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HEDGEHOG BALLS FOR NUCLEONS

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Abstract

A decaying Higgs boson is theoretically described through the well-known biological bifurcation, here used for six energies generated. Electromagnetism splits form gravity. Generated are the strong and weak forces inside nucleons and deuteron P which carry six or four states by mathematically integrating force vectors. Extensions of symmetries and (6-vectors) coordinates are necessary to include for P the 2-sphere boundaries Moebius transformations which allow space-time poles, not used in physics today.

Introduction

In my articles (JPAM or [3]) and books I suggested a macroscopically running flow of the Thom's catastrophe elliptic umbilic EU [6], called 6 *roll mill* for a new energy potential distribution inside nucleons, may be also in other parts of the universe U. It works in my model as extended interaction complex EIS coordinate operator space $\mathbb{C}^3$ with matrices and energy force vectors for energy transfer and measuring units attached to coordinates. Since Higgs bosons H are detected in CERN, July 2012, I use this for my bifurcating evolution (last Figure) of physical energies and forces. It explains, why fermions in nucleons and leptons

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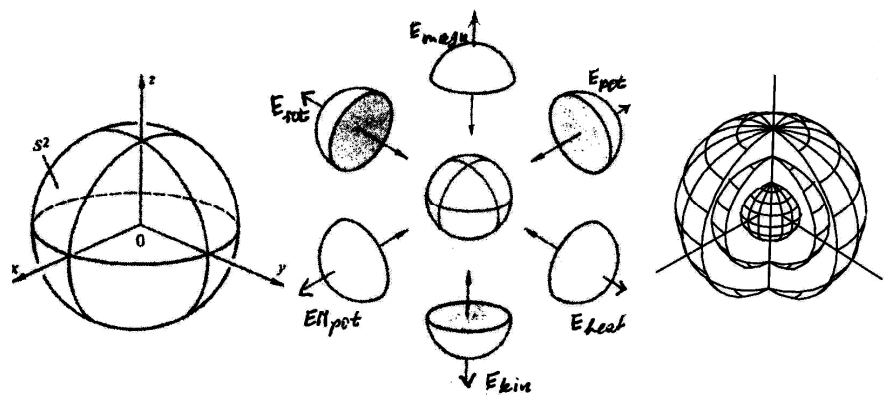
(electromagnetic EM e_0 or neutral EM charged) are observed in U as stable systems arising from H decays.

Take a compass, a sheet of paper and draw a circle S^1 of radius 1, set a horizontal line through its midpoint O; draw with its compass' opening angle as radius 6 points P_j on the circle at 60^0 to its neighbours with $P_0 = 1$. As 6th roots of unity, they provide the 6 EM charges of quarks and leptons, normed to $\pm 1/3$, $\pm 2/3$, ± 1. For the 6 color charges of quark I postulate 6 whirls like the experimentally found magnetic flow quantum ϕ_0. Draw for this a 2-dimensional Riemannian sphere S^2 with center O, *xyz*-axes for space as in the figure at left, take



S^2, Hedgehog, radius scaling of spheres.

a parametrization of S^2 by 6 color charges half-spheres such that the Heisenberg uncertainties are listed on opposite sides of the three axes (middle figure). Attach to the 6 intersection points of S^2 with the axes 6 force vectors for the energies EM_{pot}, E_*, $* = heat, rot, magn, kin, pot$ as indicated. They carry also the quarks 6 color charge whirls. The Higgs masses are distributed for leptons to EM_{pot} and for r, g, b red, green, blue color charges or their complementary color charges to $E_{kin, rot, pot}$ as linear and rotational momenta and gravitational force (GR potential). The 6 points marked on S^2 are poles, space-time singularities of Moebius transformations MT on S^2 with the attached vectors as eigenvectors. MTs have one

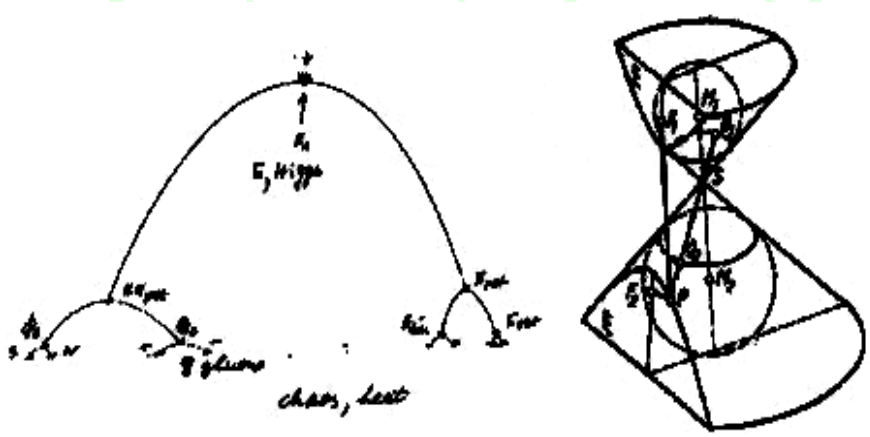
or two complex poles (including $\infty \in S^2$). As MT's I use *id* for the radius scaling, occurring for instance for the main quantum numbers of electrons in an atom's shell (figure right). For θ, *z* (also spherical coordinates are used) I use α^2, σ_3, a flat rotation about -120^0 and the third Pauli spin matrix. The first Pauli spin matrix σ_1 belongs to *r*, *x*-coordinates and the second σ_2, together with the matrix $\alpha\sigma_1$ to φ, *y*-coordinates. α is a flat rotation about $+120^0$ and belongs to a new frequency coordinate of EIS *iu*. To E_{pot} belongs a new mass coordinate of EIS *iw* and also σ_1 as MT. The new symmetry group for physics with nucleons, leptons developing from *H* are in my model all Moebius transformations, complex 2×2 matrices, acting on bag boundaries of energy carrying systems $S^2 \sim \mathbb{R}^2 \cup \{\infty\}$ as complex line and projective complex closure of a 4-dimensional space-time.

The Pauli spin matrices σ_j are just one example; the MTs come in systems like this one for Pauli spin. Their quantum mechanics symmetry group SU(2) allows the Hopf geometry of the map $h : S^3 \to S^2$, S^2 which I use for the toroidal geometries of leptons as described in [3]. Beside the 3-dimensional Pauli spin, the new MTs above (disregarding *r*, *id*) are a 5-dimensional spin for nucleons inner energy integrations and exchanges. The integrations are performed as in the complex residuation theory by circular, flat rotations about a pole. The rotating eigenvectors can point towards the outer part of a local space-time in $\mathbb{C}^3$. A macroscopically running, hand driven machine shows that the MTs of the triangle symmetry group for 3 quarks in a nucleon (including *id*) runs in a time 6 cycle. Pauli spin runs, for instance in a deuteron, as a time 4 cycle belonging to the weak interaction *WI*. The 6 cycle belongs to the strong interaction with exchanged gluons between paired quarks and GRW, gravity with phonons, inner heat and gravity energy exchanges.

For the cycles in time, I use difference equations, replacing differential equations for nucleons as (physical) systems. $z^6 - 1$ and $z^4 - 1$ are the characteristic equations for them. They have 6 or 4 states of the system as solutions. The confinement of 3 quarks in a nucleon is described special relativistic synchronizing two inner nucleon SI, WI coordinate systems $EIS_{1,2}$ in motion against one another. The barycentrical GRW coordinate system shows radial contraction and expansion of a quark triangle while in WI this is observed as a spiralic motion. This model can

also be applied to spiralic galaxies. WI and SI are in escape speed from one another which allows through Kepler escape hyperbolas with two balls inside touching the hyperbolas conic two symmetry axes to compute through half of the cones opening angle (which varies with the distance between the two balls) Einstein's relative speed between EIS_1, EIS_2.

The measuring process is understood as in the Copenhagen interpretation by using Gleason operators T with EIS coordinates in $\mathbb{C}^3$. They provide through their matrix representation different (pseudo-) metrics, quadratic forms and probability distributions for localized energies in U and for linear subspaces of $\mathbb{C}^3$. They can have different dimensions, for the whirls, Pauli spin 3 or including time 4, for SI gluons 2, for WI bosons and photons/light 3, for nucleons and leptons 6. The T quadrics or toroidal products of scaled unit spheres in $\mathbb{C}^3$ are S^0 for dipoles like magnets, S^1 as U(1) symmetry for photons, S^2 for Hedgehog ball surfaces and the location of the force vectors where inner and outer Hedgehog space preferably exchange their energies. S^3 is the Hopf electromagnetic, WI SU(2) quadric, $S^3 \times S^5$ the SI SU(3) toroidal product of the former with the nucleon quadric $S^5 \subset \mathbb{C}^3$. Also other quadrics are in use, as in the Kepler orbits or the special relativistic Minkowski metric (a light cone). The latter is, non-linearly scaled to the Schwarzschild metric through the Schwarzschild radius of a central sun which is the only exception from the Gleason quadrics.



Evolution bifurcation, Kepler cone with hyperbolic escape.

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Note: Look up the elliptic umbilic, the GR wheel and the 6roll mill.

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