dark energy E =hf (with helix frequencies figure 8 last of the models exp function cylinder closed at infinity by a point). Inversions are in the last cases for speed v‘ > c inside and universes speeds v with v‘v = c.

For matter wave packages ψ it is assumed that the inner energies as frequencies f are transformed by $m_fc^2 = hf$ to mass and the mass of ψ is rescaled to $m = m_0 + m_f$, m_0 sum of the ψ energy parts masses by using the special relativistic mass cosine rescaling with sin θ = v/c, v relativistic speed. Differentiating dm/dv gives a group speed computed as optical v = ∂ω/∂k for ψ. This rescaling is used for nucleons mass where m_0 is the three quarks mass.

Conclusion

The finite dimensional model can be used to substitute the infinite dimensional Hilbert space in quantum mechanics concerning gravity and nuclear systems. The postulates are added to the standard model. Needed is the proposed use of Gleason frames for quantum measures with the Copenhagen interpretation, the use of projective geometry which allow changing dimensions, central, orthogonal projections and finite symmetries mostly belonging to dihedrals.

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