Acta Scientific Ophthalmology
Volume 2 Issue 7 August 2019
Review Article

View Physical Systems New

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Received: May 30, 2019; **Published:** July 18, 2019

Abstract

The modern treatment of particle physics has established that the mathematics from more than 100 years ago need a revision in this century. MINT-Wigris offers an alternative for extending the revised standard model of physics such that gravity GR fits in this scheme. The Noether theorem has been used for the symmetry U(1)xSU(2)xSU(3), describing in the nano range the three basic forces EMI electromagnetic interaction with U(1), geometrically a circle, the weak nuclear force WI with SU(2) and the strong nuclear force SI with SU(3). Invariants of their geometries as circle, a 3-dimensonal Hopf sphere S^3 for WI and a toroidal fiber bundle product S^3xS^5 for SI are in the first case presented through the particles photons, for WI through the three weak bosons W+,W-,Z0 and in the SI case the 8 gluons. For gravity was suggested as particle a graviton, but only graviton waves are by now experimentally verified. As particles are found Higgs bosons for Higgs fields which attribute mass to particles. Exchanged field quantums however for transferring energies between (physical) systems have in general mass 0. To them a Higgs field cannot be applied.

The author revises the use of an infinite dimensional Hilbert space, using other finite coordinate systems up to eight dimensions like those of the gluon space, use also octonian coordinates which have another multiplication than the SU(3) matrices and projective geometry extending the affine 4-dimensional Minkowski spacetime geometry. In this case 5 dimensions, not 8 are used where the 5-dimensional coordinates are used for describing fields. If one coordinates is protectively normed to 1, the spacetime coordinates are obtained. They are no new dimensions, but on the field spaces boundary. This can further normed at projective infinity where in this model in the next step the S^3 coordinates of the geometrical SI factor occur, for the normed 2-dimensional boundary the Einstein energy frequency plane of octonian coordinates e5, e6 is used and for the last projective normings U(1) of EMI is added. Up to now there is no need for higher projective dimensions. Gravity as force can be included in these finite dimensional vector spaces. For the application of the Noether theorem the group of Moebius transformations as symmetry of the 2-dimensional Riemannian sphere S^2 are added to the symmetry of the standard model and also the symmetries of the dihedrals Dn, n =1,2,3,4,6,8. S^2 arises in different occasions, for instance by fiber bundle maps for WI and SI. The dihedrals have as points on a circle the roots of unity. They generate for instance shapes for the Heegard decompositions of the Hopf S^3. This sphere as the location of weak bosons adopts the energy of two colliding systems in space and decays again into two systems. For the geometrical particle presentation Higgs bosons have their energy located on a Horn torus where in the usual torus Heegard decomposition two diagonal opposite disjoint transversal circles are joined at a common singular point. For a Higgs field the octonian coordinates e0, e4, e7 can be normed to 1. For rgb-graviton whirls is used the SI sphere S^3 and their location as observed neutral color charge whirl in nucleons, a superposition of three quarks color charge whirls red, green blue of QCD/SI. For leptons the Heegard decomposition HD into two solid tori with a bounding torus is used. The ordinary torsu is for electrical EM charged leptons, the spindle torus for neutralleptons. For quarks the HD has genus 2 surfaces with two central poles for its EM and mass charges, for nucleons genus 3 surfaces, for deuteron genus 6 surfaces. The HD into 4 or 8 genus surfaces for systems are used for a magnetic symmetry with induction coupling magnetic and EM forces in motion. For the octonion 8 case the vectors e0, e7 are added to those of the deuteron genus 6 case. Here the complex cross product extends the genus: the six octonians arise from spacetime coordinates as z3 = z1xz2 and the eight arise from z4 = z1xz2xz3. The octonian e7 coordinate is projective closed to U(1) ans e0 is an input vector, geometrically also shown as a half-open interval (a, b) with no point added at left. This can be used for a helix winding of frequency on a cylinder when a circular rotation is blown up in time and moves this energy along the cylinders surface. As unit, a photons energy is then quantized by E = h, h the Planck constant. To the above use of the complex cross product is added that this method is also useful in the real case for getting the projective 5-dimensional space: in two dimensions the cross product is replaced by a map which generates from a vector (a,b) its transform (-b,a) by using a matrix for the imaginary number i in the form of the second Hopf-Pauli matrix. The complex numbers x + iy are this way generated, extending as plane the real number x-coordinate line, the iy line is orthogonal to the x-line. The real cross product is then extending the plane to the 3-dimensional space coordinates x, y, z where the z-coordinate is orthogonal to the xy-plane. The cross product measures with its length the area of a rectangle with side length x, y. But here the first use of symmetries in physics is needed: systems transform through operators which in most cases are not commuting. In general for two operators P,Q the performance one after the other shows that PQ ≠ QP. In the Pauli matrix descritpion for spin coordinates sx, sy, sz hodls for the matrix cross products σx.σy = -σz, σz=σy.σx. Extending the space to orthogonal 4 dimensions, a volume |e4| = xyz can be measured by the octonian e4 coordinate. The octonian e1,e2,e3 can be used for x, y, z space coordinates and e4 for time. As the last projective cross product as vector w for fields, orthogonal to spacetime coordinates, the projective normings of fields can be introduced as a projector. In a book of Schmutzer the w projector (as e5 octonina coordinate for mass) is projecting a 5-dimensional unified EM + GR field down to three 4-dimensional potentials, observable in spacetime as the EM potential, the GR potential and a third scalar field. The projective norming of octonians is by setting the values for e0, e6, e7 to 1. Other 5-dimensional fields can arise this way. MINT-Wigris puts up three driving motors POT for the case of Schmutzer, SI for the nucleon rotor and the genus 6 brezels from above, integrating forces to potentials, speeds etc., WI for the case of the genus 4 brezels from which are generating for instance locally a systems Euclidean space coordinates while SI generates barycentrical coordinates. The rotors dimensions are not 5, but can be in the case 4 projective extended to 5 by a virtual induction coordinate at infinity for a WI field. As projective octonian coordinate normings set the values of e4, e5, e6 to 1 and use e0 as a compass needle, the rolled e7 circle as the boundary of the compass disk and add the dihedral circle for setting roots of unities on the circle by discrete rotations of the needle in equal angles. The SI case can use its geometrical factor S5 = R5U ∞ and project it down by the stereographic projection from its point ∞ down to R5 as an SI field. Normed are the first three GellMann matrix coordinates of SI and the field has λj, j = 4,5,6,7,8 coordinates, excluding rgb-graviton coordinates. As functions the exponential function and the complex logarithmic function are used. Differential equations from physics for exponential wave functions are as usual, the use of log(z) as integrated potential is for branches of surfaces where the branches are joined by cutting the surfaces opne along the negative x-axis. On branches multi-valued functions have a unique value. This is also of use for roots which can have in this model up to 6 branches. Invariants as six energies or six color charges for instance arise in the complex numbers case by the use of the six cross ratios, invariant under Moebius transformations. The new geometries, symmetries and invariants according to the Noether theorem require a broad spectrum. The particle physics, gravity and the other forces like SI, WI, EMI and EM can be described this way.

Keywords: Noether Theorem; Roots; Physics

Branching's

The butterfly is the nucleon version in a black hole. The three quarks are retracted to a 1-dimensional lemniscate and all lemniscates are arranged about the central singularity ∞ with their central singular point along a tube which is rolled up such that its middle line is retracted to ∞. The wings of the butterfly with 6 circles are densely arranged and touch the line on the tube diametrical opposite to its retracted line. This looks similar to a spring arrangement, chosen for the Tool Bag model of dark matter. It is pointed out that in exploding the butterflies develop first from its six wings the potential unified wings red and turquoise as Schmutzer's unified 5-dimensional field. Fields develop 5-dimensional and are projected down into lower dimensions like the 4-dimensional spacetime where they ae arranged in branches like then logarithmic surface branches where its complex planes are for unique functional values. For red and turquoise color charges of quarks the two branches carry the electrical potential EM and the mass potential E(pot). At a ray along the negative x-axis the mass m branch joins with its upper closed half ray to the frequency f lower branch where on the joined half rays Einstein can arrange his computation mc^2 = hf for non-negative mass. m = 0 is for massless systems and the mathematical inversion of mass from the butterflies dark matter location is at the Schwarzschild radius. The gravitational constant arises in a dark matter explosion for gravity.

The lower m-branch joins the upper ray branch of EM which has on its upper ray the electrical charge, not mass, and EM charge 0 is for neutral charge of leptons. For a transfer of measures, the kg can be expressed for instance in J and J in eV on the common ray.

Magnetic fields as a new branch join with their upper ray, carrying vectoral magnetic field strength E(magn) or its derivative as measure, to the lower EM ray where its vector points always orthogonal to the fields plane in space. Its butterfly quark color charge is yellow, for frequency it is blue. The common ray between EM and E(magn) is blown up vectorial by the real cross product: if EM runs along a current with speed v in a loop for instance and E(magn) vectors as field cross the loops area the normal cross product in M = mxB where M is an angular momentum for induction B and m magnetic momentum. The physics use of differentiation and integration is introduced by area-differentiating the magnetic flow Φ to B and integrating B to Φ. The magnetic field can also cross transversal the loop area A in an angle φ, then Φ = Bcos φ·dA. The magnetic field quantum whirls compute their energy as $\Phi_o \cdot e_o = h/2$, e_o the EM charge, h the Planck constant which was already above introduced as scalar for frequency. The EM-E(magn) field is also 5-dimensional and located together with the POT field in a 5-dimensional, real projective space R5. The cross product for this field is in another form F = Q(vxB) where v is the speed of the current and F is the Lorentz force. Circular loops arise for EM orbits in space. The right hand rule shows the cross product orientation in space, the F vector is along the +z-axis, the v-vector on the +y-axis, the B vector on the -x-axis. The EM potential is like the mass potential measured as a constant·(1/r), r radius. and computed by - ∫ F/Qds, ds the v =ds/dt direction of motion and is used for integration. For the mass potential φG the constant uses the second cosmic speed squared. It is integrated by the radius differential dr to the (log z) function, the inverse of the exponential ψ-function exp for waves. Physics uses at some instances the log(z) function, but not geometrically as in this model. φG is dr differentiated to gravity GR as Newtonian force vector. Concerning the 5-dimensional field demos, like the Schmutzer field, physics can check in his book how his common force vector for EM and GR is named. I call it now EMGR. Such a vector exists also for the common 5-dimensional field in R5 for EM E(magn), maybe they are interlinked as the log(z) branch surfaces.

There are two more butterfly wings green and turquoise. As 5-dimensional fields they are for E(heat) as energy and E(rot) as rotational energy. Since E(rot) uses angular frequency ω = 2πf we join its lower branch with the upper branch of the frequency field with this equation for the measures on the ray.

We end with a problem for heat, green. It should actually sit attached to the blue ray between red-blue. Replace turquoise for the moment, fit green in between, join the two remaining free rays of E(rot) and E(magn) and include turquoise between blue and magenta. This way the G-compass has the conjugate color charges diametrical opposite located on its disk. If some measures are missing, add them by using a physics handbook. For instance ω is the scalar of time t for the harmonic wave function, speed v is measured in meters per second m/s, frequency f, ω by 1/s, mass in kg, energy and heat in J.

After locating a vector in the R^5 space for every energy field and after to these energies are carrying the butterflies quark color charges of QCD it is useful to extend also the other items mentioned before: real cross products, differentiating, integrating, etc..

Dimensions

Before we do this, the G-compass is explained because we had to rearrange the colored segments: the needle of the compass is the octonian e0 vector, mostly listed as 0 if no confusion occurs. It spreads out on the segments area the listed color charge of QCD. The vectors for the energies are then attached to a point inside this segment, having for instance their initial value on a circle with half the compass radius circumference of the disk. On blue sits f, on g sits heat, on red sits EM charge, on yellow magnetic energy, on magenta sits E(rot) rotation as angular momentum, on turquoise sits E(pot) for mass. They are normal input-output vectors to the disk for the indicated energy exchange which a deuteron atomic kernel DAK with 6 quarks can perform with its environment. The location of this DAK is obtained as follows: R^5 has as 1-point compactification the geometrical QCD factor S5 = R5 U ∞, a 5-dimensional unit sphere in the complex 3-dimensional space C^3. In a homogeneous projective norming by an angle this is normed to the DAK location CP^2 of a complex projective 2-dimensional space with a bounding Riemannian sphere S^2. It carries towards the DAK environment as shelter like the earth‘ atmosphere 6 polar caps as parametrizing half-hemispheres (caps). The in-output directed energy vetors sit then t the ends of the S^2 sphere, drawn in Euclidean space coordinates x, y, z, at the ends of these axes or in the middle of the atmosphere arranged color charge caps. +x has EM(pot) as vector, -x has E(pot) and this presents also the coupling of the Heisenberg uncertainties position at +x and momentum at y-axis carries at +y E(heat) and the polar complex angle φ, and at y E(rot) angular momentum. The z-axis has at +y time and E(magn) as energy and at y E(kin) as inverse time interval f = 1/Δt. The equations E =hf is for this uncertainty. Their opposite location in the G-compass segments means that they are related by the real cross product c = axb. The energy measure E (as a) multiplied by the time interval (as b) has as length |c| = h, an area measure. The same holds for the other two uncertainties: the croos product measures in these cases |c| = h and the area equations are λ p =h for position as a wave length λ and momentum p = mv and φL =h for angle and angular momentum L = rxp, r radius of rotation.

CP^2 is not located inside spacetime, but its boundary S^2 generates a grid in space where these energy projections show up for DAK. The inner spacetime of DAK is obtained from the field interpretation of S^5 as closure of R^5. We add for these spacetime coordinate expansions the octonian coordinate system. The G-compass needle can be e0, e1 x, e2 y, e3 z, e4 ct (speed of light c scaled time t), e6 f (frequency), e5 w (mass at rest as weight), e7 is stereographic rolled up by adding a point ∞ to a circle U(1) for the electromagnetic exponemtial exp wave functions. It is also their interactions EMI symmetry. The DAK location can be taken on the 04567 QCD sphere S5 (the e is deleted and only the index j is listed). The QCD GellMann matrices λj, j = 4,5,6,7,8 can be also used. The QCD symmetry is SU(3). The first three λj, j = 1,2,3, generating dimensions are for rgb-gravitons. They are 3-dimensional extended Pauli 3x3-matrices of the weak interactions SU(2) geometry S^3 and are geometrically for QCD the second factor S^3xS^5. rgb-gravitons set then in the projected xyz-space of Pauli inside the observable DAK grid a tetrahedron on the x, y, z axes with six quarks sitting with their mass as weight attached at the axes endpoints having the six color charges of the caps from above.

Rotors

We can now turn back to the log(z) surface description where energies have been located and the g-compass was introduced. The real cross products for integrating forces to speeds or potentials are repeated again: speed integrations dt are for E(kin) from kinetic energy to speed and to the space direction vector in which a system moves with its momentum. E(rot) is time dt integrated to angular momentum L and this to angular frequency. The cross product in octonian coordinates is 347 for E(kin) 167. Radius dr integrated are the potentials E(pot) 257 to gravity as φG and this to log(z). EM(pot) 123 is dr integrated to its EM potential and also to log(z). E(magn) 145 has been listed above (area integrated) and E(heat) T 246 is volume V integrated for pressure pV/T = constant inside a bounding 2-dimensional sphere, for instance with mass systems inside moving like a gas filled balloon. This is a dynamics inside the DAK, described by nucleon triangles symmetry D3. The nucleons sit with rgb-gravitons color charged quarks in the x, y, z axes endpoints and the other nucleon at -x,-y, z. In the MINT-Wigris model the dynamics is called the strong interactions SI-rotor.

The triples for cross products are lines in the Fano memo where octonian coordinates are listed by their indices, 0 is an input vector from the 5-dimensional fields and 7 is an output vector for EMI., light Its rolled up U(1) symmetry generates a light cylinder where light is moving with its frequency as an energy carrying helix line on the cylinder, one winding is for its wave length, the photons energy is quantized as E = h unit and EMI moves with speed c along the time directed central x-axis of the cylinder in space. Observable is only the cosine projection of the complex exp wave. EMI can have as field in octonians the e0,e2,e3 coordinates normed to 1. 123456 is the complex 6 roll mill space, arising as cross product extension from the Pauli spacetime in z3 = z1xz2. The z1 = z + ict, z2 = x +iy spacetime coordinates carry the Minkowski metric, xyz space is Euclidean measured. For the motors SI, WI and POT in the 6 roll mill can be added three 5-dimensional fields combining the rolls as GF for 1,5 to12357 as (barycenter) field, the GF for 2,3 to 23467 as (heat, rotation) field and 4,6 to 14567 as (kinetic) field.

The weak interaction WI has a WI-rotor attached, similar to the SI-rotor. While SI is as representation of the D3-triangle symmetry of nucleons generating barycentrical coordinates and a barycentre for it, the WI-rotor is a wheel where two tangent vectors are in opposite direction diametrical located on a roll, the roll is driven for instance by water or another fluid like plasma or polymer and its motion generates the three axes x, y, z of the roll, having as intersection the center of the Euclidean coordinates 0. The rolls are located in the axes orthogonal planes yz, xz, xy. How does gravity fit in and how can the two different speeds of WI and SI rotors be accommodated without getting DAK decaying? Concerning rgb-gravitons inside DAK: put the six quarks points on loxodroms on the S^2. In one winding about the north-south poles S^2 axis their location is on the south poles tangent plane E to S^2 measured by the stereographic projection as a point which has an interval joining it with the other five quark points in E. If necessary to see what GR projects down as length of the nucleon triangle sides, move the quarks to another point on their loxodrom. They all can sit on 6 parallel loxodroms and on a latitude curcle for instance when the G-compass is drawn inside DAK. SI with GR moves the points in G-compass location from a latitude heigth ½ up to radius/height 1, to height 2 and the stereographic projection shows as shadow image that GR stretches and squeezes the intervals length. rgb-graviton whirls are superpositions of the three color charge whirls red spin 1/2, green spin 2, blue of spin 1 for bosons, ½ is for fermions spin and 2 for the graviton. The magnetic field quantums are stronger as force than gravitons and can annihilate these whirls: green is then a phonon withhout spin and transfers in the decay the red energy to mass in the environment and blue energy to oscillations (for instance of electrons) inside matter with mass particles in between. In the projection above, if done central for SI the nucleon triangle with rgb quarks is central stretched and squeezed. Wi has a different speed with its rotor than SI This shows up in this demo by rotating the S^2 against the tangent plane E at rest. Then the triangles arrange in a spira motion like three dogs in its vertices replacing quarks, chasing one another head to tail or running spiralic back again in a pendulum-like motionl As figure the reader can draw a triangle, put in its sides middle points the vertices of the contracted triangle and on the middle points of the second triangle the vertices of the third. Spiralic motions belong to GR, for instance when two galaxies have generated a common barycenter where they hit and explode then again for a larger newly generated galaxy. Quarks are set at a certain distance through gluon SI exchanges which keep them also confined in a nucleon. Their energy is like a spring in motion about the quark triangles side which in bounds can be stretched and squeezed. For separating them, for instance in mesons, a huge amount of energy has to be located on the springs until the double meson energy is reached and two mesons split from the one which is annihilated.

Metrical scaling's

Why now is WI, SI stable as nucleon or deuteron force when they run with two speeds for their rotors, generating local coordinate systems? Stable means in general for systems or particles like an electron that a matter wave can be integrated. As known from the Schrodinger ψ-wave, a common group speed v for WI, SI actions and the DAK parts can only be obtained by rescaling mass. The special relativistic rescaling factor cos θ, sin θ = v/c introduces on the DAK level Minkowski metric and its mass rescaling by m' = m/cos θ. It shows up as the nucleons mass measured at its barycenter while the energy for a mass defect is used for the u-quark mass. Also the neutrons mass defect does this when atomic kernels aris from Cooper paired deuteron nucleons proton and neutron. Some neutrons split in AKs in between without a proton. The periodic system of chemistry shows that the distances between the Cooper pairs cannot become too large then nuclear decays occur. For atoms the mass defect of electrons in the atoms shell generate a common group speed v special relativistic. The coordinate description of Einstein is affine where one system like WI has x', ct' coordinates and SI has x, ct coordinates, using the Lorentz transformations. The known special relativistic rescaling's of coordinate units such as length, time mass can be demonstrated by the Minkowski watch having two rays with a common initial point 0 and one ray on the x-axis while in an xy- plane the other ray has a leaning smaller angle θ towards the x-axis: project length l from the upper ray orthogonal down to the x-axis for the length l' = l·cos θ and time t, mass m from the x-axis upwards to their increase t‘, m‘ by scaling with 1/cos θ.

We have put up this metric. The second one is Schwarzschild metric and Einstein‘S energy-momentum tensor cannot be taught in a MINT course to ordinary high-school students. There are also 2x2-tensors available. Hence the author chooses a different tensorial way, available for this kind of teaching. It is linear projective as well as the 5-dimensionale Schmutzer field for EM + GR. It cannot account from precis Gr computations like computing a Schwarzschild scaling factor. How Schmutzler obtains this factor can be read in his book, also not readable for high school students. But both approaches show that this new generation can forget a spacetime curvature. This interpretation of physics is only because (maybe) the GR field lines projected into an empty spactime without energy indicates this about a large mass system Q like a sun. The planets P rotation about the sun however is in the plane E of the Kepler ellipse as conic section through a Minkowski double cone. The gravitons have as differentiated potential force vectors an accelerating effect to the speed in which P Kepler rotates about Q. Hence you can draw in the E plane two circles C1, C2, a small one about the Q barycenter as one focus of the Kepler ellipse and a large about the point. Let then the smallest distance on C1 from P to Q at an angle φ be moved by a fixed tensor computed angle added to φ + φ0 and look at P moving on to the larger circle C2 where the ellipse diameter through Q is now ending scewed by φ0. The orbit of P is then a rosette. For the rescaling of Minowski affine metric ds^2 in form of the Schwarzschild metric $dsG^2 = dr^2/\cos^2\beta - \cos^2\beta \cdot c^2 dt^2$, using radius dr and time dt differentials, it is projective geometrical possible to first put up a metrical, tangent plane having dr, dt coordinates. In a coordinate plane for r and ct you list projective, for instance octonian coordinates and measure the distance between Q, P unsymmetrical in these coordinates as $|QP| = r$ and $|PQ| = r - Rs$, Rs the Schwarzschild radius of Q. Then you renorm projective the radius coordinate to 1 and obtain the Schwarzschild metric scaling factor as $\cos^2\beta = (r - Rs)/r$. A tensorial computed 2x2-matrix A with $1/\cos^2\beta$ as nonlinear coordinate on its main diagonal and 0 as the other coordinates is then vectorial multiplied from the left and right to the tangent planes affine dr, 1/cdt or dr, -1/cdt coordinates such that dsG as metrical unit is obtained. This can be taught in a MINT course. The projective nonlinear norming is due to a GR central projection where its usual parametric presentation has these two coordinates and the quotion is obtained for computing the parameter.

GR uses projections, as mentioned earlier for the DAK triangles contraction/expansion as also in the log(z) surfaces projection planes for energies having in these planes a unique field description with normal energy vector directions to the plane. Ray projections the reader knows well from watching TV. Some hight-dimensional parts of systems are hidden and cannot be viewed. This is also the case for quantum mechanical systems. The nonlinearity of Schwarzshild metric is not the original, higher-dimensional linear, projective field presentation. The GR potential for motions of P about Q gives the first cosmic speed v1 of Q and a circle of P about Q as orbit This can be for instance in projection the WI spherical S^2 rotation about the tangent plane E, rescaling possibly cos β in this new interpretation for DAK and projecting the equator of S^2 down to E for the circle. The second cosmic speed of Q for the escape of P where their GR interaction ends and only Minkowski metric counts in future between them, is given by $v2^2/c^2 = \sin^2\beta = Rs/r = 2v1^2/c^2$. Look then again at the Kepler orbits a projective way; the circle as orbit before has been moved towards the projective line g at infinity of an xy- or E-plane as projective closure of the affine plane. When it has one point in common with g, the orbit for escape is a parabola. If P comes in towards Q like a comet with an even higher speed than the circle cuts g in two points for a hyperbola on which it escapes as its orbit from Q. In the Minkowki cone figure, the plane of P,Q is lenaing until the ellipse diameter is infinte and parallel to a cones surface line for the parabola, further leaning gives the hyperbola.

Gleason measures and symmetries

In this discussion we collected some datas from the handbook of the MINT-Wigris Tool Bag. EMI is further discussed there and many other aspects of the models. Here it is shwon that GR can be put on the same lines as the standard model of physics was developed: look at geometries, symmetries and invariants. Gluons are the SI invariants of QCD, using the generators of its SU(3) symmetry. The geometry is S^3xS5. The WI invariants are the weak bosons W+,W-,Z0 as generators associated to the Pauli matrices of its SU(2). The geometry is the Hopf sphere S^3 as a projection of the rgb-graviton sphere S^3 of SI. It has a rich geometry through the Hopf projection, a fiber bundle with a circle as fiber and with $h(S^3) = S^2$ where leptons location can be 2-dimensional demonstrated. Also the S5 projection by a circular fiber down to the DAK space CP^2 is a fiber bundle. EMI is added to the standard model by its symmetry in U(1)xSU(2)xSU(3), Having exp functions as invariants and a cylindrical geometry for its time expansion. For gravity added in the MINT-Wigris model is the octonian system where the numerical dimension is the same as the SU(3), but the multiplication table for octonians is different from the GellMann multiplications. For the general spacetime extension only 1 more coordinate for the R field space is needed and the other dimensions of octonias can be put up in closing this space to a projective space: the R5 part in the closure is spacetime, the R^3 part the rgb-graviton subspace of SI, the R^2 part is the Einstein energy plane for energy as frequency f and as mass with his line $mc^2 = hf$ and the U(1) Kaluza-Klein circle of light can close this up for P5. Projective norming's, transformations, projective correlations and their quadrics are an essential new tool for physics when GR has to be included as an extension of U(1)xSU(2)xSU(3). Mentioned are again the added GR S^2 symmetry of Moebius transformations on the Riemannian sphere. Their invariants as cross ratios are the six energies of the G-compass. The geometry is projective, uses projections and generates many shapes for energy distributions, often nonlinear like correlation quadrics.

We add for experiments in physics that the SI rotor has as measuring devices Gleason frames GF which are pairwise orhtogonal triples like this spin coordinate triple s = (sx, sy, sz) ins space coordinates. Above we havelisted with the octonian coordinate indices the GF triples for energies integrations and describe them as lines on the Fano memo. They carry other weights attached to the vectors than (spin) length. It is not respected from the side of physics in the year 2019 that these quantum measures μ as Gleason operator associates obey the Copenhagen interpretation: the measuring system has to be prepared before the measurement, for instance spin has to be directed as vector along the y-axis in space, then the experiment is made and spin changes stochastically in its allowed two direction up, down for the particles P in use along the z-axis as outcome of the measurement. But also P cn have a changed state, not any more its original state.

The μ measures have a support which is an octonian subspace where the associated energy takes on the value 0. Hence mass has such a support for systems without or with 0 mass, particles at rest means frequency or speed is 0, rotation 0 is also clear for not rotating systems, length 0 is for points like a barycenter or pole as sink or source in fluids or potential fields. There are also dipoles for the correlation quadric S0 = +1, -1, a sphere also for Cooper pairs, not only magnetic momentum with north-south poles. Kinetic energy 0 can be for dark matter's support, time 0 for decays or explosions, set then newly again after this event. Magnetic momentum 0 occurs also for energy systems. Heat 0 is not obtained by systems in our universe. Heat tending to 0 means for stars that they become neutron stars or even smaller and eventually can collapse to a black hole B where only gravity, not heat counts. Gleason measures have not only a subspace support, they measure for instance a probability energy distribution on subspaces where they can be found, for instance as fields. A vectoral description of fields was recommended. Why not use them for experiments like their GF's?

Heegard rolls, dihedrals and the WI field

The subspace calculations are non-commuting like their associated projection operators. Some of them are for the MINT-Wigris model. Also the GF measures are non-commuting because of the matric multiplications are non-commuting.

Non-commuting means logically: you have no deduction theorem for them, you miss mostly modus ponens of Boolean classical logic. It applies only to commuting sets operators. Physics has some of them available: the C conjugation, P parity and T time reversal operators commute and generate the discrete Klein-group symmetry Z2xZ2. Where the square of these operators is the identity id and CP = PC, PT = TP, CT = TC. The Klein symmetry is for the dihedral D2 with 2 points like 0, ∞ or +1, -1 separating a circle into two parts.

The D3 symmetry was for the quark nucleon triangle and has three points on the circle as cubic roots, the G-compass is for D6 with the sixth' roots of unity as points on the circle, the octonians are on D8 with the eight' roots of unity. The fourth roots of unity on D4 are for WI with 4 rolls driving a flow in between and the rolls can carry as polar energy sink/source the EM charge, the magnetic energy, the mass energy (for instance of an electron) and a kinetic energy kind of spin roll. Continue now with a nth circles added at the end of the (n-1)-circle along the x-line and add one for fields, the next one for the 6 roll SI mill, the next one for lights U(1) and the last octonian e0 vector rolled up to a circle or half-open interval. Since for GR the log(z) surfaces as branches are used and also EMI has light rolled up as helix lines on a cylinder, it can be argued that the e0 circle is not closed, but lets one of its ends for a half-open interval free (a, b), having only one closing point b at the end. Hence these intervals can be joined like the log(z) branches to helix or spring geometries on cylindrical tubes. This ends the Heegard decompositions of the sphere Hopf S^3. The use in physics is meager and the Feynman diagrams are a replacement for two particles hitting, generating a weak boson as intermediate energy carrier which decays then again into two particles with exchanged momentum direction. The Feynman diagrams are very useful and suitably geometrical drawn when other energies play also a role for the decays.

In the Heegard decompositions of the Hopf S^3 sphere the geometrical presentation is demonstrated for rolls in another way. The rolls are replaced by toroidal handles, mostly with one or two disjoint small disks removed. Start with a sphere and remove as many disjoint disks as needed for handles attached at one circle. Also a Moebius strip can be attached for the spin moving from up to down or down to up on that strip. To simplify the geometry, take retracts as circles centers of a torus Hopf tube. Then attach a circle for a Heegard decay decomposition into two leptonic tori of genus 1, attach to it a second circle with one point in common for a quarl lemniscate retract with two poles for its EM and mass charge, then add the same way, the circles arranged orthogonal along a horizontal x-line, at the second circle a third one for a nucleon retract with 3 poles for the quark barycenters, then a fourth circle to the this along the x-line for the WI rolls above, having an EM pole, a magnetic north-pole (disregarding its south pole), a mass pole and a central point of a GF 145 whose weights are for instance the three magnetic momentum μS vectors for spin, orbital angular momentum μL and μJ, J = S+L. Their endpoints on the GF sphere are in equal distance as radius scaled cubic roots. In time the GF rotates in time as magnon oscillation such that μx and x are on one line with a common initial point, pointing for a negative (positive) EM charge in opposite (equal) direction for x = S,L,J. The GF 347 roton cone is orthogonal to the planar circular harmonic oscillation. For neutral leptons the EM charge is replaced by neutral charge, the angular rotation is about an equator of the neutrinos sphere S^2, the spin rotates on the S^2 north pole and the momentum vector p is attached either at the south pole in opposite but linear direction as spin on the rotation axis or it points for antineutrinos in direction of spin. The GF for them is a momon 257, described similar as the magnon. It has at its 3 values the three weight of neutrinos for three momenta p1,p2,p3, replacing S,L,J. It is equal or opposite orineted on a common line according to the left- or right hand screw for ist helicity. On its world line g in time it has its GF cone orthogonal to the transversal line g and its three pj cubic roots endpoints are on the cones boundary are observable in a cyclic GF rotation on g. This explaines the neutrinos oscillation in time. The geometrical leptons particle presentation in space can be by the Hopf map image $h(S^3) = S^2$.

The WI field has added a dihedral Dn compass (e0,e7) as described in the introduction. For the above roll description in every retract circle is set a pole. The poles are then dividing the circle of Dn into equal spaced point locations as roots of unities on the compass boundary of radius 1. For D0 no pole is set and in the HD the S^3 splits along its equator into two solid balls. Dj, j = 1,2,3,4,6,8 for HD splittings with an equal number of poles for j have been described above.

In other Dn cases for mills the two GF described above can be replaced by other GF's which carry other energy weights or unit measures at their endpoints. All of them can in time rotate as described above, either on a closed circle or along a world line. For n = 3 spin s has as GF 123 measure length and rotates its locally generated space coordinates sx, sy, sz, rgb-gravitons λ1,2,3 GF rotate their whirls in the SI rotor, carrying units for potential r, rotation g and kinetic energy b, as described for the SI rotor in [1] by the GF 356. They rotate at the same time a cones axis, generating the barycentrical coordinates of a nucleon triangle. Its use for length contraction or expansion of the nucleons quark triangle moves on a DAK bounding sphere the nucleon triangles quark vertices, for instance along three loxodroms. Phonons with GF 247 can rotate their cone for an energy and momentum transfer and locate it transversal or longitudinal to the (in time) expanding harmonic wave. Lights GF 167 has as weights wave length λ, frequency f or ω and a map for an angle or time with value in the exp function for its wave description. Photons are curved half-open interval on a cylinders helix line, expanding in time along the cylinder and carry as quantized energy E = h in one winding of the helix. The octonian 1 is a central line in the cylinder, 6 is for the photons frequency energy and 7 the transversal U(1) circle of the cylinder. There are many more quantized pseudo particles of this kind observed in physics. For other n values of Dn than 3 the measures are not real cross product GF's or for pseudo particles endings attached as ...-on. Gleason measures exist for any number of pairwise orthogonal vectors as basis for frames in an n-dimensional real, complex or quaternionic space [1-8].

Conclusions

An effort is made to avoid today unnecessary space dimensions. The geometries for the nano range indicates that 8 dimensions can accommodate them. The field description is extended to 5 projective dimensions. For the symmetries are added the complex Moebius transformations and other finite symmetries for the dihedrals as another example. For measures the octonians are very useful, providing seven Gleason measures which arise also in the SU(3) space. The dynamics is extended to include rotors for SI and WI beside one for potentials. Gravity in its many geometrical applications is described by the use of rgb-gravitons in nucleons. Experimentally, physics has discovered there neural color charge of nucleons while as waves they discovered them recently. Maybe they adopt the authors view for its field quantum's as rgb-gravitons. The author has not convinced them up to 2019.

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Volume 2 Issue 7 August 2019