

# The basics of physics (or why the standard model fails)

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Abstract:

We here will discuss basic physics = “physics of particles that form the universe”. Particles are the source of fields and carry some invariant, constant properties (like charge, mass) that are used to define physics. Unluckily the current so called “standard model” (SM) left the path of classical modeling and did introduce fields that have no real = physical counterparts. E.g. the so called 4-potential has no real source among particles as the two (E/B)field generators have no common point in space and e.g. the E-field of the proton is not linear in the near field. An other problem is the term mass, that shows a totally different behavior in macroscopic use compared to particle level use. We will explain why  $E=mc^2$  breaks down when e.g. the relativistic Dirac equation is used for describing proton proton interactions. There also exist quite a large number of experiments that debunk central “claims” made by SM. So does in general  $e^+/e^-$  annihilation not lead to two 511keV photons. The normal case are 3 photons, what fundamentally contradicts the symmetric wave modeling. Also nobody so far could measure a so called strong force that is different from the magnetic force...

At the end of the paper you should understand why SM is not a basic physics model and cannot be used to model particle internals.

## 1 Introduction

Basic physics = “physics of particles that form the universe”, to a certain extent, is in a big mess. More than 100 years passed and “we” still do not exactly know what mass is and how charge is generated. Thus these two basic elements of physics are still treated as **axioms**. Further all so called “great physicists” so far failed to unify all forces especially to unify Maxwell Physics with Gravitation. We also don't know the exact relationships between proton mass/magnetic moment/charge radius. Also missing is the understanding of fusion and gamma spectra etc..

On the other side the development of a so called general field theory, did bring a huge progress to mathematics in general. Based on this fantastic progress theoretical physicists did believe that they are very close to solve all problems of physics. The only thing that has been overlooked was the fundamental mapping problem between physics = reality and the mathematics itself. For the description of this mapping problem the full understanding of very basic mathematics models (category theory) is needed. The math is not high flying, in fact it's on the boring side.

As several mappings of some classic models in reality fail, we here will show why the standard model is a fantasy only. We will track the history of decisions, that did mislead the physics world to a state, where now just the believe in a model replaces a **basic physics** model.

One crucial step is the understanding of the category 'mass', that is the center of failure. Another cornerstone of failure are simple point symmetric gradient fields that in **basic physics** (physics of particles and their properties) have no place. An other tricky issue is the rotation mismatch of fields/matter. And last: Reality tells, that mass energy conversion very rarely is symmetric, which makes the bra-ket formalism a very bad fit.

Further about 3 years ago the author did complete the first iteration of SOP (SO(4) physics [9] ) that is able to explain all missing facts of basic physics with outmost precision.

### What is our intention?

We want help to **reestablish** the base of the most basic natural science that is physics. Physics is the heart of almost all engineering and for this purpose the simple classic axiomatic models work well enough. Even if some model aspects are not 100% correct, these do work and are called engineering models (e.g. QM – quantum mechanics is just an engineering model).

The first step, before learning a new more complete model, is always to fully understand what is wrong – or what are the limits - within the old model. Thus we also want to motivate young physicists to go back to the lab and to simply do basic experiments before they learn, that the force between two condenser plates is defined by the field energy...

In reality there are no static fields that contain independent energy. Fields need a source and if we separate electrons from protons, we generate field sources. Obviously when we place the sources on two distant plates the force is not defined by the field energy it simply depends on the number of field sources and their distance.

Indeed we can reverse the math and construct an analogy between field energy and force. But this tells nothing about the **real origin** of the force.

So one key point students should learn is: There is abstract physics, with abstract fields, that allows to draw complex conclusions (e.g. about energies), that, at the end for **basic physics**, only will have a value if the final mapping to **real field sources** is successful. Unluckily this mapping for the standard model (SM) does normally not exist.

As an excuse for the missing mapping usually gauging is applied in experiments. But successful gauging implies that you have full control of the H/L (Hamilton/Lagrange) functions at the exact gauge level. Unluckily for a proof of this you would need the missing mapping to real field sources. Thus so called successful SM models preferably work in the far field region, where a good match between distant field sources and **linear gradients** exists.

What the author did

After leaving physics for computer science the author– during his PhD. - worked on the basic mapping problem of mathematics to basic physics (hardware). The goal was to construct a fail safe provably correct computer one could use for automatic prove systems or highly reliable control systems. For reaching this goal the same ideas have been developed, we here are going to use to explain some mapping failures of standard model physics.

## 2 Today's (year 2022) state of basic physics

In this chapter we sum up the state of current physics and give a short overview why it is obvious that SM fails to describe real physics as shown in “recent” experiments.

Definition: Basic physics is used to describe the lowest layer of nature, that is particles including atoms and their structure.

We sadly must note that today's state of theoretical **basic physics** is no better, than we did see during the old Phlogiston period of chemistry. But things are much more complicated, than what we did go through in chemistry. In fact all parameters of our physics reference system, the famous constants like “fine structure  $\alpha$ ”, Plank quantum “ $h$ ”, speed of light  $c$ , mass of electron/proton and charge “ $e$ ” have been defined by mutual relations and thus are interwoven with the pseudo axioms mass (of electron) and charge. So we first must gain a more deep understanding of what physics really describes.

### 2.1 Basic engineering physics

Most of what today's physics teaches are engineering models. Point particles/charges point interaction are good examples of how we can simplify the problem of describing large compounds and finally achieve a deep understanding of its complex behavior. The 4 potential and kinetic 4-vector perfectly work in the **linear far field**, a prerequisite already mentioned in Jackson[14] 12.9\*.

All engineering models like QM/QED have a limited validity/precision and never can give a complete picture of a running process.. But for controlling our modern life, engineers have developed powerful control algorithms, that can successfully work around these prediction deficits.

So we here do not criticize engineering physics models as long as these are used to describe collectively acting ensembles of “point particles”.

### 2.2 A severe historical error

Over the last 130 years famous laws have been found and some basic constants (like “ $h$ ”) did show to be less related than others. One law everybody knows today – its attributed, wrongly, to Einstein – is the equivalence relation of mass and energy. The origin of this law was the progress made in electrodynamics and thereafter Poincaré found the famous relation:

$$(1) dm = E/c^2$$

This says a small increase/decrease of **acting** EM-mass is proportional to the change in (EM!- coupling) energy over the speed of light square. The Einstein version  $E=mc^2$  simply is logically and physically wrong as we cannot convert **all mass** “m” into energy = photons. In our real world, we only can sometimes directly transform an electron/positron into basic photon energy but never protons. So the Einstein version needs some limits added. There are more deep reason for this violation, that we will show below.

(Also the Poincaré formula is not perfect as the Energy is given in absolute form and thus itself “dm” should be read as a tiny change in mass-”action”).

Here most physicists stop to read and simply tell that  $E=mc^2$  has been proven by countless experiments. But nobody really did look at these experiments and did try to understand, what has been converted into what form of energy. This is how myths over time become unquestioned facts.

Such things happened because around 1900 nobody had a clear idea of what mass really is and how its structure looks like. This – the nature of mass - has been “answered” much later than 1900, but so far **only in minor parts**, and obviously still most of the answer is missing for most people.

So one thing we can keep: **Basic energy is photon energy**. All other forms of energy are stored photon energy. This fact, some 5000 years ago, was clear to most high cultures e.g. in Egypt or middle America.

## 2.3 A system of belief

One key problem of today's physics is its foundation on religion like axioms for mass, charge, fields, points. This, over a long time “of quasi worship”, had a big stagnating influence on the “physics system/establishment” that in some important parts shows the same behavior we find among religions. So people working in particle physics always discuss about items of belief e.g. (tensor-) fields, point masses but never question whether these fields, point masses are adequate for the situation.

It is a 1000% fact that e.g. an electron never can be a point particle (based on classic physics) as a magnetic moment disproves (falsifies) this proposition. So a point particle – in **basic physics** - always is an approximation e.g. mass point. We can say that an electron in most cases acts point like. But all measurements we do are based on electrons or electron electron interaction, what simply explains that we have no tool to look inside an electron and hence we can tell nothing about its structure.

We also learn formulas tied to names like the bible presents the prophets and the formulas make the name famous. The Poincaré formula always holds, but the Einstein version on basic physics level generally fails. So there is no way to convert e.g.  ${}^4\text{He}$  into energy without first adding more energy. Hence the relativistic mass “ $mc^2$ ” can never replace an equivalent EM mass in any combined equation. Thus from a mathematical point of view “m” is not a so called first class citizen in any formula dealing with mass/field/mass interaction, what means, “m” has no universal use. Nevertheless we associate Einsteins name with a claimed genius idea, he just took from somebody else. Because we always look at a tiny mass that n-times is converted to energy the Einstein equation **seems** to work...

This is just given to illustrate one problem we face inside the physics circus and certainly it's not made to diminish the overall contribution of Einstein. In pure science names just should be templates for new terms= facts, we have to memorize and discuss with others. The reality is much different. People very often tie their live/existence to names or models, that are represented by names, instead of just using and improving the models.

### 2.3.1 What is the problem behind this religious behavior?

Most often there are many models for the same problem as in QM (quantum mechanics – Schrödinger, Klein Gordon, Dirac ). This is fine for engineering, where non basic aspects often dominate and you can choose the model, that best fits your modeling needs. **But our very basic world just knows one basic physics!** There is no place for two basic models! This fact is given by mathematics as there always is only one truth for a given problem. And basic physics (explains the structure of mass and charge) is always mathematics. So we can show, as done in [1], that all SM (QM like) formalism are basically identical, what in mathematics means that a homomorphism exist among them. What does this mean? There was Schrödinger's equation and afterwards just plenty of noise. Just more sophisticated variations have been invented: But the basic solution structure of QM (e.g. with Dirac) was only mathematically refined to gain more deep insight. But basically the same – for physics - can be done with Schrödinger, but far less elegantly. So we can say that people did believe that more complex math gives more deep knowledge of physics what obviously is

not the case.

Now we face the next historical problem. Is mathematics also physics? The answer is simple: No! We already above did mention it. Real fields need real sources, what finally defines **real physics**, that is the only physics that counts. Mathematics knows/owns much more degrees of logical/structural freedom than nature's basic particles. And thus the first basic law of physics is:

A fact is known as physical if it can be repeatedly shown/proven in an experiment. A new mathematical model for physics, first is – speculation.

## 2.4 *When mathematical fantasy becomes reality*

But what happens if a speculation, like QM, Dirac equation, QCD becomes fact as all experiments up to date can “prove” it as fully conform with experiments?

This is the worst case we can face. Unluckily this happened in **claimed basic physics (SM)** and it is the origin of all troubles we face today. Simply said: To many speculations could be (somehow..) “proven” by experiments until the 1970-ties. But then engineering and measurement did improve and the lacquered ivory tower suddenly showed deep scarves. In the mean time – as mentioned - , Inside this lacquered tower, a “church like structure” has been established and nobody was willing to re-think why and how the priests made it to their position.

E.g. among different QM groups – obviously not understanding that there is no logical difference among the models – fantasy fights started under the name of the Copenhagen Coffee-shop. The same happened among people doing general relativity, whether the field contain energy or not or whether we need a cosmological constant. To make it short. Such fights are a sign of mental distortion. Some call it religion and such fights are a shame for a field called basic research. Self deception is the biggest danger in science and for avoiding this dark force we usually work in groups and share knowledge but, as mentioned, such groups finally, as a group thinking (=religion) occurs, face the same problem again...We are all humans.

So why do, worldwide, physicists repeat statement, laws, equations that, as we will show, simply are wrong or inadequate without ever doing any reflection about them? This – repeating facts = praying mantras - works only fine in mathematics as once a proposition is proven, it holds for ever. Not so in physics, where we can falsify a so called “truth” already tomorrow. So presenting physics must always clearly state on what a claim is based and why/how it could fail in future.

## 2.5 *What physics claimed to know but is..*

In 1978 my physics prof still taught in class “we can exactly solve the p-e-p = the “3 body - system” what from a today's perspective is complete nonsense. But at that time it looked like being so! But around 1980 the break down of the so called standard model was the first time obvious, when more exact measurements indicated unexpected deviations.

Also the belief that group theory e.g.  $SO(3) \times SU(2) \times U(1)$  can successfully describe particles is a fundamental **logical** self deception as one here mixes interaction between particles and the particles themselves. If you break a glass then you get shards. But every child known if it finds a shard, then it can be from any possible thing made of glass. So why do people believe that e.g. smashing protons produces parts (particles) that exclusively form the proton?

Why should the action of e.g. a ball tell you everything about the balls internal structure? In fact the scattering of the “proton-proton interaction” did show some regular actions, that are caused by the intrinsic internal proton structure. But the postulated (ud) quarks are not particles and also are not part of any proton sub – structure. In the best case quarks are a kind of mirror image that e.g. the CERN p-p interaction projects on a detector.

It is a scientific fact that the claimed basic masses forming a proton (up/up/down quark) never could be fully separated. It is thus one of the big mysteries why ever people did start to weave a mesh of fictive particles. It is highly likely, that this has been done just for one reason: Namely to get more finances for accelerators.

Real particles like Kaon,Pion,Muon are also not parts of the proton but the decay of an excited proton mass produces some meta stable intermediate EM masses, that have a measurable half live.

An other even older myth is the e+/e- annihilation claimed to produce two 511keV photons what in reality=experiment is almost never happening. This 511keV “fake news” did lead to wrong mathematical structures in the mass wave mapping.

So it is time to look again at the real basic facts of physics.

### 3 What are the true basic facts of physics?

We must answer three key questions:

- What are the facts that can be used/proven in experiments?
- What is the relation between mathematics and physics?
- What is the basic formalism we need for this goal?

Some real known basic facts, measured with high precision of physics are:

Speed of light, fine structure constant (derived), time  
Mass of electron, proton, neutron, muon, isotopes...  
Magnetic moment of electron, proton, neutron, ...  
The Rydberg constant, proton fine structure frequency  
Far field force between electron proton.

#### 3.1.1 What defines our mathematical formalism?

We have three basic tools we can use to structure the information of higher mathematics. We have set theory, number theory and category theory. From this we can derive logic/group theory, topology as also mathematics is circular among basic definitions.

Most people are familiar with numbers and the rules including the non countability axiom for real numbers. Sets, categories are used as a basis for group operations like +, -, \*, / and combinations (functions) of them and categories are also used to structure complex relations. We also assume you know what a dual space is.

#### 3.1.2 What distinguishes formally mathematics and physics ?

Obviously physics is totally different from mathematics as we always must do measurements and there we deal with non ideal (not mathematical) objects. So any mapping from real physics to math is surjective and thus, in principle not unique. The basic underlying problem is the so called quantization error, that always occurs when we convert a measured value into a final binary number (the mapping result is effectively a whole (infinite!) range of points in the **Real** domain). In the ideal case we can find a highly coherent subset matching between physical quantities and mathematical quantities (abstractions).

To logically, to map physics to math, we say that there e.g. is a category length and a category time/"wave number" etc. that have the same internal mathematical structure – number density (in the "real" numbers) and only the physics, that is the application of the category to a real fact makes them logically different structures (categories). This is on one side visible in physics by the metric units (m,s,kg,J..) we append to mixed category (capital "C" for category) calculations e.g for velocity (m/s). On the other side (math) we must prove that the number density is the same among different physical categories (C<sub>v</sub> for velocity, C<sub>m</sub> for mass, etc..) for this we must show that for all mixed calculation e.g.  $s \in C_v$ ,  $b \in C_m$  the product of  $s*b*k$ , - k any number constant - is commutative and distributive in the physical space and second follows the underlying law of physics.

As we will show below this simple law does not hold on all levels where mass is used.

This basic mapping seems to be a banal problem but in reality it is far more complex, than most think. Just one example. The unit length (meter) owns many different mappings depending on whether we talk of matter, abstract distances or a wavelength.

## 3.2 What is known from the basic mathematics point of view?

The ultimate requirement for connecting mathematics & physics is the existence of a 1:1 mapping between a physical dimension (open set of element) and mathematical definition of the enclosing solution space. For mass this is “easy” to achieve e.g. for mechanics, where we only neglect the “internal static action” of gravity on mass itself – that is very small. So when we map a “real” solid 3D body into 3D math, then this is pretty much inline with a 3D Euclidean space. Atoms that form the mass have a very fine resolution of  $6.2E23$  points(atoms) /molar unit and the point like division (about  $10E8$  points per dimension and cm) of the space is far finer than the resolution of measurement we today generally have **in mechanics**. So all math we basically do in 3D space is well behaving in respect to the physical mapping for mechanics/**engineering**.

Of course we here ignore that the mass points never do perfectly align for many reasons. Primarily there simply is no homogeneous “single atom brand” massive mass (pure Aluminum is close but what is pure...). A good approximation are perfect crystals of cubic grid structure. So for small pieces of mass we can get very close to a perfect physical  $\rightarrow$  mathematics mapping.

For abstract dimensions we can do much better! Albeit there exists no physical point density for basic atom masses we can construct a virtual point axes with the help of kinetic laws. We can accelerate an ionized atom and measure its deflection (MS) by a field or the time it takes the atom to fly a certain distance (TOF).

Fact is: The closer we look at the points (atoms, particles) of the “mass number grid” the less precise the 1:1 (physics  $\implies$  math  $\implies$  physics ) mapping becomes and finally the simple 1:1 mapping obviously fails and the axis must be replaced by **virtual axes**. To measure (M) the mass (m) of an atom (a) first at rest we must transform it by an accelerator (A) function.  $M(A(m(a,0))) \rightarrow (m(a,v))$  . For this we must first measure A with a normed mass(n)  $M(A(n,0)) \rightarrow (n,v_0)$ . Then we finally compare the two velocities.

From this simple example it is immediately obvious that for basic physics no simple real 1:1 mapping = experiment from physics to math exists.

### 3.2.1 The Precision

In mathematics we can infinitely increase the precision of any calculation. In physics the length of a solid body on one side can be measured up to 8 digits precise at best. In reality in production mechanics 1 micrometer is a kind of limit. In electronic circuit design we currently manage to print structures in the **range** of 1 nanometer. But here the precision is low! We are close to the single atom frame size.

The physical limit is given by the structure and behavior of the object we measure. Further we have a “strong” dependency on temperature! that influences the length and also the oscillation of atoms tied together in compounds. So on the basic point level we have the basic dimension and its uncertainty caused by thermal movements of all kind.

So finally all is about measurement!

Basically precision of measurement = quantization power!

The question is :What is the maximal resolution we can repeatedly produce and apply to a **be measured** object? The best we today have is atomic clocks with up to  $R_{\max} = 10^{18}$ /second resolution (here wave numbers define the point density). So basically we could measure virtual intervals with length  $1/R_{\max}$  .

So when we do math with infinite dense reals, then in physics e.g. with large masses, we are often thrown back to **rationals of length 8** that can be mapped to integers (numbers). If we measure an abstract distance, then we get a much higher precision based on discrimination of a wavelength. Theoretically even more precise is the measurement of “real” charge because its an integer that we simply can count if none of the charges disappears...

Nevertheless, the real basic measurement space for physics is always **numbers** (not REAL's!), what leads to the basic numeric perturbation we call rounding/quantization error (+ -1/2 of the last bit!) . As a consequence all serious physics we do needs an (combined-numeric/measurement) error bar. Further, rounding errors cannot be avoided **in computations too**, where we often work with a large number of nested operation. The intrinsic minimal accumulated purely numeric error is proportional to the max precision and  $^2\log(\text{ops})$  in a connected formula. Be aware that you

cannot work around this fundamental error widening effect caused by

$A_{\{-1/2, +1/2\}} *_{\{-1/2, +1/2\}} B$ . So if the maximum error of one number is 1 bit after “\*” its 2 bits!

The real error is also proportional to the lowest precision input in any physical calculation (involving “\*”). So if you can measure one term with only 4 digits, then only under very rare conditions you can improve the quality of the overall result, e.g. if you can apply statistical enhancements - in case the physical process is well known. For a more deep understanding of rounding error propagation go to [10] Wilkinson.

### 3.2.2 Number density

If we in the following talk of number density then we imply two things.

The absolute limit is given by the precision of measurement that e.g. leads to a point density of a rational interval e.g.: [0..1] with e.g.  $10E15$  real points – The intrinsic (real) density is given by physical restrictions. E.g. a chemical bond oscillates with well known Doppler frequency that restricts the precision (to an average over) of a bond length to and interval of e.g.  $\pm 10E-11m$ . The same problem we see with rigid mass and phonon activity (temperature).

Further we imply that any physical manipulation should basically not change the number density. If we e.g. double the speed of a rigid mass then the kinetic energy is multiplied by 4 and if we double the mass then the energy at the same speed is double the energy of a single mass.

The second case always holds but the first case sees a small but “linear” increase in number density based on SRT what we can correct if needed! So a linear change (given by “k”, above) of the basic number density can be accepted as it only leads to a linear dependent reference frame or just a change in category.

Other problems occur with classic charge as it is an axiom and as such cannot be mapped to mathematics except as an integer number. So if we treat an electron then charge is = 1! and thus the number density for charge is 0! (or Infinite) Other units like mass (kg) have a very large number density of  $> 10E25$  if we define the kg as a fix number of atoms of a given structure. But the mass of an atom can only be given in relation to the standard atom what today is 12-C. Most atom masses are known with maximally 10 digits!

The most tricky unit is energy as it is a combination of different units that occur in different forms. Pure energy is photon energy. It can be transported all over the universe. Mechanical energy is local (rotating, oscillating) or kinetic. In between we have phonons than can become photons or do locally rotate/ oscillate for ever. So here we face very different number densities. Even more problems will occur when we treat the mass energy relation.

### 3.2.3 Which precision can we expect from real basic physics?

From the average number density and precision of basic quantities that today is  $> 9$  digits we should be able to deliver all basic physics quantities with at least 8 digits precision. The exception is gravity, that is only known for about 6 digits. Reason: Most likely G (the gravitation force constant) is not an absolute constant.

On the other side the standard model is unable to deliver precise basic quantities at the required precision for all invented particles like quarks, gluons, bosons etc... This is expected as there exists no consistent mapping to the real physics of mass.

## 3.3 *First classic base of physical facts*

Solid bodies have 3 homogeneous Euclidean dimensions

Solid bodies have a volume and are mass like. (mass is an axiom)

Homogeneous bodies of same weight need the same energy for acceleration to the same speed.

Separating an electron-proton pair leads to charge (axiom).

Charge of electron and proton are equal in magnitude (axiom).

Electron-proton have opposing charge (axiom) as after separation we can measure an attractive force.

Separating two masses also generates a force (gravity) but without generating an opposite charge.

Simple axiom: Meter: Defines the measure for a linear number density. This is a mathematical mapping axiom.

Complex axiom: Mass (kg) later related to force/work.

#### What can we measure?

- Distances, meter
- weight by acceleration (force)
- Energy by work done (or by counting photons of known frequency = most basic form of energy!)
- Force at a varying distance. (E.g. as EM potential)
- Count wave numbers
- Force between 2 currents or charges/E-field.

### 3.3.1 Second classic base: speed of light.

The speed of light is :

A fundamental quantity as locally ejected photons “fly” at light speed.

Defines the frequency of photons (together with the meter).

Defines the conversion of EM energy into **mass-action (Poincaré)**.

Defines time in relation to a distance and a known wave number.

These axioms are of circular nature and we use the meter as a base.

So the combination of the fundamental speed of light with the meter (basic measure) delivers new basic measures! (time, frequency/wavelength) For this we must select a base (reference) frequency (e.g.: Cs,Rb) for time.

### 3.3.2 Third base dynamics

Moving charge (=current) produces a secondary EM (B-)field!

Accelerating charge may produce an EM radiation field

A changing B field may induce charge

Moving mass produces a momentum

Rotating mass produces an angular momentum

### 3.3.3 4th complex base

We can see/measure different particles

Mixing elements produces new combinations (molecules – chemistry).

Mixing particles (atoms) may lead to fusion

Smashing particles(atoms) may lead to fission (under rare circumstances also fusion)

Delayed action defines Lorentz contraction or SR. (special relativity)

Mixing Hydrogen atoms under highly symmetric conditions and low pressure leads to fusion [13] or spin matter  $H^*/D^*$ .

## 3.4 *First order = invariant quantities of physics*

What does “nature” gives us as invariant quantities? Basic quantities that cannot be manipulated by a procedural change or a mathematical model.

Mass of :: Stable particles (atoms  $A(N,Z)$ ) at rest – electron, proton, neutron

Magnetic moment of stable particles  $\mu_e, \mu_p$

Speed of light (photons)

Static and dynamic force between e-p at any distance.

Force of an EM wave of a given wave number and intensity.

That's it. Everything else is composed of this or given by axioms = agreed measurement rules.

The proton so called charge radius currently is not a basic measurable fact as SM has no clue of the electron/proton structure and does not understand how the structure (of e/p) does influence the charge radius. In SO(4) physics we can give the exact proton charge radius as an **equivalent relation** to the magnetic moment. Further there is the so called

magnetic radius that defines the SO(4) proton center of mass. This radius also is a part of the gravitation “constant” formula. On the other side the Bohr radius is an equivalence radius for the electron proton resonance coupling. It can be exactly calculated from the e/p EM mass ratio and is known since Bohr.

### 3.5 What are not basic facts of physics?

Just some wrong claims...

Most fields contain no independent energy. A static electric field is not a field that contains independent energy. Only the force can be measured.

Only a real EM (radiation-) field – emitted waves – contains **independent** mass/energy and thus can be called “real=physical” field **with an energy density**. A static magnetic field evolves from magnetic moment or magnetic polarization. It is not an independent field, its a part of the generators mass as all mass is EM mass.

There are no quarks as free particles and hence no sea of quarks exists. Gravitation is no space curvature force. It's a real EM force as we show in SO(4) physics.

Charge is only a virtual effect of nested EM flux. But the electron/proton are the only stable local (high speed particles like muon, kaon are also be long time stable) form factors for EM mass, hence **real charge**. So all locally stable (velocity = 0) , visible static charge is generated by the same process = separating electron proton. Thus visible charge – due to symmetric generation/annihilation, is conserved.

So generally said: Most fields (static ones) contain no independent energy and the so called energy density is just a homomorphism derived from the **action of the force field**.\*\*\*\*

\*\*\*\* for the classical electric field this is obvious as energy has mass, hence the cancellation of a field that expands to infinity would give nonsensical results as all the “field energy= mass” should flow back at hyper speed....Same for the opposite action. So either static fields that contain energy do not expand to infinity or do not contain energy. But from the Gauss source law it is obvious that a local, static electric field cannot expand to infinity or the sources themselves must be located at infinity. (Just remind that the field came into existence due to charge separation and for an infinite field you have to bring the counter charge to an infinite distance!)

## 4 The three basic errors of classic standard model physics

The main problem of the standard model (SM) is the missing understanding of the mass and charge structure. Due to this, the fringe idea of rest mass has been created and in an even more disparate attempt the equivalence relation  $E=mc^2$  has been defined and wrongly used to fill a missing gap.

The same happened with the basic math of field increments for particle adsorption/emission where only a symmetric operator the so called bra-ket could fit the simple math of Hermitian conjugation.

Even worse is the assumption that one can understand mass with a 3 rotation anti symmetric stress energy tensor.

Basically all these ideas entered physics because mathematician with no clue of real physics tried to extend the understanding with more complex math instead with studying experiments.

To be fair: At the time where these wrong decisions have been made experiments were not very conclusive. Even worse: It was time to find new heroes and even bad experiments like the measurement of the solar eclipse have been declared a successful proof of a new model (Einstein's GR) that in fact found nothing new as the claimed solution is classic (Keller) and was known since years...

### 4.1 The wrong use of mass in $E=mc^2$

In the context of basic (particle) physics the equation  $E=mc^2$  implies that both sides are equivalent, what is almost never the case. Correct and proven by experiments is:  $E=dmc^2$  or originally as given by Poincaré:  $dm=E/c^2$ . In the case of an electron the error using  $E=mc^2$  is relatively small and thus the wave form solutions works pretty well for engineering purposes. Mainly because the electron is the generator of the field and must couple with the field's generator (Coulomb) force.

But what if “m” = a proton? This is a completely different story. A proton does only weakly couple with the charge field as its mass is 1836.15 times larger than the electron's one. The proton also shows no photon or wave like behavior at all.

Further, all real = dense mass has an internal structure. Unluckily all mass is also = EM mass and EM mass already is at light speed by the physical definition of EM mass. We can also see this at photon emission. So dense mass internally is fully relativistic. This will lead to problems with more dense mass (high Z nuclei) as it's structure obviously has a **different density** than the electron and proton.

From a mathematical point of view you can only write (mix different categories – energy, mass, velocity as in )  $E=mc^2$  if the number density on both side is the same. (Else the underlying basic metric = point density of the category changes.) As the standard model uses mass as an axiom = “mass has no structure” it is clear that the Einstein formula was an unfounded guess only. From the periodic table of isotopes masses (facts) and the new SO(4) physics[9] model (theory), we know that the density of mass is different among high and low Z nuclei. This, may be, was not yet obvious at the time Einstein wrote down his guess. But today everybody can see it. The new SO(4) physics model shows that an increase of nuclear EM flux density leads to a **logarithmic** increase of the binding force hence of the **number density for basic mass**. As we all know logarithmic coordinates do not linearly map to natural/real number spaces. So you cannot generally mix the category (classic) mass with energy.

Said in Category theory. The morphism that must be transportable between all the categories (m,s,kg,J) used in physics do not retain certain physical properties like the vector length of a product. This can also not be fixed by a linear equivalent formula like in SRT.

To reveal the difference between classic mass and dense mass. For classic mass we align atoms into a grid with dimensions  $X_i \ i = \{1,2,3\}$  and the density is constant and the mass increases “linearly” by  $x^3$  as all dimension can be treated the same. So here the coupling of Categories works fine. On the nuclear level protons do not just align they also make “bonds” and release energy. So expanding the nuclear “grid” is not a linear operation.

**It is thus impossible** to directly transform e.g.  ${}^4\text{He} = m$  into photon energy “E”. For this purpose you first must add the lost fusion energy. After this you must add a further  $4 \times 52\text{MeV}$  to crack the 4 protons.

So in **basic physics**  $E=mc^2$  just works the way Poincaré did show it and never the Einstein way.

If you increase the point density of dense mass e.g. by a factor of two (p+p) then the number density of real mass does not increase by a factor of two (p+p leads to  $p^* \cdot p^*$  a weak nuclear bond or  ${}^2\text{H}$  if an electron is involved). The mass density (for a “point”) does only slightly increase by a logarithm (L) in relation with the nuclear force (F) in the form of  $L=F^k$ . But the metric density (kg/m) almost doubles at a given point (classical grid) if the product of p+p is  ${}^2\text{H}$ .

In case of doubling the EM flux by 2 (as in  ${}^4\text{He}$  – two planes are needed) the increase in mass density is given by the force scaling constant  $k=2^{1/2}$ . In the following F (the 1D matter binding force) is a number (<1) given by the product of all three (SO(4) physics) nuclear binding forces  $F = 0.9959335244\dots$ . So the number density of mass (e.g. for  $4p + 4e \implies {}^4\text{He}$ ) only increases by  $F^k$  from 0.9959335244..  $\rightarrow$  0.9942539823.. (not by 2). The exponent k increases with the amount of flux that runs/flows in parallel. Magnetic flux only couples symmetrically that is 1:1, 2:2, 3:3 ... This is due to the single side nature of the real physical flux manifold. In fact  ${}^4\text{He}$  is the first nucleus that is fully bound by the strong force.

So if in a **basic physics formula** you write  $2 \cdot m$  this induces a coupling of mass that is not linear and also it is quantized (by number of protons) as in the case of 1.12345.. instead of “2” nothing (no change in density) happens. So any manipulation of a formula containing  $E=mc^2$  (m any possible mass) is not covered by basic math  $\implies$  physics mapping rules that clearly states: You can only mix categories that have the same structure, rules for number density.

The problem is obvious as the formula  $E=mc^2$  just gives the net energy **not the acting energy**.

For a proton the basic acting energy equivalence can only be given with

$$(2) E_{\text{photon}} = m_p c^2 + 52\text{MeV}$$

Here we neglect that the final  $K^+ \rightarrow P^+ \rightarrow \mu$  chain produces a positron (+), that is not a photon.

Summary: expanding mass “m” in the formula  $E=mc^2$  into energy is not linear! **To get the proper free energy equivalent you need to know the density of “m”.**

Most people will at first hand fail to understand this because at the end the maximal net energy you can produce from e.g.  $m={}^4\text{He}$  or p is equal to  $E=mc^2$ . But in a physics formula like the Dirac equation you deal with the mass-field coupling, what definitely is not given by  $E=mc^2$  !

#### 4.1.1 What does this mean for the relativistic Klein Gordon or Dirac equation?

Both equations add  $E=mc^2$  or  $(mc/h)^2$  and then associate it with the wave function despite “m” is not a photon (wave) equivalent energy. Then e.g. a plane wave is proposed as a solution despite E, in general (= experiment) cannot be split into 2 orthogonal plane waves what is the next misconception. Even in the electron case you normally cannot split the mass into 2 symmetric waves. The symmetric 2 photon e+/e- annihilation was the first fake information that deeply penetrated the physics world. So we have multiple contradictions of a so called high level physics model with the basic physical reality. The normal – matter bound - e+/e- annihilation produces 3 photons and **almost never 2 symmetric ones**. The free positronium annihilation usually produces at least 2 unequal photons.

Basically the classic so called relativistic models for QM/QED etc. have some restricted meaning for treating electrons in the very special case of symmetric annihilation. These models have absolute no validity for describing dense mass internals or even the proton or the proton - proton interaction as said above. The proton can by no mean follow the  $E=mc^2$  equation and decay into symmetric photon/field energy. The proton never behaves plane wave like. Also the description of electrons is restricted to a singular special case and thus we can say, that the Dirac equation does not describe the electron in general. Electron +/- annihilation normally is a 3 photon process [8], that does not translate into the known mathematical solutions. See below.

### 4.1.2 There is no Bra-Ket symmetry

The most basic form of energy is photons and not field energy. Photon transport (besides radiation fields) is the most universal form of energy exchange in the whole universe. For simple cases of photon transport in an electron shell the Bra-Ket operator works fine as photon is pretty close to a wave. But transforming an arbitrary mass into field/photon energy does not fit the formalism!

The misconception of transforming mass into energy was based on the experimental finding that an electron can be transformed into a gamma photon of 511keV. [7] But for this you need a positron to complete the operation. Unluckily, also here, nature shows – most of the time - no symmetric decay of a free e+/e- “pair” into two 511keV – Bra-Ket symmetric - photons. Normally e+/e- undergo a binding reaction and do form out a positronium. This introduces a secondary orbital momentum, what perturbs the decay. Only e+/e- **inside** dense mass (in **para state**) can potentially undergo a symmetric 511keV decay. But also there the 511keV is just a small peak and not the main event. See [7]fig. 7.9. So nobody ever found that you generally can symmetrically **split mass** into two waves that are conform with classic field models. This was a historical speculation only.

And it is for 1000% given that this, two 511keV photons produced from a free e+/e- “pair”, never happens inside a locally **homogeneous** field ones uses as classical QED solutions! ortho-positronium!

Said the other way round. Why should a special case define the general physical solution?

Even worse is that that the free ortho-positronium usually decays into three photons see figure 7 right from [8].

So it is mathematics – gauge theories - that requires the symmetric bra-ket operation because we can only easily handle conjugate complex formalism (e.g. spherical harmonics).

Summary :: You principally never can expand dense mass “m” into a field like energy structure because for this you first have to add extra field like mass, what never has been done so far. Thus QED, QFT, QCD **for dense mass** are nonsensical models from the very basic math point of view. Or simply said: these models cannot adequately handle mass.

QED, QFT, QCD are models for ideal (linear) fictive fields with a photon like mass. You can use these models to describe high energy scattering of particles as the detectors stay in the far field.

The Poincaré formula  $dm=E/c^2$  has been derived from **radiation field energy**! Then by guess work the static  $E=mc^2$  mass energy equivalence formula has been postulated.  $E=mc^2$  then, in an next erroneous step, has been misused to define a **static (bound) field energy** equivalence for a general mass...Exactly the opposite of the original Poincaré use...

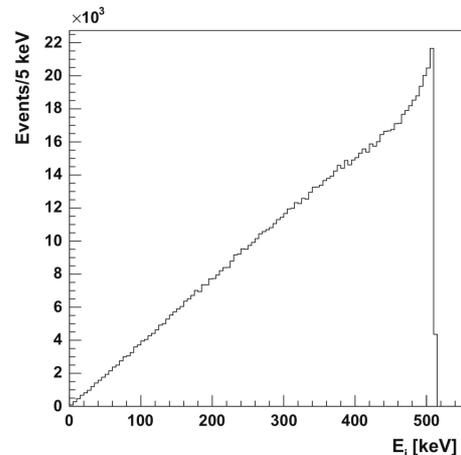


Fig. 7 Energy spectrum of photons originating from three-photon annihilation of an electron and a positron

So people definitely must learn the difference in energy density and structure between free mass (photons) and bound mass.

## 4.2 *The rotation error*

Dense mass = matter we e.g. can hold in our hand and use in mechanics is only able to independently mechanically rotate/spin around two axes. This is a fact proven in elementary geometry. You can reach every point on a sphere with 2 rotations hence any third rotation can always be written as a linear combination of the 2 base rotations. (A sphere perfectly fills a cube (stretched to ... topology) and hence this holds for all “real” fully connected bodies of all shape!) The third (orthogonal) axes – mathematically - only makes, best case, an oscillation. This leads to a full contradiction with the basic assumption made in QCD and GR where in general 3 symmetric rotations are assumed.

(There can be 3 different inertial masses in respect to the 3 orthogonal axes. But at one point in time only 2 of the three axes can rotate!)

In GR Einstein did introduce a third symmetric rotation (in stress energy tensor) what implies that these rotations share a common origin (in e.g.  $S^3$ ). But massive mass, if it evolves in space time, can do a third rotation only **as a whole**. This leads to a toroidal solution space, with no common origin for the 3 rotations.

(Of course from math point of view you can say that also the third rotation can be mapped to the same origin but then we must remind you that an oscillation – seen for third axes of real mass - and a rotation around the same origin that always leaves the common center.. leads to a final contradiction.)

As a conclusion we can say: GR cannot handle massive mass and thus is not a theory, that describes the behavior of real mass in space time. On the other side we can say: GR is an abstract field only model as of course a field must not have a stable mechanical connection, hence can do 3 single- independent common center rotations – in 4 space. In fact if we map mass to a manifold then we can have even 4 rotations in 4D space where we have 2 counter rotating membranes in the same coordinates pair just mirrored. But for this you need a single sided toroidal surface e.g. Clifford torus what leads to an  $SO(4)$  solution space.

We cannot explain why such basic errors never got revealed and removed by better models. Of course in a homogeneous 4D space you can have 3 rotations but this implies that a structural map from **physics = real matter** to mathematics must exist. Nobody ever did define how a mixed rotation of a time axes with as single real mass space axes should look alike! So we can say GR (general relativity) with a 3:1 metric is pure fantasy **in relation to real mass** and has no relation from math to physics as matter cannot extend coherently into the 4<sup>th</sup> dimension to do a third rotation (related to stress energy tensor) . It is also not clear why the physically existing third pseudo rotation = oscillation should suddenly change its coupling and do a full rotation....

Of course you can always rotate empty (4D)space around 3 axes, that's what a mathematician does in his brain, but a brain is not the physical reality.

Neither model (QCD, GR ) thus can properly explain mass or field mass interactions because the use of a 3:1 metric leads to fringe results. The use of a 2:2 metric could solve the problem as then it would be allowed to rotate in the time domain without loosing the 2 rotations of the rigid mass, but other – separation – problem would be introduced.

## 4.3 *Fringe fields*

3D tensor fields (with full 3D independent generators) are a mathematical invention as no physical generators of such fields are known. Also point charges – point fields are a pure mathematical invention and have no real = physical counterpart\*\*\*\* - **in basic physics**. The three real= physical fields(E,B,G) we know are 1D or 2D (D - space Dimensions covered by field lines). It is also known from basic mathematics that only so called 2DF models are real physical models [3]. A physical field (its math) always must be fully conform with its physical generator. So in GR the uniformly added time dimension should allow a third symmetric matter rotation what is physical (mathematical solution not possible) nonsense. Thus, according this contradiction, matter does not uniformly expand into time...

The same facts can also be derived from the Gauss source law, that proves that the magnitude of a field depends on a set of fully enclosed sources or flux lines (B-field). This implies that for classic = real sources there always is at least one (e.g. B-field) dimension where the field locally (tangent) does not change.

So real “basic physics” fields cover 1 or 2 dimensions. Thus real 3D tensor fields always can be simplified to 2D **in real basic physics**.

So best case we can say **GR/QCD describe massless background fields** independent of real physical generators. From this point of view the math is consistent. But this math has nothing to do with real physics! It just handles abstract fields, that in certain regions, e.g. far field, may overlap with real physical fields.

Point field based, **basic physics** models generally fail already logically because there exists no 1:1 mapping between mathematics and Physics = measured facts. As said there is no (just a very poor – 4 digits) near field match between the Coulomb field and a field produced by a proton/electron pair. We can only use – in physics - the mathematical abstraction field if there is a 1:1 physical generator for this abstraction. E.g. a charged sphere that contains billions of billions electrons is a very good approximation of a point like far field generator. But this is not basic physics as we use a large set of basic generators for a far field model.

In SO(4) physics the coulomb potential can be exactly (10 digits) correct by the ratio of the strong force to the electro weak force that works for the “electron orbit”.

\*\*\*\*Reminder: Even an electron (classically provides the charge) has a magnetic moment, which contradicts the existence of a point mass and a point field. So here we must clearly note that math based on point charge/field is not **basic physics** and a consistent number density only exists in the so called far field or for massive objects with a large number of basic sources.

## 5 What does the standard model make us believe?

Here we will say a few words about some inadequate concepts like point fields for particles. We also sum up what we know so far.

What we know from real physics = experiment! Fields do not exist on their own. Fields are defined by the force on a probe and most important **a field always has a source**. If you write down the 4 potential without any source topology you necessarily end up in fantasy space. In real basic physics a **local** 4 potential simply does not exist as the magnetic field depends on a movement of the source charge and its own magnetic moment.

If we look at a single proton/electron then we can see an almost locally stable B field only if we can fix the orientation of the magnetic moment vector. But the real situation always shows an at least rotating magnetic moment vector hence a globally changing field. This explains why a static 4-potential approach in general is inadequate for basic particles. Further, the local field strength of the e/p magnetic moment is magnitudes larger than all external fields we can produce. Thus without understanding the e/p structure a local 4 potential for particles makes no sense.

### 5.1.1 Simplistic fields

In SM, from the e-p charge force law, an ideal field model is derived. For this purpose a homomorphism (mathematics) is defined that maps the force to an energy density sometimes also called field.

For simplicity charge (axiom) is mapped to a point or a sphere (axiom). But the plain Coulomb solution gives you only about 3 digits of the real result for the e-p potential with added magnetic (also called reduced) mass you get 4 digits out of (today) 10 (11) known ones. Thus any physics that uses point fields of charges is engineering physics only, as it simply does not work (= reproduce) for basic physics = particle physics. Particles neither carry a point charge nor do provide a locally constant magnetic field.

Further the basic generators (e,p) at rest produce 2 fields and moving (e,p) produce 3 fields. For simplicity SM most often uses the Coulomb-gauge = charge based field, that in addition assumes a locally constant B field and never 3 fields.

The extension to a simple Coulomb field is the use of the 4 potential in analogy to GR what finally leads to SO(3) based solutions. This approach is just an educated guess and only works for abstract far fields.

Physical reality: A Coulomb like 4 potential field approach does not work for the very basic field between an electron and a proton. It “only” works for the so called far field solution or mass (large number of electrons) field solution. In fact the electric field is only the first order interaction of the total field. But the 4 potential modeling techniques use the

magnetic field as an add on to the electric field. (See 5.2.2) This is just reversing the physical reality. The “static” (- in magnitude only!) magnetic field from the magnetic moment is a part of the generators mass and the particle's charge depends on the particle total magnetic flux. Further a moving particle produces two different magnetic fields.

## 5.1.2 The limits of gauging

Basic models of physics can never be gauge theories. Gauging\*\*\*\* – in experiments - is always a data based brute force approach to explain a natural behavior. From a mathematical point of view SM is a set of calculation rules for deriving approximate Hamiltonian's for concrete experiments. Any numerical model that uses the Taylor approach would give you the same solution. (Without claiming any physics..)

So physics based on gauge theories is engineering physics. It can never explain basic connections inside matter as for basic physics you need a so called ab initio model that relates unchangeable basic facts to calculate experimental data. Here so far SM failed totally. SM can give no relation between the proton magnetic moment and the charge/magnetic radius and the proton mass and all follow up masses of isotopes.

\*\*\*\* Today most people have forgotten what gauge theory really means as all math that has been developed around the abstract gauge theory models obfuscates the original physical goal. So people learn all the symmetry rules and the transformation laws that protect the metric and the connections. The basic idea given by numerics is to do at most one measurement for one independent variable. Ideally if you can connect all variables inside a symmetry structure you can approximate the whole system by one measurement. E.g. the 4-He far field spectrum based on the exact measurement of the S(2) state.

## 5.2 Historical models

Here we will cover the problems that were introduced by the wrong use of the 4 potential. First we will classify some historical models that are used in engineering physics.

### 5.2.1 Quantum mechanics (QM) version 1 (Schrödinger)

Uses inaccurate Coulomb gauge (linear e-p field) .

Defines a homomorphism to map Bohr electron orbits that obey the force law. The orbits of the “virtual” charge are given by two mathematical entities.

- 1) Spherical harmonics smear the electron on concentric spheres (n=1) around the attractive charge (point) center
- 2) A radial “Green function” defines the “decaying” amplitude combined with 1) this defines a probability density by the product of an “orbiting \* oscillating” charge.
- 3) EM multi-pole expansion allows to define more complex orbit combinations.

Drawback: The model is totally un-physical as real charge can not be represented by spherical harmonics on a sphere. Real currents (charge) cannot have orthogonal paths. Why should the axiom charge be divisible? So charge had to be static. But a static local fine grain charge has never been seen as its an unstable state of matter... other than an elementary charge that is long time stable.

Conclusion: (QM) version 1 is an engineering model that did help to find some chemical orbit approximations (scalar magnitudes) and for approximate calculations of coupling resonance frequencies of chemical bonds etc..

Even more fringe is the classic explanation that the wave function  $\psi$  gives the probability to find the charge (e). To shine up in a new place the charge related mass must change its momentum! Already from this it is obvious that classic QM fails for any mapping to reality.

To fix this problem of charge only forces, the 4 potential was introduced, but this is only equivalent to classically add the reduced mass mechanics – you can also do the same with QM1.

### 5.2.2 Quantum mechanics (QM/QED/QFT) version 2 extended Dirac formalism

“Fully integrates” relativistic EM theory and claims to model (on the highest level) a so called Hamiltonian density[6] . That is the probability to find a certain quantum of energy in a tiny region (volume) of (relativistic!) space covered by an energy like field...

Still uses inaccurate Coulomb gauge. But worst: Claims that any mass can be added to a “static” field of the **general type** - 4 potential - to simulate EM mass. But this fails as a relativistic 3:1 metric does not work for general EM mass (includes magnetic vector potential) that in reality would need a (relativistic ) 2:2 metric. (magnetic vector potential “A” – for 2D in reality - is already relativistic).

As a consequence of this – to hide the failure - a mathematical trick is used for claiming gauge freedom in a way that any change in charge density can be exactly compensated by a change in field (vector potential source) density. So the two transformation rules ( $q = \text{charge potential}$ )  $q \Rightarrow q_0 - d\psi/dt$  and  $A \Rightarrow A_0 + \nabla\psi$  are used to cheat away the dependency of the magnetic vector potential from a change in charge. But this is children math not physics as in physics you have to properly write  $q \Rightarrow q_0 - d\psi(\mathbf{q}_2)/dt$ . Either one accepts the laws of physics or one stays in fantasy space. A field (wave)  $\psi$  is not just there it is always produced by “something”. Worst thing about this is that the field  $d\psi(\mathbf{q}_2)/dt$  that changes the charge is not only generated by the local charge!! So there also is a coordinates mismatch. Thus in real physics there is no such thing as gauge freedom as the additional added gauge field cannot have the same source (origin) as the changed field! Only in the far field you can add a static field!

Please keep in mind: An added  $\psi$  is not or never exclusively related to  $q_0$  as there principally is never a symmetry between  $\psi / q_0$ . So  $\psi$  can never exist without a second generating source (charge)! So if we look at a single particle, then it is obvious. Of course if you assume an infinite small source you can postulate a 4 potential for the whole space except the source point. But all particles have a real dimension and the field around the particle is neither point like nor homogeneous. So if you want to model the influence of one particle on an other you have to cope with two sources at two different places.

Only in a large detector like CERN you can assume that the external field is dominating and can be treated the classic way. But this setup tells nothing about the particle – particle interaction **its all about particle detector interaction**.

Further some people still do not fully understand the Maxwell laws. If we write  $q = d\psi/dt$  instead of  $d\psi(\mathbf{q}_2)/dt$  then we stay in fantasy space.  $d\psi/dt$  in general is not a local quantity! In real physics charge is produced at the edge (line integral!) of the flux that changes. This flux mandatory **must fill an area** not just a point in space. So its not allowed to make a point wise comparison of a local change in flux with a charge generated at the same place. This is obvious when you look at a moving charge that produces the B field. Here the fields start at the edge.

Only in a wire the **static** E/B field seem to have a common source - point.

Also instructive is the standard beginners lab experiment with a solenoid. If you stop the current through the solenoid by setting the potential to 0 then the internal field upholds the current but not at the place of the field – in the solenoid instead. So the induction law is not a local law. And of course we did not even mention that a particle produces 2 different B fields that never can be cancelled by an added gauge field...

For more details see Hitoshi 221B Lecture Notes [6].

QM/QED/QFT have been “successfully used” in the **far field modeling** of particle scattering. Here success means the model did provide some guidance for finding a scattering Hamiltonian.

The limited success of SM was only possible because the real physical structure of particles (proton see SO(4) physics [9] ), that externally interacts does 3 rotations (in 6D). But this 3 rotation structure is not simply connected with the 5 rotation core of all particles and it also is not conform with SO(3) in general. So we can say people have been fooled by an inadequate model that “unluckily” - locally - did show some real correlations for real source generators (e,p).

### 5.2.3 QED ==> QFT ==> QCD

QCD tries to find/describe the basics of matter using quantized \*\*\*\*\* fields. This is a basic logical contradiction in itself as matter is the origin of fields. Also fields are not a physical reality as only forces are real.

So in fact QCD “describes” the action density of (EM-) matter inside force fields. The association of different actions measured in experiments with different particles is just an act of deceptive fantasy. The very basic particles defined (by QCD) the so called quarks could never be isolated = separated. Of course the most fundamental up & down quarks still have an unknown mass. So quarks are not particles. Quarks are resonances of hadronic mass.

Real particles are discrete sets of EM - mass, that can be independently and exactly measured at two different points in space and time given the measurement does not (significantly) change any measured feature of the particle. The delta in time and path, of such a measurement, must be larger than the internal particle EM mass path length. This path length is close to the De Broglie radius for an electron only. For all other particles the minimal separation time factor (is given by the internal flux winding number \* SO(4) group measure) must be multiplied in.

An other historical error was the invention of a simplistic strong force. Ironically all these deep errors (quark, strong force = Yukawa potential, later Higgs mechanism) haven been rewarded with nobles (see physics as religion). All experiments done with high energy electron scattering in mass[2] do show only one active (strong) force at work = **magnetic force**. SM does not use the magnetic force. Thus, already from this point of view, we can know that SM, structurally, is a total fail.

Dirac wanted to simplify physics ( in fact the numeric behind it) by avoiding second order time derivatives. This was needed for concrete calculations as at that time no computers were available and e.g. iterative higher order polygon Taylor approaches were unknown. Second order time derivatives are the basics of physics as without forces we have no defined action and with no direct solution for the action paths we can only use symmetric solutions.

As a consequence of these conceptual errors later (symmetric) mass like actions have been reintroduced by the use of the delta function for adding/removing a quanta of mass/energy from a field. (Creation/annihilation operators.) This works almost fine (Only second rotation momentum is missing) for the adsorption and re-emission of a photon, but not for the transformation of mass (annihilation) like energy to photons.

\*\*\*\*\* The origin of QM quantization is the existence of stable intermediate states with a closed action path in a  $1/r$  force field. The historic origin of quantization is the physics of coupled rotating rigid masses = mechanics [11][12]. The quantization originally has been known/introduces as so called energy surfaces that form the Hamiltonian solution space.

## 5.2.4 Failure due to use of $E=mc^2$

The other logical failure is the use of  $E=mc^2$  as basic conversion of any mass to field action, what simply is logical nonsense. Dense mass has no field like external structure. With the  $\langle \text{bra ket} \rangle$  operator you – in general - only can add/remove symmetric EM energy but not/never convert mass energy into EM energy or vice versa. If so, we would see it in experiments! Be aware that there also is a profound difference between a mass like action and real mass. Anybody with a first degree in mechanics knows that rotating mass like action in real physics also depends on the intrinsic **shape bound momentum** (I) of EM mass. Only for circular orbits  $I=1!$

May be some simplistically thinking people really did believe that mass internally is at rest...

So mildly said the potential solutions of the Dirac equation even for fields containing mass (energy)are restricted to circular orbits...

For hadronic mass, analogue to the absorption/ re-emission of an electron an absorption/re-emission of a proton should be seen. But if e.g.  ${}^7\text{Li}$  absorbs a proton this starts a nuclear process. We also did (SO(4) physics) show that classic mass, on the basic physics level, has no conform number density with energy, or velocity.

The fairy tale of a separate strong force did lead to the next blunder, the so called gluon model. A gluon is a fantasy particle, that should represent the strong force field. Even more absurd is the idea that this particle is exchanged between the quarks. Of course this violates all basic laws of mechanics. How can a very light particle absorb and re-emit a much more heavy one? This already is comedy. But we can also call it just a mathematical abstraction with no physical foundation.

Final fantasy:: The Higgs model.

As said: Gluons are already comedy but the idea of a Higgs particle is a deep sign of collective madness. The Münchhausen trick - a particle without mass should give other particles mass is an abstruse fantasy. Just to remind you. The base is always a Hamiltonian density “=” energy “=” mass-action. So now something - ether like - pops up that should give all particles their mass. This something is a “magic field” - of course **generated by an unknown source** (fantasy particle because the field source is unknown) – that fulfills some mathematical properties and still uses the fantastic = **non existing Yukawa coupling potential**...

But mass is an axiom = internally undefined and thus a Higgs particle is already a logical blunder = producing

something structurally undefined. How can you logically claim to generate something that is undefined? Further the idea that mass occurs only on action is crazy as we can see/measure dense mass without any action. Of course – as Poincaré did show some **120 years ago** “new” (EM-) mass (-like coupling) can show up in (EM-) action but for this we don't need a new field with an unknown source coupling by a non existent classic strong force...

Of course nothing has been found so far as the Higgs event found in CERN just is a heavy proton, which mass we can exactly calculate (SO(4) physics). The heavy proton must pop up as a charged/neutral doublet but this is not expected for the Higgs... Also, as expected, no progress has been made with the calculation of particle masses. Further the so called Higgs mass is known since more than 20 years and has already been detected with older accelerators just the luminosity was a bit to low to declare it a new particle....

So the basis question is: Why did physicist invent a new mechanism for forming mass, when there already exists a well known one since 120 years? Answer: To get more money for accelerators.

## 6 What is local energy = mass-action?

If you finally understand that the only form of storing local energy = mass-action is rotation, then you immediately do understand which mathematical rules **real mass** must follow. So in fact all (hadronic) mass we see is permanently rotating – at “light speed”, following a complicated orbit. The constant sum of local mass- action “=” energy is given by the sum of orthogonally rotating rigid “masses”.  $E = \sum \frac{1}{2} I_i \omega^2$  ;  $i = \{1,2\}$  for symmetric classic mass without a third axes coupling. But  $E = \sum \frac{1}{2} I_i \omega^2$  ;  $i = \{1,...,5\}$  for SO(4) physics = real mass.

Because the rigid mass we know (formed by protons and internally bound charge) behaves symmetrically – **in real 3D** - we can conclude that it does at least own **3 independent symmetric internal rotations**, what – for a mathematically consistent description needs at least a **homogeneous 4D space without time**. In any other case with 1 or 2 rotation mass would show a coupling with a 3D angular change.

So we have one more fundamental contradiction between reality = physics and most current mathematical models of physics. The number of minimal **space dimensions** needed for basic physics (4) does not match (3) the models currently in use.

(Einstein later Klein did try to fix this with adding one more space dimension but using the wrong old point field math both failed.) As  $E=dmc^2$  is proven, we now know, that the real physical space we will need for a new model has **at least 4+2 dimensions** because experiments (ring accelerators) do show a 2D relativistic action what would not work with the 4 dimensions covered by the mass inherent rotations at “c”.

When can we use  $E=mc^2$  ? For classic mass “at rest” this formula still can be used as an **equivalence relation** for giving a mass in eV units. Also the simple sum of fission energy of independent reactions follows the simple engineering approach  $E=mc^2$ . But classically differences in measured mass are cheated away by neutrino masses...

### 6.1 Summary:

The formula  $E=mc^2$  assumes that free energy ( $E$ = photons = wave) has the same shape as bound ( $mc^2$ ) – dense energy, what is not the case. Even an electron positron pair almost never decays into two equal 511keV photons[7]. Such a decay is only possible “inside” (a strong gradient) dense matter or an ultra strong field, that produces a highly symmetric situation.

Classically the Virial condition did serve as a logic base to explain  $E=mc^2 = E_k + E_p$  both of same size ( $E_k = 1/2mv^2$ ).

But this condition is only an approximation for massive mass-action. In fact it is an **average over all particles \* forces \* radius**.

So  $E=mc^2$  has a limited use for electrons (the only serious problems are spin pairing in S2 orbits, 3-photon decay and in general asymmetric decay) but absolute no use for dense mass. This formula implies that mass has the same structure and mathematical point density as the real space, what is not the case. Experiments (= all measured isotope masses) show that the density of mass increases logarithmically in relation with the involved mass.

But  $E=mc^2$  completely fails in the case of QED/QFT/QCD to treat dense particles as the plane wave solution is not allowed for protons. If a proton does not interact plane wave like then also any interface to a field of hadronic mass is basically broken by the above mentioned problems.

## 6.2 Failure reasons for classic theories (summary)

- GR, QED, etc. wrongly use 3 rotations in 3D, t (4D space time) for mass what is forbidden by basic mechanics laws.
- 3D independent tensor fields have no known basic physical generators.
- The structure/density of dense mass is not linear thus not properly following a Hamiltonian density based on SM fields.
- Point fields/masses do not exist and are simplifications that only work for the far field.
- Fantasy forces (strong, electro weak) instead of magnetic force are used for defining fantasy particles.

Thus all models inside the standard model are – best case - engineering approaches only and do not reflect/represent basic physics.

### 6.2.1 Why then do some people claim high agreement with the actual models?

Nature follows smooth functions thus any trajectory can be approached by a Taylor development. Most so called “successful SM models” consist of a large number of gauged constants, what is also expected from the plain engineering based Taylor approach. In reality nobody ever did derive a SM Hamiltonian that matches physics from a basic SM model. So these models are reverse physics and not “ab initio” = given from basic physics constants. It is obvious that you cannot reuse e.g. a Hamiltonian for the Helium electron orbits for modeling an other nucleus' first 2 electron orbits.

Best case we can say SM gives a set of rules how one can derive a Hamiltonian for a given physical problem using extensive gauging.

There are also much worse examples like the electron g-factor project based on some > 10'000 Feynman loops. This reported result simply is fraud based on using infinite precise fake constants.

So we end with the sentence, that most success of the standard model is based on self deception.

## 7 How does/must a basic physics model look like?

We have to find the structure of mass and the process that generates charge. **Axioms have no base in a serious theory/model of basic physics.**

What we know::

The only possible form of local (stationary) energy is rotating mass. The only physical entity that permanently rotates is EM mass or EM field lines. Thus mass must be a magnetic coupling effect. Also because all mass (electron/proton and compounds of e/p) does seamlessly, - charge like - and EM-like interact/integrate with EM fields, there is no reason to believe that mass is formed by some fantasy “blubber”.

The last one that failed to show the EM to mass relation was Feynman. So many believe that if a genius (in SM church terms) failed to show the connection, that this failure must be correct (hold) for ever. A true genius like Einstein never did believe in what he did complete and Einstein had the great insight at the end of his live (1954), when he said that most likely physics cannot be based on fields and thus “his” GR[5] is a castle in the air. Nevertheless GR did help to solve some very old math problems! Under this view it is/was a great achievement.

Rotating mass is a very old domain of mechanics and today well understood. Interesting enough a rotating mechanical

mass has a similar action like a magnetic mass. The only difference is the laws that cover the two. In both cases we have a 2D energy that leads to a 1D action.

How must real fields look like? according to the law of Gauss in the far field of charge/gravitation nothing will change and the classic physics is true albeit it is an approximation only. But as soon, as the energy decays with  $1/r^2$  deltas will become tiny. Thus most classic solutions for the far field are good enough.

Local – to particle - fields can only be of toroidal nature as we know from mechanics, that all action surfaces of coupled rotating masses are given by torii. Thus torii define the action surface of a rigid body doing multiple coupled rotations. This also explains why forces in the near field are not  $1/r$  linear as a torus has two radii. Torii are also the only bodies of higher genus with an Euler characteristic of 0 what implies that a flux can be homogeneous and encounters no poles.

Due to the fact that we see magnetic moments (e,p) we know, that we have something like a net charge moving on the visible action surface. Further we know that magnetic flux lines do never cross, the same for charge (current). This implies that the torus surface **must be single sided!**

On a double sided (in/out) torus fields/flux must cross on change from inside/outside.

So we now know that we need at least 4D (without time!) for a locally rotating mass, that shows a totally symmetric behavior in classic 3D,t space. For this we have one good choice to start with. The Clifford Torus! - embedded in SO(4).

Why is  $S^4$  no enough? This is the most complex - some may say simplest - part of the new model. The space we use must allow self enclosure because charge follows from the law of Faraday that says. The action (=force “=” potential) is visible along a **closed path around a changing** (enclosed) magnetic flux. As we have only magnetic flux that forms mass the flux must be self enclosing to generate charge. Further there is no possible mathematical solution for a homogeneous cover of any  $n>1$  ( $S^n$ ) sphere without **crossing paths**. Also a self enclosure of EM flux is not possible with a “flat” sphere.

After all this you will understand that very basic things are e.g. missing in dense mass related QM,QED, QCD etc.. Already in 3D space one would need 2 different spin axes/quanta (QM).

## ***7.1 What should such a new model be able to explain?***

(All items mentioned below have been solved in SO(4) physics)

- The exact relation between proton mass and proton magnetic moment and charge radius
- same for electron
- The exact relation between all 4 forces we measure
- The structure of proton, electron, neutron
- The fusion of protons, electrons to new elements/isotopes
- The structure of particles that are formed by smashed protons
- The new form of dense matter called H\*/D\*
- The structure of elements
- Magnetic moment of elements/isotopes
- Gamma spectrum of elements/isotopes

More complex explanations that miss:

- How does “cold fusion” work?
- What is the exact structure of Hydrogen (the e-p system)?
- Same for  ${}^4\text{He}$  known as alpha particle.
- What is a neutron and how is it generated?
- Is the electron just an excitation of the proton?

Just as a reminder: SM can explain nothing – not even close - mentioned above

Unluckily mass today is a synonym for energy and charge is the only origin of force we can create at will (gravity is

always here). So these axioms in reality cannot be axioms as we can split these into parts, (charge in quantum hall effect) what is, from a logic point of view, a very basic violation.

The history of science is full of such blunders, where mankind was missing insight and generated an abstraction to explain complex experiments. Famous is the Phlogiston theory in chemistry, that was used to explain fires or oxidation. So we did show that the standard model of physics is a modern version of the phlogiston theory. Basically  $1/r$  fields do not exist on the basic particle level and also point masses, point fields are fringe ideas for the physics of particles, that form dense mass. There are also some more complex mathematical blunders that nobody did question so far mostly based on trivial logic failure or basic mapping errors. Three are famous: The 3 rotations error for mass (in GR stress energy tensor) the wrong use of  $E=mc^2$  and the symmetric bra-ket formalism that is not conform with  $e^+/e^-$  annihilation.

## 8 Conclusion

### Consequences of this paper

All models belonging to the standard model (SM) are declared engineering approaches and will have no future use to explain basic physics = **the model for mass and charge**. SM models today are used to cheat the politicians for the sole reason to get money for basically nonsensical physical experiments like done in CERN, ITER. Off course these experiments are very interesting for engineering!

So the political consequences of explaining why the self elected most brilliant people totally failed for 120 years will cause some tsunami waves, we only can counteract if people very fast start to understand how the real basic physics model ( may be based on  $SO(4)$  EM mass) works.

With each added myth fiction started to dominate the so called church of standard model physics. Why should you leave a house (the church) that feeds you and your friends? A house that defines your live? But today, past 2020, we are ready to cross the last border or biblically the Jordan, where the physics church just pirates states or unions of states and simply steals billions of taxpayer money with explanations based on fake models. There is no difference in behavior compared to the ancient pre-reformation catholic church.

Today we definitely know that successful ITER like hot fusion is bare nonsense, that experiments done in CERN will not bring us any more insight and worst: Said straight out, that the complete standard model is wishful self deception. We know that in the sun a different fusion process than  $p+p \rightarrow {}^2\text{H}$  is running and fusion does not stop at  ${}^{56}\text{Fe}$ . We also know that neutrons are not the basic building blocks of elements and thus neutron stars are fairy tales.

Of course such a statements are shocking for people that blindly follow the SM church or for politicians, that did trust "famous names" and thus allowed them to spoil billions. Further this will be even more shocking for many students/phd's that now have to learn that they just wasted a part of their live with simply learning "nonsense". Albeit, of course, **many things still are good enough for engineering** and thus not at all nonsense!

Why are we so confident about this?

- 1) We have a new model that explains all missing SM facts and fully agrees with experiments
- 2) We have experiments – cold fusion – that refute all laws of a fantasy called standard model (SM).
- 3) We have experiments that refute (strong force, internal charge structure) central claims of SM[2][4]

Further:: Since 40 years it is known that the Coulomb (electric) field between an electron and proton does not follow the Coulomb field law. This only works for the far field of macroscopic Maxwell physics!

Why did nobody try to understand why??

## 9 Summary

We did show that the so called standard model (SM) is an accumulation of erroneous decisions made by some claimed so called "great physicists". SM fundamentally is not able to explain basic physics = **the structure of mass and charge and particles**. The assumption that mass and energy are equivalent does not hold for SM like fields. Point fields / masses for particles simply do not exist at all and the Coulomb gauge already fails because the Coulomb field equation fails for the electron proton system. Further electron/positron almost never annihilate symmetrically and mass cannot

do 3 rotations.

Unluckily most physicists are not trained in basic logic. Also most physicists do miss some basic lab background of mechanics.

## 10 Outlook

We urgently need more help to refine the new  $SO(4)$  physics model that is able to explain the structure of mass and how charge is generated. There is a new path for physics already available but as long as most universities teach fantasy models and fairy tales the physics world for nuclear and particle physics will remain a Kindergarten.

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