The proton, electron structure, its resonances and fusion products

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Abstract

A novel method for modeling particles and dense matter is presented. It departs from conventional physics based on point particles–masses, allowing to express all of their properties as products of complex-interacting electromagnetic (EM) flux/waves. Significant portions of standard physics based on dense matter interactions are completely redefined, which has unprecedented ramifications.

At the current stage of development this model can be named *SO*(*4*) *physics* (or *SOP*), as SO(4) is the symmetry group required for attaining a true understanding of EM mass interactions. SO(4) is used to the full extent of 5 rotations and therefore cannot be mapped to the Standard model (3 rotations). The exact relation between all known forces and how the mass of standard particles is structured and forms simple nuclei like ^{4}He and ^{6}Li will be shown. The model gives exact results and will challenge future measurements and methods to seek a even deeper insight into the structure of matter.

The main prerequisite for understanding SOP is a basic knowledge of topology and EM theory in higher dimensional space [1]. Additionally, a complete understanding of rigid body dynamics is required for correctly visualizing the evolving EM mass structures, and being able to think in at least 4(6) uniform dimensions will greatly ease the process. Conversely, trying to understand the model from a quantum-mechanical viewpoint will certainly be a hindrance. Nature cannot be modeled by a simple force/field approach.

1 Introduction

Three years ago the author started a ground-up search for the basic laws of Nature responsible for the formation of dense nuclear mass. The motivation behind this task was the fact that for 90 years physics has failed to explain the fundamental relation between mass and first-order quantities like magnetic moment, charge and magnetic radius. The belief that mass and its structure can be only understood at high energies has led to a model [2] that is akin to a stamp collection, and of contemplative value only.

The main obstacles to finding a new solution were the common belief that general relativity is valid for all space and time, and that the Maxwell equations cannot be used

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to model dense mass. As will be seen, both assumptions are wrong. The universe is filled by EM mass—photons—and thus it is no surprise that dense mass is pure EM mass too. It is obvious that stable particles feel no time, as they eternally exist, and if waves form the mass, then these "waves" must be strictly of rotational–symmetrical nature only, which is not given by the current standard Dirac (potential) -like modeling.

EM mass shows two forms of interaction that are within certain limits "symmetric", as a moving charge may generate a field and a changing field generates charge. The nature of this interdependence invalidates the use of a strict operator-based solution for dense matter physics, as its calculating power is restricted to closed systems, and a complete one (including the mathematical operations +,-,×,÷) is required. The first and simplest suitable mathematical space for a successful description of dense mass is the symmetry group SO(4), with the center of symmetry given by the full Clifford torus (CT) orbit structure, all orthogonal construction. Energy (i.e. mass) is stored in a different number of rotations performed by coupling electromagnetic (EM) flux. This EM mass strictly follows classic—higher dimensional—rigid rotor mechanics and couples Biot–Savart like with a topological and most of the time virtual (massless-topological) charge.

Most solutions shown in this paper have a very high numerical precision, which might be considered "numerology" by skeptics. But eventually, the gravitational constant (section 11) will emerge only using the basic electron–proton form factors of dense space. The gravitation mechanism is thus found using basic logic and experimental evidence for its derivation. The internal structure of the most common particles (e, p, n) and their fusion products (n, ^{1}H, ^{2}H, ^{3}He , ^{4}He, ^{6}Li, ^{7}Li, ^{12}C in appendix A) will be shown. At the same time, the split of the proton into so-called resonant masses (kaon, pion, muon) will be also shown. Of course, a few paragraphs will be focused to the accelerated proton resonances also known as Higgs masses, as these resonances can be derived too.

The beauty of the new model is finally expressed in the naturally-evolving wave factors (e.g. of hydrogen), which are 1, 1, 2, 3, 5 and explain the relationship with Fibonacci and the Golden ratio and finally the Nature we all live in (Real modeling starts in section **??**.

1.1 Historical models

(*SM will be used as an acronym for Standard Model, and SOP as a shorthand for SO(4) Physics*)

Over the past ninety years physicists have held the belief that matter could be explained by quasi "looking" into it, which is the standard method used in Biology. There was never any reason given as for why matter should behave like a living cell composed of the very same matter. This process evolved into a plethora of so-called particles, many of which are only resonances of interacting EM masses. The "concept" of quark [2] as a building block of matter today must be called out as the most fringe idea conceived by physics, because by definition an EM resonance cannot be a form factor of a particle. It is not surprising that today it is still not possible to give quarks a concrete mass, deserving of this name. The error bar is up to 30%. Interestingly enough, the sum of two down and one up quark—actual masses—is precisely equivalent to the perturbative mass of SOP protons (owned by proton and neutron). Even more inter-

estingly, the perturbative mass of the proton has a 3-rotation structure which explains why SM calculations based on SO(3) logic still gives some useful results.

Therefore, it can be said that the current SM has been developed based on the interaction of electrons–protons with only the perturbative mass of the proton. The perturbative mass of the proton is about 1.2% of the total proton mass, and seen from this perspective it is clear why SM failed. Without any insight of the main proton mass structure, no real conclusion about actual physics of the proton can be drawn. The main mass part of the proton is a 4-rotation structure that is charge-neutral and only interacts magnetically under a symmetric excitation, which sometimes randomly occurs in collisions. This situation has never been modeled in modern accelerators, which are actually not needed investigate the proton structure. This can be done with a very simple low-cost experiment [3, 4] with input energies in the order of 1 eV. As will be seen, matter under higher topological symmetry can form magnetic resonances, which allow energy transfer causing nuclear fusion or even fission of a proton. Unfortunately, such topological symmetries are virtually impossible at higher energies. This is one more reason why SM investigations (e.g. at CERN) have failed to find new physics, as most data has been gathered from collision experiments. Nevertheless, these SOP magnetic resonances do have a counterpart in SM, where they are called the *virtual particle background*, which is usually modeled with the so-called Feynman diagrams.

The research in cold fusion or alternative fusion technologies [5, 6] will have a very deep impact on the future direction of dense matter and particle physics. It will be also seen that magnetic resonances explain all aspects of Rydberg matter and the new structure of dense hydrogen first found—and "patented"—by Santilli [7]. Dense hydrogen is "spin"-based matter, forming a condensate that researchers first claimed to be a Bose Einstein condensate (BEC). But dense hydrogen is stable up to very high temperatures, which is not the case for a classic BEC. Even an optical effect, the Goos–Hänchen lateral displacement of an incoming ray (photon) under total refection [8], may be now explained by the SOP toroidal resonant electron orbit.

1.2 How can a new "standard" physics model be found?

Initially only three questions needed an answer:

1. What is the exact dimensionality of the mathematical space we need for the new model?

2. What is the basic shape of particles?

3. How does mass compression work, when particles (proton, neutrons) join/fuse to form larger ones?

The first question was early reduced to the answer "at least 4 homogeneous *uniform* ones". The second question about the shape was easily answered by studying existing mass and radius data: the shape must be toroidal. The third question took significantly more time and brought the first breakthrough, when the 3 mass compression factors (called 1FC, 2FC, 3FC) could be finally identified, where the strong force equivalent factor, called 3FC, indicated 6-dimensional framework. (FC = flux compression).

Today there is no longer any doubt that $SO(4) = SU(2) \times SU(2)$ currently is the best suited mathematical space to describe dense condensed matter. This is based on

experimental facts which can be exactly reproduced by the model with the highest possible precision. The three flux compression constants have their classical counterparts and reflect the electroweak/electrostrong and the strong force, legacy concepts of SM. The basic connection between mathematics and physics is given by the proton potential folding factor 2FC, which has an exact representation as potential mass disposed of at the proton De Broglie radius. The other two factors (1FC, 3FC) depend on 2FC. Gravitation is on the other hand a residual force of the electroweak force mediated by a potential driven by the electrostrong force.

To explain the calculations, relations and sums of contributions in this text, small spreadsheet-like tables will be used, containing all steps in a condensed format. Real physics models, as explained, cannot be closed formulas—e.g. representing fields with a Hamiltonian density. Within this first non-perturbative core model covering highly symmetric situations, barely any advanced mathematics is required.

1.3 What others have tried so far

Einstein himself was convinced that a future model ought to be based on a homogeneous 4D surface with constant curvature. Unfortunately, he stuck to a single time dimension and ended up in 5D (4D, t) space. The model was finally elaborated by Kaluza–Klein. Einstein [9] himself also proved that general relativity (GR) is not a proper model for describing real world situations due to the fact that a field-only solution can only handle uniform point masses. Sadly, people never listened to him. Recent deeper findings based on classical reasoning were made by Klee Irwin [10], who found a modulo-6 structure in mass modeling, and the 6th dimension being the golden ratio. This is exactly one of the results presented in this work.

Of course, countless other models exist which are rooted only in fantasy, like the string theory or ether-like, infinitely small mass particles that all have the same common problem of not being self contained (internally consistent) and never showing any result.

1.4 What and who contributed to the model

The first ideas of mass–space-time compression were developed by Randall Mills in his GUT-CP book [11]. The value for the so-called Mills "sec" factor is very close to 3FC, but in the end "sec" is only based on measurements—and does not reveal its origin. Mills also motivated the author to only use Maxwellian and Newtonian physics to find an advanced model for nuclear and particle physics as he, to some extent, could explain what exactly is neglected in QM-based models.

The input data for the SOP model is entirely based on publicly available data like NIST [12], IAEA [13] or the nucleon spreadsheet of [14]. All calculations were made on open source software and Google helped to investigate more in depth related papers. The LENR library [15] paper archive was a constant source of inspiration. Online manuscripts like the one of Prof. Steven Errede (University of Illinois at Urbana–Champaign) about electrodynamics were helpful when performing calculations and modeling.

Another important contribution were the LENR experiments in Essex with Russ George, which the author could be a part of, that eventually confirmed many theoretical findings. Cold fusion is a magnetic resonance effect between magnetic masses,

which explains again one reason why SM failed to predict it, as SM provides no magnetostatic solution.

The importance of experiments should never be underestimated. A model without experimental backing has no value at all and gives the time invested on it the same feel of gambling. The chance of combining theoretical modeling with "true research" is very much appreciated.

References

[1] Robert Jason Parsley. "The Biot–Savart operator and electrodynamics on boundedsubdomains of the three-sphere". PhD thesis. Faculties of the University of Pennsylvania, 2004. eprint: http://users.wfu.edu/parslerj/research/dissertation.parsley.pdf.

[2] Mary K. Gaillard, Paul D. Grannis, and Frank J. Sciulli. "The standard model of particle physics". In: *Reviews of Modern Physics* 71.2 (Mar. 1999), S96–S111. DOI: 10.1103/revmodphys.71.s96. eprint: https://arxiv.org/pdf/hep-ph/9812285.pdf.

[3] Leif Holmlid. "Mesons from Laser-Induced Processes in Ultra-Dense Hydrogen H(0)". In: *PLOS ONE* 12.1 (Jan. 2017). Ed. by Christof Markus Aegerter, e0169895. DOI: 10.1371/journal.pone.0169895.

[4] Leif Holmlid. "Emission spectroscopy of IR laser-induced processes in ultra-dense deuterium D(0): Rotational transitions in D(0) with spin values s = 2, 3 and 4". In: *Journal of Molecular Structure* 1130 (Feb. 2017), pp. 829–836. DOI: 10.1016/j.molstruc.2016.10.091.

[5] Martin Fleischmann and Stanley Pons. "Electrochemically induced nuclear fusion of deuterium". In: *Journal of Electroanalytical Chemistry* 261 (1989), pp. 301–308. ISSN: 0022-0728. DOI: 10.1016/0022-0728(89)80006-3. eprint: https://lenr-canr.org/acrobat/Fleischmanelectroche.pdf.

[6] *Safire Project*. URL: https://aureon.ca.

[7] A. K. Aringazin. "Toroidal configuration of the orbit of the electron of the hydrogen atom under strong external magnetic fields". In: *Hadronic J. 24 (2001) 395-434* (Feb. 19, 2002). arXiv: physics/0202049 [physics.chem-ph].

[8] F. Goos and H. Hänchen. "Ein neuer und fundamentaler Versuch zur Totalreflexion". In: *Annalen der Physik* 436.7-8 (1947), pp. 333–346. DOI: 10.1002/andp.19474360704.

[9] Albert Einstein. "On a stationary system with spherical symmetry consisting of many gravitating masses". In: *The Annals of Mathematics* 40.4 (Oct. 1939), p. 922. ISSN: 0003-486X. DOI: 10.2307/1968902.

[10] Klee Irwin et al. "Quantum Walk on a Spin Network and The golden Ratio As the Fundamental Constant of Nature". In: (2017). eprint: https://quantumgravityresearch.org/wp-content/uploads/2017/07/quantum-walk-on-a-spin-network-and-the-golden-ratio-as-the-fundamental-constant-of-nature-7.17-final-reference.pdf.

[11] Randell Mills. *The grand unified theory of classical quantum mechanics*. 2016, pp. 565–590. ISBN: 978-0-9635171-5-9. DOI: https://doi.org/10.1016/S0360-3199(01)00144-6. URL: https://brilliantlightpower.com/book-download-and-streaming/.

[12] *NIST online line data*. URL: https://physics.nist.gov/cgi-bin/ASD/lines_pt.pl.

[13] *IAEA online nuclear data pages*. URL: https://www-nds.iaea.org/relnsd/vcharthtml/VChartHTML.html.

[14] G. Audi and A. H. Wapstra. *The 1995 Update To The Atomic Mass Evaluation*. Data taken from the 1995 update to the atomic mass evaluation. 1995. URL: https://physics.nist.gov/PhysRefData/Compositions/mass_rmd.mas95round.txt.

[15] Jed Rothwell. *LENR Library*. URL: https://lenr-canr.org.