Spin And Rgb-Gravitons

Gudrun Kalmbach H.E.
Prof. Dr. Gudrun Kalmbach H.E., MINT, PF 1533, D-86818 Bad Woerishofen, Germany

Abstract

Gravitons are found as waves, but have also particle character like photons for light with the quantized energy E = h. No smaller energy unit exists for photons. Gravitons have too small energy to be measured is the physics claim today. Hence it was suggested by the author that they are already measured, maybe not through an E = h unit, but as neutral superposition of three quarks color charge whirls in a nucleon. The Pauli spin in spacetime makes the eigen rotation of particles. It also sets the lengths units by a triple of Euclidean measured space coordinate units. Instead of an eigenrotation the gravitons initiate an integrating strong rotor for the nucleon [1]. Symmetries, measures and geometries are newly added to those of the standard model of physics.

Keywords: *graviton, spin, symmetry, energy exchange*

I. The strong rotor, *rgb*-gracitons and spin

The matrix presentation of *rgb*-gravitons as the first three Gell-Mann strong λj 3x3-matrices has a projection down to the Pauli spin matrices σj. In the strong SU(3) SI and Euclidean weak SU(2) WI geometry the trivial fiber bundle projection of its first factor S^3xS^5 down to the Hopf S^3 is due to a central projection of the *rgb*-gravitons. In the Hopf geometry, the scalar mass in figure 5 is blown up as a fiber in the Hopf fiber bundle h: $S^3 \rightarrow S^2$ to an Rs circle S^1. It exists then for all mass systems.
Beside the S^3 *rgb*-graviton projection to Euclidean space with the spin xyz-coordinates, the S^5 factor is projective projected down to an inner complex 2-dimensional spacetime CP^2 for a deuteron atomic kernel with two nucleons. As a strong GR spin, the *rgb*-graviton whirls act in a nucleon subspace of CP^2 as a strong integrating SI rotor with the quark triangle symmetry D3 replacing the quaternionic spin SU(2) matrices symmetry. For the rgb-graviton a cyclic change of the rotor in time lets not only the momentum vector E(kin) blue b rotate but at the same time the other two quark attached vectors green E(rot) rotational energy and red E(pot) potential energy. The momentum p = mv vector is rotating in discrete time intervals and generates a first harmonic gravitational wave with moving on its way the nucleon triangle sides like vibrating strings in physics, up-down like spin orientations. In a video these motions are shown for six nucleon states, one of them is in figure 1

.

Going back to spin: the spin coordinates (sx,sy,sz) can also change, not only the 180 degree turn of spin itself; these turns of 90 degree have the symmetry of a tetrahedron where one vertex is fixed and the other two are rotated; the tetrahedron symmetry of order 24 contains also the symmetry for the C, P, T parity operators; take for this the symmetries which interchange in pairs the vertices of two not adjacent sides. Another item for spin is, - since more than 100 years physics says that it is not quite understood what the gyromagnetic relation μ = +γs or μ = γs does.

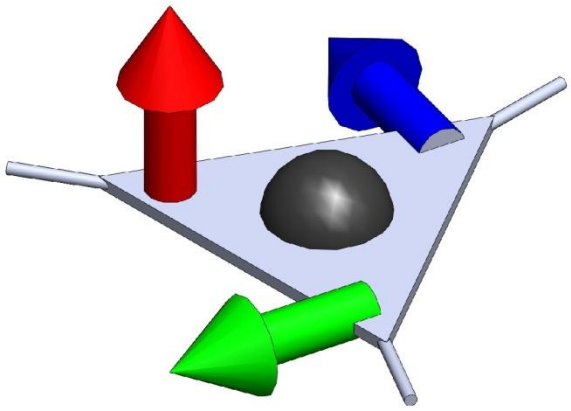

Figure 1 SI rotor, nucleon with 3 quarks and red, green, blue color charges attached

The helicity of neutral leptons and the EM leptons both generate Minkowski space lh- or rh-orientation. In the first case EM binds spin to the EM charge e0 Hopf rotation cw - or counterclockwise + mpo. The magnetic flow quantums are bound to e0 in Φ0 = h/2e0 Heisenberg relation. Similar is helicity of neutral leptons where μ is replaced by momentum p = mv. Neutrinos are discussed later on.
For the pairings of spin with parallel or antiparallel other vectors orientations of the x-, y-, z-cooridinates are useful. The spin plus magnetic momentum pairing uses as bases x(-y)z and its negative (-x)y(-z), for the change the time reversal operator T of physics as member of the symmtery Z2xz2 (Klein group of order 4). For the neutral leptons case uses the bases x(-y)(-z) and (-x)yz and for the change the identity id member of Z2xZ2. In the cae of *rgb*-gravitons the conjugation opreator C of physics replaces T and the pairing with the spin of a seuteron atomic kernel sets the two nucleons position in an ocetahedron for deuteron with the bases xy(-z) and (-x)(-y)z. For the fourth element P of Z2xZ2 the bases are xyz for spin and (-x)(-y)(-z) for quarks angular momentum L, an orbital motion of the green quark in the

octahedron. If its is rotated with the SI-rotor it changes between up and down after every six state changes of the cycle. For leptons the pairing shows up in the cw or mpo charge rotation on an S^2 latitude circle, with the other cases setting their helicity or gyromagnetic relation.

II. Energy exchange, the hedgehog

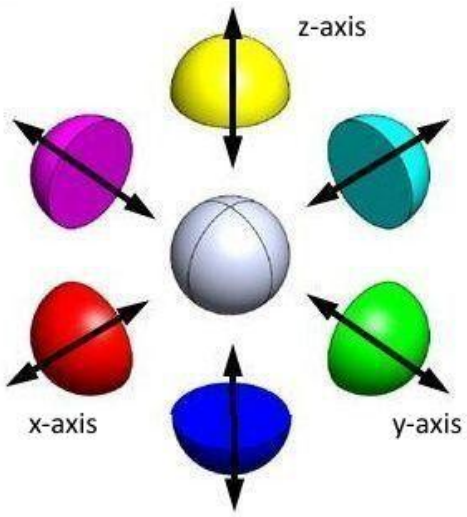

Figure 2 hedgehog with 6 color charged polar caps and energy force vectors attached for input output changes between a deuteron atomic kernel and its environment

The symmetry of order 12 for the input or output direction of the 6 hedgehog vectors is D3xZ2 where Z2 has the conjugation C and the id operators as members. Below is a technical oriented description where a neutrino mass operator GF with its three masses mj, j = 1,2,3, are used and the positron in a deuteron chooses an energy when needed at a time to be measured with two thresholds for being too low (ready for an input) or too high (ready for an output). It uses for this its angular frequency where it alternatively could change its Bohr radius for emitting or absorbing electromagnetic energy.
The below table for this is in the D3xZ2 symmetry notation (the D3 matrices are added for the ijk permutation):
the vector out directions come in pairs, the in direction also; when needed a rotation of the vector is applied before a technical valve is (see below the positron action) opened; the list is for
1 out 123 no oscillation mj, 1 mpo if needed, 1 in 123C no oscillation mj, 1 cw if needed (id),
2 out 312C oscillation cw turn from 3 to 1, 2 cw if needed, 2 in 312 oscillation cw turn 3 to
1, 2 mpo if needed ($\alpha\sigma$1 reflection),
3 out 213C oscillation mpo turn from 2 to 1, 3 cw if needed, 3 in 213 oscillation mpo turn from 2
to 1, 3 mpo if needed (α^2 of order 3 rotation),
4 out 321C oscillation mpo turn from 2 to 1, 4 cw if needed, 4 in 321 oscillation mpo turn from 2
to 1, 4 mpo if needed ($\alpha^2\sigma$1 reflection),
5 out 132 no oscillation, 6 mpo if needed, 5 in 132C no oscillation, 6 cw if needed (σ1 reflection),
6 out 231 oscillation cw turn from 3 to 1, 6 mpo if needed, 6 in 231C oscillation cw turn from 3
to 1, 6 cw if needed (α rotation of order 3)

The orbital frequency of a positron in a deuteron atomic kernel can measure for an observable neutrino mass mj the six energy level in a coupling with them; this has two thresholds too low or too large which generate in a valve function (open or closed) the input, output direction of the hedgehog vectors.
Mentioned is in addition that the symmetry D3xZ2 also generates the fermionic 12 series. The polar caps in figure 2 are named by numbers 1 for red, 2 for green, 3 for magenta, 4 for yellow, 5 for turquoise, 6 for blue. For D3 the mebers are using numbers 1, 2, 3 in triples (not as red, green, magenta) as permutations. Adding C means that form Z2 the C operator is chosen, otherwise id in Z2 is deleted. Use for instance 132, 132C of D3xZ2 for the 6 quark masses at 5, for the antineutrinos 213 at 3, for neutrinos 213C at 3, for electrical + charged leptons 123 at 1, for electrical - charged leptons 123C at 1.
In physics some persons claim that spin lives in some P^2. Construct a Moebius strip as usual from a rectangular piece of paper and glue it with a twist together to having the spin vector as orthogonal interval between the two boundaries. Two is wrong, that is for a cylinder, here its is only one circle, and moving the spin by 360 degrees around the strip you get its lirst location from upside to down. This is called nonorientable for a surface like P^2. It has the strip inside. The P^2 use is also for deuteron having two nucleons inside a ball surface. The ball surface is an atmospherical shelter of it towards its environment where it exchanges at six poles its inner with outer energies. In the hedgehog figure are drawn 6 hemispheres with input output vectors Ej for the polar energy exchange in the middle. They have also changes in their orientations like spin. The hemispheres are made to a P^2 by projective identifying on their bounding circle diametrical opposite points $-p \equiv +p$. The Ej can change when needed on these P^2 their orientation in space. Absorbed or emitted are beside heat E(heat) green, frequencies E(kin) blue or electromagnetic waves/frequencies EMI, also GR waves or particles can be absorbed or emitted as E(pot) turquoise, electrical charges are quantized and their potential EM(pot) red prefers often in the atomic range to change Bohr radii of their inner energy location and send out or absorbe suitable EMI frequencies for an equlibrium inner state, magnetic energy E(magn) yellow has conic field quantums and sets its stable energy level by the known parallel space arrangements of the magnetic momenta for getting a deuterons or nucleons magnetic momentum. E(rot) magenta as rotational sixth‘ energy is at a last hedgehog pole.

III. Potentials, Leptons and Symmetries

The neutrino mass GF is discussed later on. In another application as 6 roll mill the coupling of the color charges with energies is used for a common potential in deuteron which is demonstrated as a flow, for instance of plasma, polymer or water driven by 3 motors POT, SI, WI each driving two rolls. Adjacent rolls have opposite orientations for their rotation. In this arrangement the *rgb*-graviton whirls rolls are on the upper right in figure 6 and the duals at lower left. The Heisenberg uncertainty pairing 1,5 red turquoise is for POT, 2, 3 green magenta for SI and 4, 6 yellow blue for WI, in the hedgehog it is along the x- or y- or z-axis, coupling a coordinate as interval Δu with the inverse interval 1/Δu as derivative of a function f(u) in this coordinate. As functions are used the exponential function exp (also in several variables), the real or complex logarithm (for potentials a/r, a constant, r radius) and polynomials or their fractions for symmetries like the dihedrals or Moebius transformations.

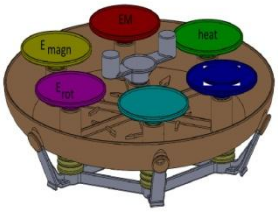

Figure 3 6 roll mill for SI with 6 color charge energy forces as rolls

The author suggested that the neutrino oscillation may have the same rotor setting by rotating its mass as force vector with its momentum in a neutrino rotor. The quarks in a nucleon triangle are replaced by a Gleason frame GF measuring triple having three mass weights not length as measure attached for the possible three masses of neutrinos. There are a lot of pseudo-wave like particles in physics ending all with ...on like phonon for heat having no spin. - Name one *neuon* which makes the neutrino wave like change in time on its world line spin like between the neutrinos three observed masses. The base matrices have determinants with the + sign for right hand rh-screws antineutrinos, with the – sign for left hand lh-screws neutrinos. Sometimes this can be a pendulum motion, going in one or the opposite oriented way
Neutrinos live in a third 4-dimensional space. These spin, strong, weak 4-dimensional spaces arise as subspaces of the octonians where the coordinates ej are listed by their indices in 1234 for spacetime, 1356 for neutral leptons, 1456 for electrical charged leptons and a WI rotor. The SI coordinates are 123456 and rgb-gravitons are in the strong nucleon projection 356. The 123, 145, 356 are cross product Gleason frames GF in the octonians The 8 Gell-Mann SU(3) matrices have another multiplication table as the octonians. The GF physical system under investigation has for its triple coordinate presentation unit

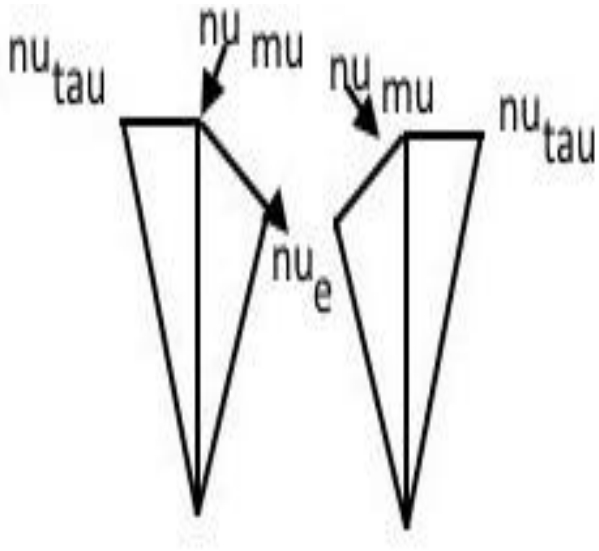

Figure 4 neutral leptons mass pendulum for its oscillation

bases as vectors which have only one number +1 or 1 and all other coordinate numbers 0. Write down instead of the 2x2 Pauli spin matrices σj for the three spin coordinates the above base triples on the rows of a 3x3-matrix for space coordinates having a determinant +1 or -1 for rh- or lh screws. After some calculations you start out to mulitply the matrices in order to find out more. As surprise you find 8 of them for the Pauli spin SU(2) quaternionic matrices +σj, -σj +id, -id used in physics. The multiplication table is the same and you have orientation included by the matrices determinant.

Pauli spin, neutrino oszillation and *rgb*-gravitons are whirls, neither waves nor particles in the usual sense. They have a third energy character which shows up in experiments.

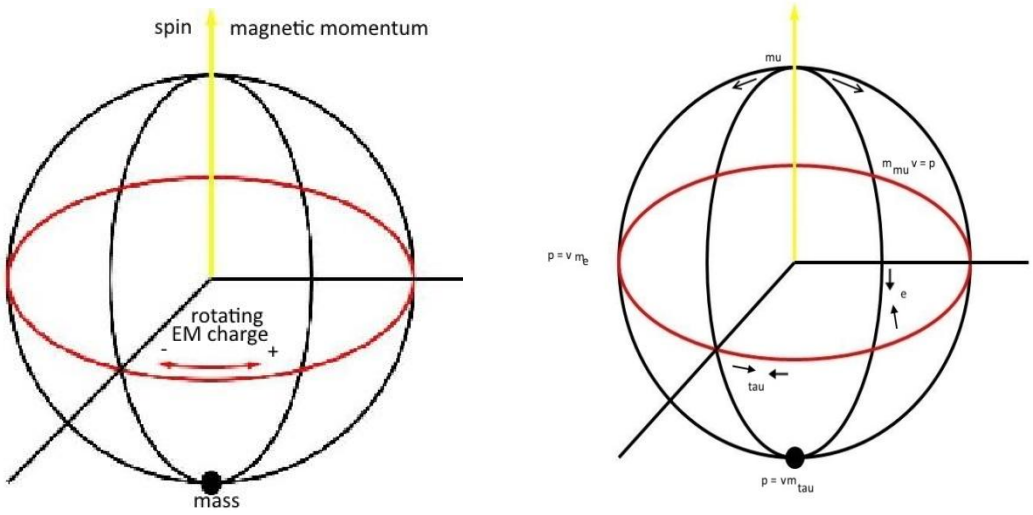

Figure 5 Hopf S^2 location of EM charged leptons, neutrino mass oscillation in time: no oscillation for a measurable mj, for instance j =1, oscillations for mpo turn from m2 to m1 (m2 is measurable), oscillation for cw turn from 3 to 1 (m3 is measurable)

In whirl like presentation, the Hopf sphere S^2 for leptons is used. The EM charge (figure 5 left) is rotating on a latitude circle, spin plus gyromagnetic attached magnetic momentum is on the north pole and at rest is at the south pole a mass scalar. For neutral leptons either a pendulum motion can change the measurable mass vector with masses m1 for νe, m2 for νμ, m3 for ντ or the change is as in figure 5.

POT is a driving force in nucleons and has as particle presentation the quarks with one charge pole for the EM and a second pole carrying its mass weight. In 1-dimension a quark is a lemniscate with 2 poles as foci. This is projective: in a projective real plane P^2 let two intersecting lines be closed at infinity by two points and move the line at infinity in order to get a lemniscate for quarks in the finite part of P^2.

IV. Spaces

Beside pairings of color charge energies, the cross product GF triples etc. it is useful to look in which subspaces of the octonian 123456 space the systems live.
The quarks POT Heisenberg uncertainy 15 lemniscate EM, mass pairing is in a Minkowski space view projective: take in a P^2 two intersecting lines, for instance r^3-c^2t^2 =1 (r radius, t ime, c speed of light) and close them at infinity to the lemniscate. The Minkowski metric is as $ds^2 = dr^2\ c^2dt^2$ projective. The quarks can be considered as particles for a common electrical and gravity potential POT which as field is 5-dimensional according to [12].

The conic rotation angle of spin cones and angular momentum cones is due to the HU 23 angle-angular momentum. The 234 subspace has for this two angles and time as coordinates.
The subspace 456 can be used for the cosmic speeds thresholds. 4 is setting the thresholds, 5 is setting the GR potential in form of the first cosmic speed and as limit for free fall of a mass system P towards a central mass system Q, 6 is using a Schwarzschid radius Rs for the second escape speed of Q where no GR interaction for a system P in motion exists It makes also the general relativistic rescaling of the weak WI and electromagnetic EM Minkowski space metric to the Schwarzschild curved metric. In five dimensions a model [12] exists which linearizes this in a projective real space. It unifes in this book the 5-dimensional vector space gravity GR with electromagnetic EM potentials to a common potential POT.
Without refering to color charges, in the weak WI 4 roll mill 1456 the SI rolls 2,3 are deleted. For the weak potential flow the roll 6 has then to change its orientation such that adjacent rolls have opposite orientation for rotation. In a coupling of rolls, the 1, 6 rolls can act for the Bohr radius change of an electron when EMI light is emitted or absorbed. This is then generated by the usual main quantum number rescaling from the electrons angular frequency in form of light frequency with the rescaling Rydberg constant. A possible action of the 4, 5 rolls can be that the stronger magnetic field quantums are able to make a decay of *rgb*-gravitons, weakening this way gravity, and the decay 24 decy makes from g phonons (heat), transfers b (momentum) and also energy

(oscillations for instance). The 15 HU pairing was for quarks. The 14 pairing is for magnetic field quantums with EM charge in $\Phi 0 = h/2eo$. The 56 pairing was above extended to the 456 subspace. The 56 projective plane is also for the Einstein energy transfer in $mc^2 = E = hf$ between mass and frequency as line. It closes at infinity to a circle. All fibers of the fiber bundles S^3 (Hopf), S^5 are a S^1.

Another trivial fiber bundle is S^1xR, R a real line for a cyclinder with cylindrical coordinates for EMI. The GF triple is 167 with the octonian 7 coordinate added as cross product to the SI coordinates. 7 is the rolled Kaluza-Klein U(1), S^1 circle in an osculating plane with $r \cdot \exp(it)$ coordinates. The R line is on 1. frequency $f = 1/\Delta t$, t time, of EMI waves is on 6, adding time to the subspace 1467. On the central R axis is t = z, z the space coordinate 3 as world line for EMI (subspace 13467, projective normed). The new 13 pairing is for circluar cw or mpo rotations. The height of the helix rotation of the charge as point for the freqeuency energy is λ as helix wave length of EMI for one winding. The helix has the parameter presentation in spacetime as $x = r \cdot \cos t$, $y = r \cdot \sin t$, $z = at$, a constant (subspace 123467). The new 26 subspace is for the transfer of angular $\omega = 2\pi f$ and linear frequency f. The new 12 subspace is for generating complex numbers as $z = x + iy = r \cdot \exp(i\varphi)$. Since EMI shows relativistic mass the EMI space is 1234567 where the space extensions are in all cases due to taken the appropriate cross product, except for 12.

For getting the octonians the cross product to this space is taken as octonian e0 coordinate. It is for setting a vector with an intial point, a direction and for a unit measure (meter, mass, second,...) carried on its line in the octonians. It has many uses beside setting the input output vectors on the hedgehog. Vector fields are mostly 5-dimensional.

References

[1] G. Kalmbach H.E., MINT-WIGRIS, MINT Verlag, Bad Woerishofen, 2017,
available under: https://www.scholars-press.com

[2] G. Kalmbach H.E. with U. Eberspaecher, MINT-Wigris Tool Bag, Bad Woerishofen, 2019

[3] https://en.wikipedia.org/wiki/Dihedral

[4] A. Beutelspacher et al., Projective Geometry, Cambridge Univ. Press, Cambridge UK, 1998

[5] M. H. Seymour, Quantum ChromoDynamics, in arXiv hep-ph/0505192v2, 9 Oct 2010 and CERN-2010-001 proceedings 2009, pp. 97-143

[6] H. Georgi, Weak interactions and modern particle theory, Dover Publ. Mineaola, 2009

[7] G. Kalmbach, Quantum Measures and Spaces, Kluwer, Dordrecht, 1998.

[8] Many related MINT articles and parts of books in the 104 items long list of the authors (mostly scientific) publications. Often they are stored in the internet and can be downloaded or are available in the authors MINT (Mathematik, Informatik, Naturwissenschaften, Technik) book editions, vol. 1-39, 1997-2019, - the Deutsche Nationalbibliothek Frankfurt/M.

[9] G. Kalmbach H.E., Deuteron States, Nessa Journal of Physics, 2017, vol. 1, issue 2, pp. 1-17 and further articles of the author, partly quatoed under [10] .

[10] Projective gravity, in: ijcrr Internat. Journal of Contemporary research and review vol.9, issue 3, 2018; also in: Journal of Lasers,Optics & Photonics 2017proceedings;
Deuteron States Model, in: Journal of Lasers, Optics & Photonics, vol. 5, issue 1, 2018; Generation and annihilation, J. of Physics & Astronomy, vol. 6, issue 2, 2018; Collisions of mass systems, Intern. J. of Current Innov. Research, vol. 4, issue 6(A), 2018; Octonians for Astrophysics, J. of Astrophysics, vol. 1, issue 3, 2018; Energies basic numbers, Advance Research J. of multi-disciplinary discoveries, vol. 29.1 2018; Einstein metrics and two projection maps, Journal of modern and applied Physics, vol. 2.2, 2018; Octonian System, Acta Sc. Women Health, vol. 1, issue 2, 2019 (10 pages); View physical systems new, Acta Scientifica Publ. 2019, vol. 2, issue 7, (7 pages)

[11] Internet video under YouTube: Moebius Transformations Revealed 2014

[12] E. Schmutzer, Projektive einheitliche Feldtheorie, Harry Deutsch, Frankfurt, 2004,