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Charge Geometries

Gudrun Kalmbach HE

Mathematic Informatics Naturewissenchaften, Technic, Germany

Corresponding author: Gudrun Kalmbach HE , Mathematic Informatics Naturewissenchaften, Technic, Germany, Tel: +49 (0) 30 25418-499; E- Mail: mint-01@maxi-dsl.de

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In the MINT-Wigris research project the view of charges as scalars located on points in Euclidean is revised. The geometry for charges can be higher dimensional than 0. In a projective setting, a correlation in a real projective n-dimensional space can set it on a dual (n-1)-dimensional subspace and a quadric is describing those points which are incident with their hyperplane.

The Hopf geometry allows the blow up of electrical or neutral leptonic charge to be as point on a latitude circle of a 2-dimensional Riemannina Hopf sphere S^2. The point charge is set in motion and fills a circle. Applying the inverse Hopf map, a 1-dimensional loop/circle is for the location of the point charge and this 45 degree leaning circle towards a central core C fills out a torus surface with core C. The circle C is the location of a the leptons mass as fiber. In S^2 mass is a scalar attached to the south pole of S^2. The Schwarzschild radius Rs of the lepton can be concentric to C in the same plane as C, It can be of use for a radius inversion of the lepton when it is hitting other particles. For instance, if an electron and its neutral antiparticle hit, they are annihilated, and their energy produces a W- boson of the weak interaction with a 3-dimensional Hopf sphere S^3 for the new energy location. The Heegard splitting of the W- boson generates then two new particles according to the physics Feynman graphical diagrams. The mass of W- can sit as 1-dimensional circle and core inside S^3 as retract of a torus surface inside W. The decay of W- in two particles is then by splitting W- along the torus surface into two brezels of genus 1. For higher genus Heegard decompositions of S^3 the torus surface is replaced by orientable, 2-dimensional surfaces of genus n≥2. Quark brezels with n = 2 occur as Lissajous figure when two frequencies hit in integer proportion 1:2. The obtained lemniscate is a retract of the 2-dimensional brezel surface having two foci. For the case n = 3 is suggested a nucleon triangle having at its vertices three quarks attached. Their three color charges red, green, blue are exchanged in pairs by intermediate gluons, not weak bosons and are for the confinement of quarks in the nucleon. Without a gluon exchange quarks decay. In the strong SI interaction SU(3) symmetry the six color charges are are for 8 gluons as the GellMann generating 3x3 matrices of SU(3). The blow down leptonic SU(2) symmetry has 3 weak WI bosons as Pauli 2x2-matrix generators which define the Hopf map. It projects the

4-dimensional spacetime sown to the 3-dimensional Euclidean space R^3 with the unit sphere S^2 inside. A projective dual relation for the case 3,4 dimensions is possible in a 8-dimensional projective space. The eight SU(3) dimensions can be useful for this. The SU(3) geometry is a toroidal product of a sphere S^3 with a 5-dimensional sphere in S^3xS5 . It is a trivial fiber bundle. If single color charges are drawn as vecors in rotation they can have their color charge located on a cones surface.

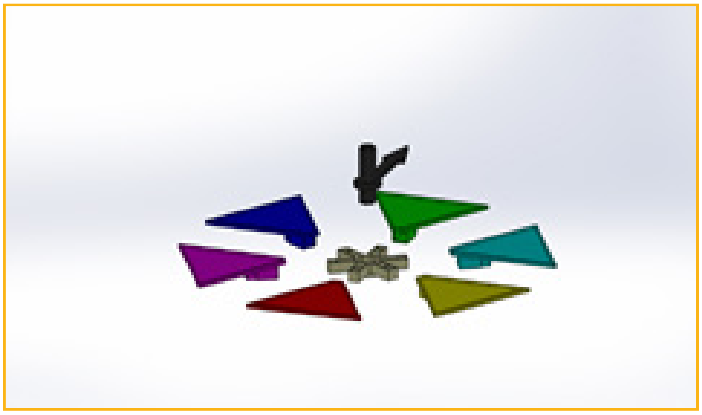
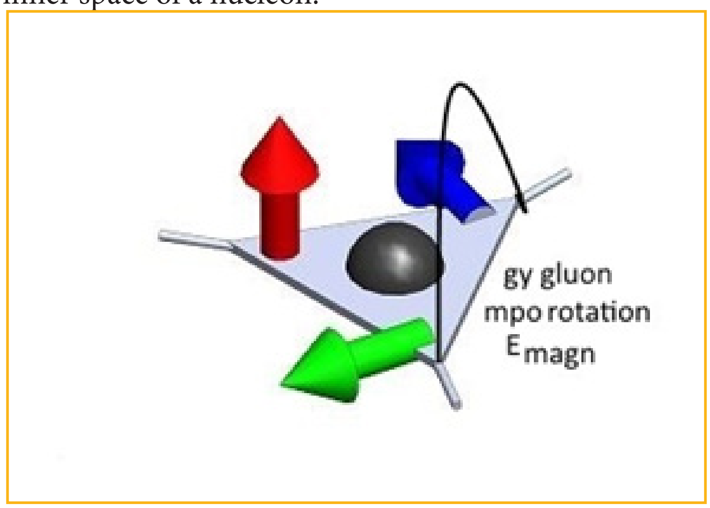
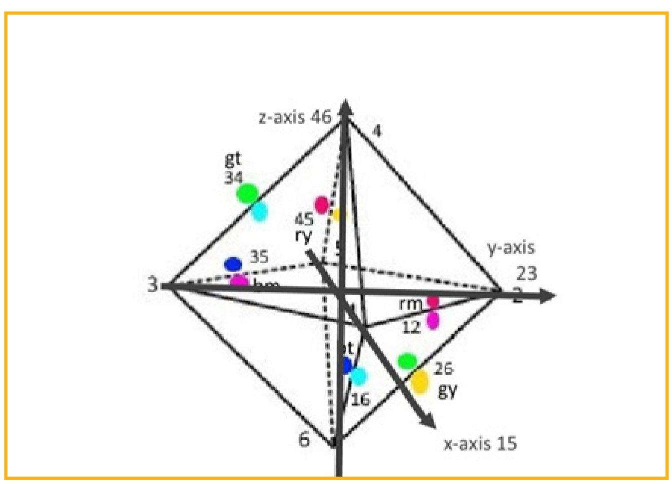


Figure 1: Colour Charges are drawn as vectors.

In MINT-Wigris this is obtained by the G-compass which has a needleand a circle as boundary of its flat disk. The needle can rotate only in six discrete steps of the sixth‘ roots of unity and put in rotation on the six disk segements the color charges red, green, blue and their duals. When decaying into the segements, their two bounding needle vectors sides are identified to a cone whirl. Whirls can have superpositions. When the three nucleon color charge whirls do this, an rgb-graviton for gravity GR and the nucleon is generated. It blows up the quark triangle 3-dimensional to a tetrahedron with the S4 symmetry. The triangle has a factor group D3 , the symmtery of the triangle. The factor group is obtained by using the normal Klein group Z2xZ2 of S4 for the equivalence classes, each having 4 elements. In this case a new measuring apparatus is generted, called Gleason operator. As its 3-dimensional frame GF serves the spin-like rgb-graviton whirl. It setfor instance in orthogonal a triple an x-axis on +x through its red color charge whirl, a y-axis on +y through its green color charge whirl and a z-axis on z through its blue color charge whirl. These are then local coordinaes, not the environments xyz-space coordinates. The location of the nucleons mass is at a barycenter inside the nucleon triangle. If it is determined by barycentrical coordinates, the three color charge whirls cones have an inner dynamics. The red whirl can be at one triangle vertex and is directd as normal to the triangle surface. In rotation it sets the two sides of the triangle with red at the common vertex vector in a gluon exchange motion and the sides trace out another cone with a bisector of the triangle as barycenrical axis through the red vertex. The cones bounding circle is orthogonal to the traingles plane. Color charges of quarks are changed at the triangle vertices. In the next rotation of this kind, generating a second barycentrical coordinate the cones tip has the green vector attached. In all six dynamical rotations the blue vectro moves in every step from one vertex to the next such that as momentum it ends at every vertex in opposite direction. The vertices are fixed points in the inner space of a nucleon.





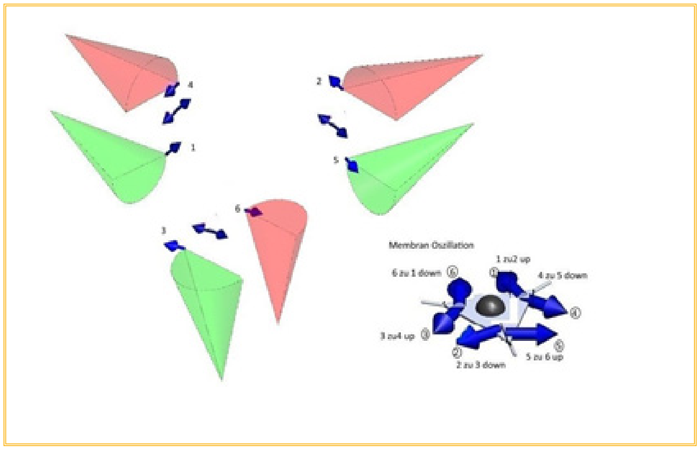


Figure 1 nucleon triangle with the three vectors for red, green, blue attached, at right a dinucleon as deuteron atomic kernel where the two rgb-gravitons tirple bases are on +x+y-z and on -x-y+z. The gluon exchange is marked on the triangles sides; below: half cones generated by the red or green tips for rotation and at right the fixed triangle vertices by opposite orientated momentum vectors. The case for setting the nucleon barycenter is only geometrically solved as intersection of the three (triangle reflections) barycentrical coordinates. In QCD the mass computation for the nuceon is done such the the quarks masses contribute only 10 percent of its mass scalar. 90 percent arise through the Einstein transformation mc^2= hf from frequencies of inner velocities/motions and anteraction energies. If a Higgs field sets trough Higgs bosons as nucleons mass it is not computed like the one mass of macroscopic matter. It is measurable as a point charge and a Schwarzschild radius Rs can be generated for the nucleon. For the rgb-graviton is postulated in the MINT-Wigris model which is not SI/QCD the 90 percent mass/frequency QCD computation is due to a special relativistic mass increase m = m0/cos β. It generates a group speed v<c for its momentum p =mv with which the nucleon and deuteron parts move in its environment. The cosine factor is the general relativistic factor with $v2^2/c^2 = \sin^2\beta$ = Rs/r, v2 the second cosmic speed of the system. The scalars for the rgb-graviton numbers a,b,c in $f(x,y,z) = ax^2 + by^2 + cz^2$ are then a maximum value a = cos β, b = sinβ and a minimun as first cosmic speed c = v1/c = v2/√2. The barycentrical midpoints of the quark triangle sides are on a touching inner circle of the triangle and rotate on it with the blue vectors motion. The red half cone rotation is always cw clockwise, the green mpo in the counterclockwise direction. Their three circles area harmonic oscillation of the triangle sides and are interpreted as a generated sound whirl/wave similar as a vibrating string does it. The 3-dimensional blow up bubble of a nucleon triangle in spacetime is due to a S5 fiber bundle of the SI geometry. This sphere is projective normed by a fiber S1 to a complex 2-dimensional space CP^2 for the nucleon or deuteron. Its inner spacetime dynamics is an SI rotor as described above in figure 1. Inner charges are located in points like a barycenter, attached to vectors as a measuring unit for some energy or located on an area as on the membran oscillating half cones red or green.

For gravity with rgb-gravitons a contracting/expanding of the bubble radius is postulated. It can alternatively be seen as changing a distance of the bubble in higher dimensional space towards its projection into its envirronmental spacetime. The Hopf map h provides such a projection into a plane E parallel to the tangential S^2 tangential plane at its south pole. First h maps with the Pauli matrices the complex coordinates z1 = z +ict, z2 = x +iy onto the space coordinates for S^2; then the stereographic map is applied and maps S^2 down to the projective plane E with [z1/z2,1] coordinates and a point at infinity [1,0], z2 = 0, for the north pole of S^2. The change in distance is by the degenerate numerical D3 triple ½,(-1), 2 of basic spin values for fermions, bosons and the rgb-graviton.

Figure 2: G-compass and its decay into six color charge segments.

In a second computation for a spiralic contraction/ expansion it is postulated that a vecotr of length 1/√2 from the cosmic speed scalings is spiralic projected upwards on a ray from its horizontal loacation onto the spirals ray in an angle of 45 degrees and this is repeated again. By Pythagoras the second length after one projection gives the length 1 of the vector, after two the length √2 and the squared length proportions

proportions are ½:1.2. This can be the color charge energy strenght on a conic surface, If cut to a disk segment in the G-compass (figure 2) the area measure for this equals the length of a real cross product spin vector orthogonal to the disks plane. Quarks, nucleons or atomic kernels get an eigenrotation with spins of these lengths, and bosons, the rgb-graviton also.

The spins are also Gfs like the rgb-graviton. They measure length with a = b = c and scaled values with the Planck number h/2π. The choice of h can be attributed to frequency energy as E = hf with a unit winding for f = ω/2π. Photons of the electromagnetic interaction EMI have quantized energy E =h for their particle charcter and bosons normed (whirl) spin 1. As wave photons are using the exponential function exp(iφ) where for harmonic oscillations the polar angle is replaced by (ωt+xk+φ0) with a phase angle φ0, time t, k wave numer for inverse wave length and the wave is traveling in +x (or in -x) direction in space. The geometrical location for photons in timeexpanded frequency/energy is a helix line on a cylinder with the photons world line as cylinder axis and with one winding of the helix for E = h. The radius of the cylinder is its amplitude. Observable is in this case only a real cosine or sinus projection into space.

This uses the Copenhagen interpretation of quantum measures: on system is an apparatus (here the spacetime environment) and measures the second system in a relativistic motion which can be a combination of special and general relativistic rescalings. The nucleons mass rescaling did use a general relativistic scaling. Photons have only relativistic mass and mass 0. They move with speed of light c in the universe as empty spacetime vacuum. Their world line can be on the surface of a Minkowski cone $r^2 = c^2t^2$. In hitting matter or other energy at a surface they can absorb or emit part of their frequency energy and break their world line for another Minkowski cone ind spacetime. The absorbtion of energy occurs as double lensing when light moves close to a huge mass center like a star. For the redshift rescaling of its frequency the wave length λ in λp = h, p momentum can be rescaled with a time dependent funcion special relativistic mass rescaling m(t) = g(t)·m0 /cos β as done for the nucleons. Photons spectral series arise form being emitted by electrons in an atoms shell. Their quantized frequency is due to a scaling of electrons circular ω frequency. The Minkowski cone world line of EMI uses the GR rescaling with the Schwarzschild factor for the rgb-gravitons potential action g(t) on it. In astronomy the claim is for the big bang sound in the universe and this is a kind of pressure on the decreasing EMI frequency for g(t). For matter systems line a star rotating ab out a central sun Q. This pressure can be blamed for the spiralic constant general relativistic angle φ0 added to the stars Kepler ellipse obit where the ellipse diameter is shifted by φ0 in one full revoluion. The star P orbit is then a rosette not an ellipse and the diameter is between two concentic circles about one focus of the ellipse on which the stars nearest and farest points towards the sun are located.

MINT-Wigris explains these three Einstein findings not as an empty spacetime curvature. His energy-momentum computation is necessary since the Rs constant for the Schwarzschild metric cannot be computed otherwise. Empty spacetime without energies or coordinates however is not involved, only metrical rescalings of local generated coordinates about a sun, star or a big bang sound pressure in measuring a second systems distances, frequencies or (relativistic) mass. The Copenhagen interpretation uses as measuring apparatus for rosettes the radius r distance |QP|= r unsymmetrically in reversing the observer to |PQ| = r – Rs. The projective normed quotient is due to a central projection of GR and is a Moebius transformation MT with normed 2x2-matrix G of order six for the G-compass. Applying rescalings by the Minkowski metric is also due to reversing the role of an observes coordinate system carrrying measure units in a cosine angle towards a coordinate system in motion of the measured system (Figure 3).

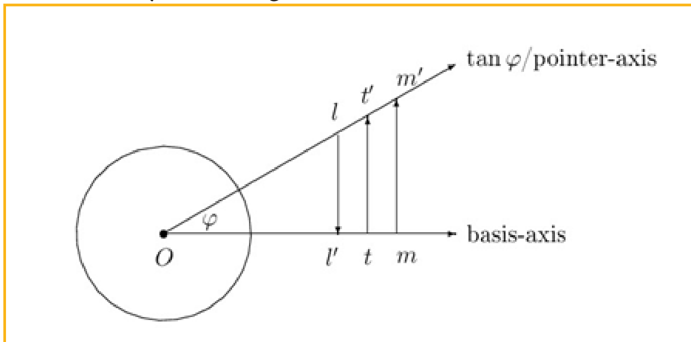


Figure 3 : Minkowski watch.

Charge geometries include other measures like the GF triples generating a projective operator for rescalings of metrics, other symmteries for physics as the MT and other spaces. Charges can sit as a scalar attributed to a point in space, a heat scalar as entropy in a volume with matter inside, generating pressure on the volumes surface. It can be an aray measure for a field transversally in motion through a loop, a magentic field strength differentiation/integration for induction. It can be a unit for a vectors length or a loop on which the charge sits (fiber) or rotates (a latitude circle on S^2). The loop itself can start rotating in space as observed for an electrical currents loop where through its area a magnetic field moves transversally and induction is a cross product as an angular momentum. In form of an energy for such a charge the G-compass sets on the color charge rd electrical potential, on turquoise mass/GR potential, on green heat, on magenta rotational energy, on yellow magnetic energy and on blue kinetic energy, also as momentum. Differntiation and integration for their functional descriptions belong to the weak and strong interactions operators as Pauli matrics or triangle symmetry members. They are for space dr or dx, dy, dz, dA area, dV volume and dt for time. Sometimes speed differentials dv are used and the researchers can add more. The matrix operators multiplication in symmetries are mostly different. The signed 8 Pauli matrices have quaternionic multiplications, the SU(3) gluon matrices multiplications not that of the octonians, used in MINT-Wigris by doubling up the quaternions through the Cayley-Dickson construction in [1]. For the use of octonians is mentioned that the coordinate e0 is for a compass needle which sets the units for measured energies in meter (e1), kg (e5), Ampere (e1), Volt (e4), Kelvin (e2), angular momentum radians (e3), inverse seconds/frequency (e6). The octonian e7 coordinate is rolled to a Kaluza-Klein circle U(1) for the EMI symmetry and exp functions. The triple (ej), j = 1,2,3 is for space coordinates x,y,z, e4 is for time and (e5 ,e6) is a projective Einstein plane closed by U(1) at infinity for mass and frequency with the Einstein line $mc^2 = hf$ [2].

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