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Review Article

10 Quanta Equational, Measuring, Spin-Like Triples

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Abstract

In order to solve the physics gravity problem, not included in the standard model U(1)xSU(2)xSU(3), a new appraoch is presented, using Gleason measuring quanta apparati, generated by spin-like triples GF in octonian and SU(3) coordinates. Seven belong to the octonians (Figure 1), three to SU(3). The last ones are for gravity and color charges. Two of them set the inversions of radius from black hole energies to universes energies and inversion of speeds from dark energy speed to universes energy speed. Used are the Schwarzschild radius in the first case and the speed of light in the second case. Accelerating gravity is for the tenth GF as a leaning plane for an orbit of a mass system P rotating with speed v about a central mass system Q (planet-sun). The plane cuts an (at 45 degree opening) Minkowski cone in a plane containg the parabolic escape of P from Q as line on the cone surface and with angle 0 for v_2 - v = 0. the plane leans with an ellipse cut through the cone until a circle as transversal intersection for v = v1, vj cosmic speeds of Q is obtained. The gravitational speed acceleration of v adds after one revolution of P to the main diagonal location of the Kepler elllipse an additional constant phase shift such that the ellipse becomes an Einstein rosette.The enumeration of triples is with indices of octonian coordinates 0,1,2,...,7. The last described triple is 126 for an *rgb*-graviton, observed as neutral color charge of a nucleon.It is 4-dimensional extended to 1267 for its exponential wave description 7. This belongs to a proton. To a neutron a dual graviton 3456 belongs (356 as triple, barycentrical for mass 5). It sets the Schwarzschild radius inversion of energy radii inside a black hole and universes energies. The third new triple 037 is for speed inversion at speed of light from dark energy speed inside a pinched torus to energy speed outside such pinched tori. The geometries are different. The speed case is for 7 cylindrical with a transversal circle and its pinched point at projective infinity, For 3456 it is spherical, barycentrical for a complex Riemannian sphere S^2. For 1267 it is a Minkowski cones geometry where the pinched point of the torus location is not at projective infinity, at infinity it is closed by a circle. To the physics wave-particle duality 7-5 is added 7-5-3 a third whirl character 3, energies can show in experiments.

Keywords: Wave; Particle; Whirl; Uncertainty; Octonian; Hilbert Space; Forces

Equations for the new GF

1. For electromagnetism Maxwell formulated his equations in 4 spacetime dimensions. Concerning relativity, Dirac found that the basic Pauli matrices had to be suitably doubled to 4x4-matrices. This has an influence for doubling spacetime coordinates R^4 to complex coordinates C^4. It sets a first 8-dimensional extension of spacetime. The Hilbert space real Euclidean or complex Hermitian metrics are used. The subspace structure is orthomodular with Boolean blocks 2^4 for sets of commuting projection operators. The logic [10] is not Boolean. A completness theorem holds, but the deduction theorem fails.

2. The strong interactions symmetry SU(3) has another 8-dimensional GellMann matrix λ_j extension. Its geometry S^3xS^5 is not linear like C^4. SU(3) projected down to SU(2) means that seven of the GellMann 3x3-matrices are Pauli spin 2x2-matrices σ_j, j = ,1,2,3. An identity 2x2-matrix for instance of time is not included. The superposition of two σ_3 matrices, called λ_8, can be listed separately

as λ_9, λ_{10} wirh second or third colums/rows of values 0 inserted. For them, are complex operator extensions like octonian Fano triples, the λ_j with indices j = 1,2,3 or j = 4,5,9 or j = 6,7,10.

They are for measuring Gleason operator frames GF, not used in physics up to now. If octonian coordinates are enumerated by their indices as 0,1,2,...,7 then they are as 3-dimensional subspaces 126, 345, 037. They are added to the octonians Fano GF 123, 145, 167, 246, 257, 347, 356 which makes 10 measuring GF for quanta energies. The Fano GF and equations are described in other articles of the author [1,9].

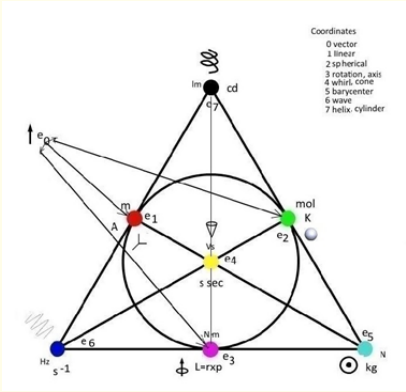

Figure 1: Fano memo for octonians GF, intervals are 3-dimensional spaces, generated by the three marked points on them; added at left is an octonians input coordinate 0 for color charges as force; energies with measures and geometrical symbols are added.

The three strong interactions GF are for an rgb-graviton Γ 126 [3], observed as nucleons neutral color charge red, green, blue. Its dual 345 is alternating repeated in a dynamical setting as earthworm when extending geometrically in spacetime.

This was as graviton wave detected by LIGO in their measuring experiment: material or frequencies length r is changing. Spin is the measuring quantized unit for them. The wave amplitude changes are in proportion of the basic spin values ½:1:2. Radial r changes appear dynamically as stretching/squeezing in Minkowski measured space. Also time is changing. The equations are for 126 a leaning, transversal planes angle towards the cone cos $\beta = d\cdot(v_2$ -v), d a constant, $\beta = 45^0$ for $v = v_1$, and for 345 $r = Rs = 2Gm/c^2$ for radius, $r'r = Rs^2$ for black hole radii r' and universes radii r>Rs, Rs Schwarzschild radius of a mass system.

Figure 2: Earthworm 126, squeezing space or time, 345 stretching space or time, transformed from the earthworm to the metrical Minkowski spacetime by Moebius transformations MT of a real 2-, complex 1-dimensional Riemannian sphere S^2.

Another application of 126, 345 is for fusion. For two protons, 257 can set by the lever law a common barycenter between two quarks in a middle point by gluon exchange. In the left part of figure 3 the two upper and lower quark triangles are parallel in space. The Heisenberg (uncertainties) pairs HU span three planes for (projected) octonian coordinates 15 (color charged red turquoise), 23 (green magenta), 46 (yellow blue). Both protons carry a positron (caps on the triangles sides). In opposite position are paired quarks u-d, u-d and u-u. This forces the last pair to let the upper u-quark decay, emit for fusion the positron and a neutrino, as indicated in the right part of the figure. The weak decay with a W+ boson changes the upper proton to a neutron. It adds a turn of the lower 126 tetrahedron. In the new deuteron, the space coordinates carry the HU: x-axis 15 position, momentum; y-axis 23 angle-angular momentum, z-axis 46 time-energy. These Cooper pairs form atomic kernels AK. The common barycenter can be removed, but the pairing energy exchange remains. For instance, an isospin I_3 exchange sets the proton on top of the neutron 345. In case the two parts get too far from one another included in an AK, radioactive decays of AK can occur.

3. The octonian 037 has the equation for the electromagnetic interactions waves λf = c, and is for a new HU 37; an equation is z·f = c as upper bound for energy speeds in the universe. It sets conic rotations of a leaning vector (3 angle θ) towards a z-axis like magnetic flow quantums 145 cones or photon 167 or color charge cc cones (six on the octonian coordinate 0 as G-compass). Also spin 123 cones towards a rotation axis occur (electron spins in atoms

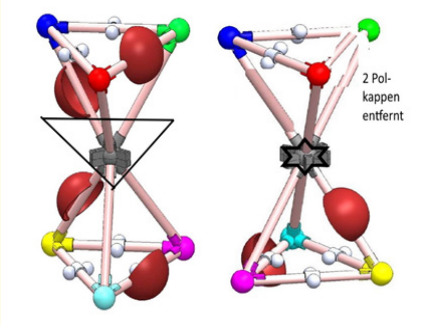

Figure 3: Fusion.

shells). The vectors are a scaled eigenvector of the quoted energies symmetry matrix.The conic rotations are often for integrating energy functions.

Figure 4: Conic vector rotations, magnetic field quantums.

In octonian coordinates, the GF 356 sets by 3 a 45 degree rotation. Integrated is the kinetic force vector E_{kin} on 5 to the momentum vector p = mv on 6. The time Δt integrated wave function is $\psi = - \omega^2 \exp(i\omega t)$. The presentation in a 12 tangent xy-plane of a Riemannian sphere S^2 of a black hole is with $\exp(i\varphi)$. The force E_{kin} has coordinates (10), (01), listed as a Moebius transformation MT 2x2-matrix id with first and second row as listed before. The rotional operator E_{rot} on 3 maps the base and matrix to the second Pauli matrix σ_2 with first row (01), second row (-1 0). The complex numbers z = x + iy for S^2 are then presented as MT $x \cdot id + y \cdot \sigma_2$. In xyz-space, S^2 has 3 along the z-axis which contains the diametrical opposite points 0,∞ of S^2. The stereographic projection of S^2 is from ∞ to the xy-plane along the z-axis. The momentum vector is attached at a color charge point on a latitude circle. It rotates clockwise cw or counterclockwise mpo which is listed as point -1 or +1 on S^2. The reference triple 0,-1,∞ generates together with z as fourth member the D_3 symmetry MT of order 6 for the quark triangle of a nucleon. The reference triple 0,1,∞ generates the G-matrix of order 6 with first row (1 -1) and second row (0 1) for the color charge G-compass. In octonian coordinates they use 123456. The octonian 7 is for the electromagnetic interaction EMI, its U(1) symmetry as rolled Kaluza-Klein coordinate, and for the exponential ψ function. The octonian coordinate 0 is for the color charge force.

In a spacetime projection, the nucleon has the hedgehog distribution of 123456 on space coordinates acccording to the Heisenberg uncertainties: 15 along +x, -x, 23 along +y, -y and 46 along +z, -z. Gravitons are the GF 126. They generate together with the nucleon triangle a tetrahedron inside S^2. The graviton has its tip in the solid ball of the hedgehogs center O and the endpoints of its three vectors carry the color charges r, g, b of the three nucleon quarks.

The tetrahedron symmetry S_4 factors by the CPT Kein group $Z_2 \times Z_2$ to D_3. Each factor class contains a color charge, an octonian coordinate, a D_3 (or partly Pauli matrices) symmetry and an energy. Electrical force charge is on 1x, heat on 2y, rotation on 3z, time and magnetic energy on 4t, mass on 5m, kinetic energy frequency on 6f. An eigenvectot of the attached symmetry sets the energy units on 1 as Ampere, 2 as Kelvin, 3 as Joule (123 have also length measured in meter), 4 as TESLA (time measured in seconds), 5 in kg. 6 in Hz. Their measuring GF are 123 spin for 1, 246 for 2 heat, 347 for 3 rotation, 145 for 4 magnetic energy, 257 for 5 mass and 356 for 6 frequency. The seventh octonian GF is 167 for EMI. Strong interaction GFs are 126 for the graviton, 345 for a dual graviton and 037 for an angular momentum (new) Heisenberg uncertainty which sets c as upper bound for speeds in the universe.

Conclusion

It is necessary to introduce for gravity the quanta Gleason measuring operators [2] associated with the GF. The triples obey the Copenhagen interpretation for measurements. Physical equations arise and are used for them.The geometries are different and also the symmetries. Color charges are treated as a force on the octonian coordinate 0 and use the G-compass for their six values. The rgb-gravitons are perspective projections as superposition of three color charge whirls red-green-blue. Color charges are described as the invariant complex cross ratios of S^2 having as finite symmetry S_4, the permutations of four elements z and three reference points like 0,1,∞. This setting is in the sense of the Noether theorem. Added is to U(1)xSU(2)xSU(3) the complex Riemannian sphere with its Moebius transformations as symmetry. They provide translati-

ons, rotations, scalimgs and inversions. For most GF mathematical designed and technically running models [4] exist in the Emmy Noether Memorial museum (Figure 5).

Figure 5: MINT-Wigris tool box in the Emmy Noether Memorial museum, lower left the SI rotor (above new the earthworm, not in the old figure), 2nd box the leptons and weak bosons, 3rd box stretching squeezing, fusion, handcrafts by a template, 4th box 6 roll mill, gluon exchange, barycentrical coordinates, 5th box G-compass for color charges, dark matter, dark energy, hedgehog.

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