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Superconducting Field Theory (Theory of Everything)

Sergio Pérez Felipe[1]

[1]Independent Researcher (Software Engineer, Madrid, Spain)

Abstract

Unification theory with no extra dimensions, using a vacuum structure and opposite from fields based. The first part deals with the unification of the strong nuclear force and the gravitational force. Strong nuclear force, with an attraction of 10.000 Newtons is which makes space to curve generating acceleration, more matter, more acceleration. Gravitational force is moved to work with more than 30 decimals. The second part describes the hypothetical structure for the quantum vacuum to be able to work as a superconductor of matter as well as of smaller subatomic particles (like photons or neutrinos) inside a 3 states multistable system that allows fundamental particles motion as described in the Standard Model.

Keywords: Theory of Everything; Quantum vacuum; Strong nuclear force;

1. Introduction

The 'Theory of Everything' is a hypothetical theory of physics that explains and connects all known physical phenomena into one.

The nuclear force has always been a controversial force. Due to having an extremely small field of action it has been underestimated in the search for a possible interaction with the gravitational force, but if we turn that field and look for its internal interaction instead of its external, we can create a basic piece for a somewhat more complex and extremely important model. It was responsible for the origin of string theory with the S-matrix, a framework in which the point-like particles are replaced by one-dimensional objects called strings, although it later drifted towards any type of vibration into space.

The aether or quantum vacuum has been ignored to a certain extent and possibly responsible for the most important interactions over long distances. It can be perceived as a kind of material medium as demonstrated by Michelson-Morley experiment attempting to probe the transmission of light in a vacuum, or as an energetic field as demonstrated by the Casimir effect as well as the Lamb shift. Its topology has been another source of discussion developing branches like twistor theory or spinors to try to explain spin interactions, and it could be the guilty party for all particles vibrations**.**

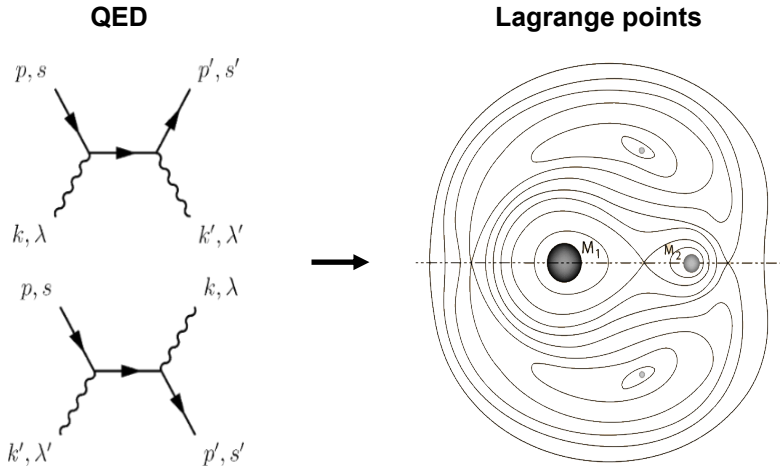


Fig. 1: From quantum dynamics to general relativity.

This physics branch uses 3+1 dimensions in space, bidimensional strings to shape quarks and a vacuum with a multistable motion system.

2. Actors

2.1 Strong nuclear force

Strong nuclear force is the fundamental constituent of matter, it allows the atomic nucleus to remain together being the strongest of the fundamental interactions (gravitational, electromagnetic, strong nuclear and weak nuclear). Gluon is in charge of this interaction, it has a scope not greater than 10 to the power of -15 meters, preventing quarks to separate by a constant attraction force of maximum 10.000 N (≈ 1.000 Kg).

Centre for the Subatomic Structure of Matter

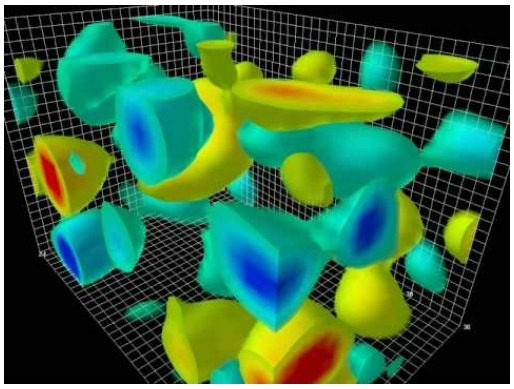


Fig. 2: Quarks and gluons interactions into vacuum.

This real picture illustrates the three-dimensional structure of gluon-field configurations, describing the vacuum properties where quarks are popping in and out constantly. The volume of the box is 2,4 by 2,4 by 3,6 fm. This induces chromo-electric and chromo-magnetic fields in its lowest energy state. The frame rate into this example is billions of billions of frames per second (FPS).

2.2 Quantum vacuum

We can note two important qualities of the quantum vacuum:

- Distance to the most distant galaxy detected by the human being is more than 30 billion light years, that means there are photons which are able to travel that distance without decreasing its speed, modifying only its wavelength. Like light, an object can move into space for a practically unlimited period as long as it doesn't find a force to stop it, so the vacuum acts as a superconductor of particles with a resistance equivalent to 0.

- In order to allow waves, it's easier into a strongly linked structure. Gravitational waves behave like ocean waves which are similar to an uptight net, these tensions can be decomposed as a unitary set of points, tenser than any known structure and under extreme repulsive forces to allow the universe expansion.

The new framework would be a quantum vacuum with a practically infinite particles conduction capacity and extremely dense. Remember we are moving into universe at an estimated speed of 600 km/sc.

Fig. 3: Quantum bond example.

3. Superconducting Field Theory (SFT)

3.1 Fundamentals

The scenario created consists in a vacuum that superconducts matter interacting with the strong nuclear force that makes that matter hold together, but how can they interact with each other? The simplest is to think about two V-shaped sticks, and an elastic band that tight them at the most opened side (it would simulate the gluon force, with size 10 to the power of -15 meters). If sticks are sufficiently lubricated and tense, the elastic band will slide to the thinnest side, more elastic bands, more force will be exerted on the sticks to join them; equally, more matter at the end of the sticks causes more attraction at the top.

We are talking about unknown limits in known world, such as infinite conduction or tensions never seen in materials.

As an example, I've chosen the most basic chemical element, a hydrogen atom (a single proton, the smallest and most abundant chemical compound in the universe), made of two up-quarks and one down-quark, bound by the gluon interaction, calculating an average approximation of how these forces would act to apply a vacuum contraction with the appropriate formulas.

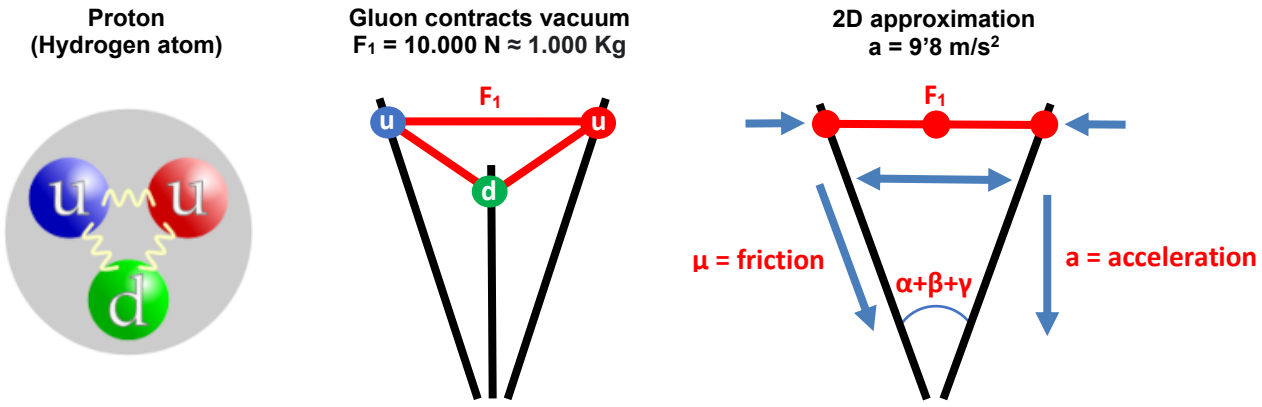


Fig. 4: Implied forces.

This behavior erases one of the fundamental forces of nature. Gravity force doesn't really exist, what we have is the strong nuclear force contracting the vacuum, affecting each nucleon in isolation. I have called this theory 'Superconducting Field Theory (SFT)'.

3.2 Calculations

The calculation is of the angle needed to generate the gravitational acceleration in the Earth. The simulation is horizontally for better understanding, applying next values with the formulas from inclined planes (Newton's second law):

- Gravitational acceleration in our planet is matched with the acceleration down the plane, 9,8 m/s^2 (a).
- Gluon force is the vertical force (not gravity as usual), which estimated values are 10.000 N (F_1) force and 1,673 × 10^{-27} (m_1) mass.
- Friction is depreciable.

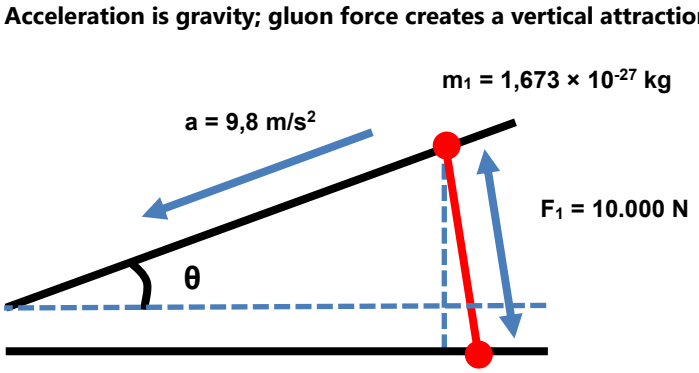


Fig. 5: Inclined plane forces.

Convert variables to metric system considering the hydrogen mass (1,673 × 10^{-27} kg).

$$m_1 = 1{,}673 \times 10^{-27}\ kg$$

$$a = 9{,}8\ m/s^2$$

$$F_2 = m_1 \times a = 1{,}673 \times 10^{-27}\ kg \times 9{,}8 = 1{,}6395 \times 10^{-26}\ N$$

$$F_2 / F_1 = 1{,}6395 \times 10^{-30}\ N$$

Match vertical force (F_1) with the attraction force from gluon (estimated as a constant with a maximum of 10.000 N).

$$m \times g \times sen(\theta) = m_1 \times a \qquad (1.1)$$

$$F_1 = m \times g = 10.000\ N$$

$$F_1 \times sen(\theta) = m_1 \times a = F_2$$

Planet Earth's angle shared by 3 quarks, creating 9,8 m/s^2 acceleration.

$$\theta = arcsen(F_2 / F_1) \qquad (1.2)$$

$$\theta = arcsen(1{,}6395 \times 10^{-30})$$

$$\theta = 1{,}6395 \times 10^{-30}\ ° \qquad (1.3)$$

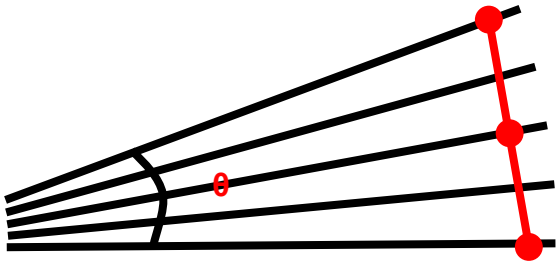


Fig. 6: Quarks scope.

The definition of mass says that it is a quantity that represents the amount of matter in a particle or an object, its calculation has many variations, like weight / acceleration (due to gravity), force / acceleration, or density × volume, all of them related to our framework.

3.3 Quantum vacuum density

Dark matter could have a different origin because of differences in the quantum vacuum density. An extension between quarks could turn mass (m_1) into gluon energy (F_1), so some places at universe can have lower or higher accelerations because of this effect; this means no dark matter in reality, which is estimated at 27% of the mass in the observable universe.

We don't really know the real relation between the vacuum density and the strong nuclear force, so this is just an estimation, but it's expected that more vacuum concentration could expand quarks and modify all the relations.

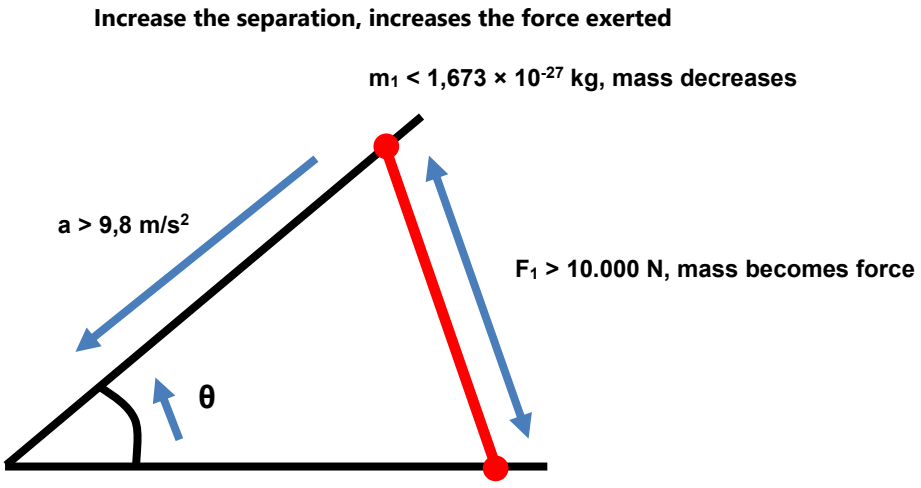


Fig. 7: Gluon behaves like an elastic band.

Variables set.

$$m_1 = 1{,}673 \times 10^{-27}\ kg$$

$$F_2 = m_1 \times a = 1{,}673 \times 10^{-27} \times a\ (kg/(m/s^2))$$

$$F_2 / F_1 = (1{,}673 \times 10^{-27} \times a) / 10.000 = (1{,}673 \times 10^{-31} \times a)$$

Calculate the relation between the angle and the acceleration.

$$F_1 \times sen(\theta) = m_1 \times a = F_2 \qquad (2.1)$$

$$\theta = arcsen(F_2 / F_1)$$

$$\theta = arcsen(1{,}673 \times 10^{-31} \times a)$$

$$\theta = (1{,}673 \times 10^{-31} \times a)\ °$$

Bigger angle generates more acceleration.

$$a = (\theta / 1{,}673 \times 10^{-31})\ m/s^2 \qquad (2.2)$$

Example with a smaller force $F_1 = 7.000N$

$$a = F_1 \times sen(\theta) / m_1 \qquad (3.1)$$

$$a = 7.000 \times sen(1{,}6395 \times 10^{-30}) / 1{,}673 \times 10^{-27}$$

$$a = 6{,}85\ m/s^2$$

Gluon force has positive correlation when transforming into mass, decreasing F_1 or increasing m_1 implies less acceleration.

Therefore, we can elucidate that Einstein field equations (EFE) would be related to Hooke's law (the force is proportional to the extension) and the asymptotic freedom (interactions between particles become weaker as the energy scale increases and the corresponding length scale decreases), because the gluon force acts as a spring to generate different tensions in the space.

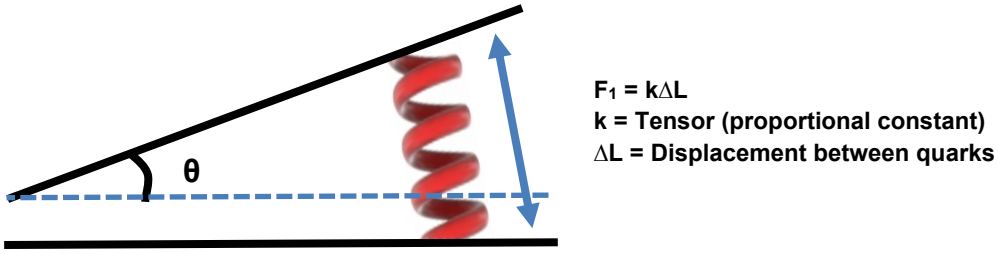


Fig. 8: Gluon becomes the fundamental tensor.

The space deforms not proportionally to create more acceleration near the accumulation of matter, behaving like an elastic material; this behavior can be quantified by Young's modulus which represents the factor of proportionality in Hooke's law at non-linear systems.

The elastic modulus or Young's modulus (E) depends on the force exerted by the matter (σ) and the deformation at each point of the resulting vector (Ɛ).

$$E = \Delta\sigma / \Delta\mathcal{E}$$

Force exerted by the angle (θ), increases (Δ) faster than force exerted by gluon (F_1) and its relation with mass (m_1).

$$\Delta F\theta > \Delta F_1 / \Delta m_1 \qquad (4.1)$$

The contraction ratio between matter and space is not known except this approach in the Earth. It could be related with the Modified Newtonian dynamics (MOND) hypothesis, that proposes a modification of Newton's law of universal gravitation to account for observed properties of galaxies.

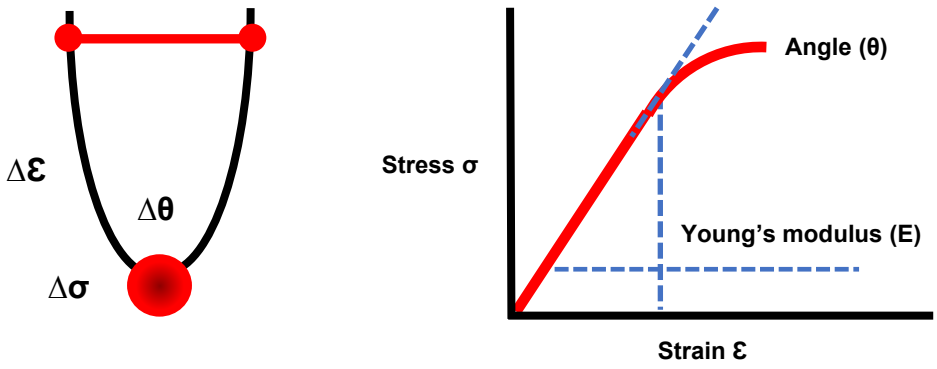


Fig. 9: Angle acts over long distances.

The gluon-matter relation modifies the space density, since it induces their approach because of the electromagnetic extraction, therefore we can speak of the existence of a bulk modulus (K), which depends on the pressure changes (p) and volume (V).

$$K = -V (\Delta p / \Delta V)$$

Other properties such as volume viscosity also called bulk viscosity can be applied.

4. Model

4.1 Fundamental forces

This is the new fundamental interactions diagram:

- Strong force and gravity unified.
- Quantum vacuum which allows motion, is a new fundamental interaction because it isn't reducible to more basic forces.
- Electromagnetic and weak force are actually unified by the electroweak interaction.

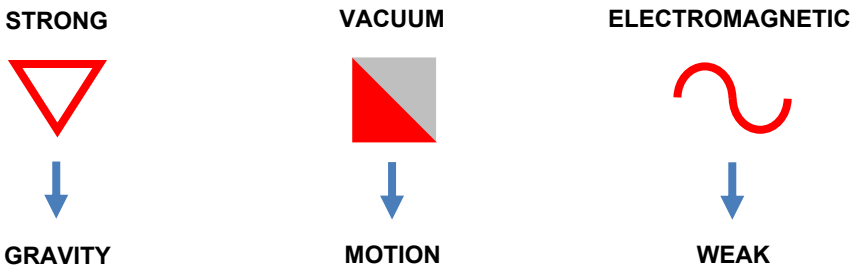


Fig. 10: Fundamental interactions.

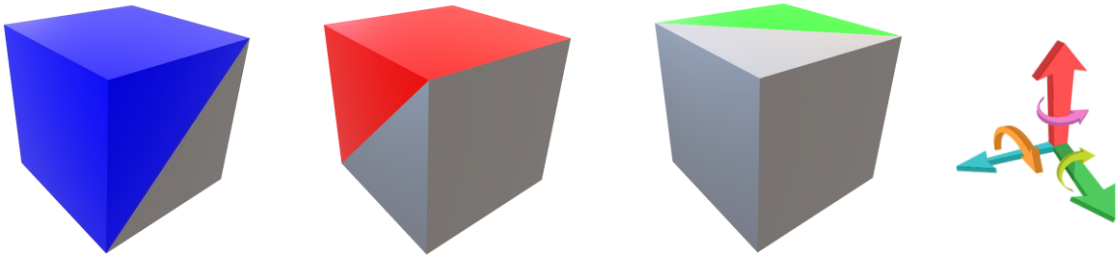
4.2 Quantum vacuum structure

We need a vacuum structure to achieve different behaviors like the motion of matter, the transportation of photons and neutrinos, and the generation of the electromagnetic field. The topological model proposed are polarized triplets rotated in a static balance in the 3 axes of space.

- Matter is constituted by nucleons (protons and neutrons), at the same time each of these is made up of 3 quarks. This vacuum net, maintains the speed because repulsions and attractions from the whole part

are equilibrated in the 3 spatial directions, this asymmetry is the cause of quantum chromodynamics (QCD) colors and anticolors and their transformations.

Nucleon structure is the only capable thing bigger than each one to survive it.

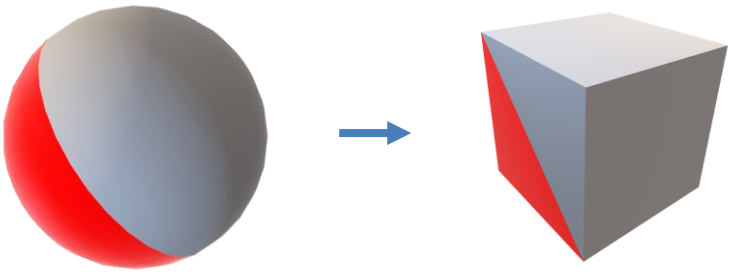


+(1, 0, 0) **+(0, 1, 0)** **+(0, 0, 1)**

Fig. 11: Spin interactions.

- We need a polarized vacuum to create the electromagnetic field (producing virtual electrons). Each polarized container should be able to extract and recover its energy as electromagnetism, helping to create electromagnetic bonds (like the hydrogen bond) to conform the chemical elements.

  This container should have an internal force trying to expand with a spherical distribution so, during for example a space burst, particles could be dispersed easily in all directions.



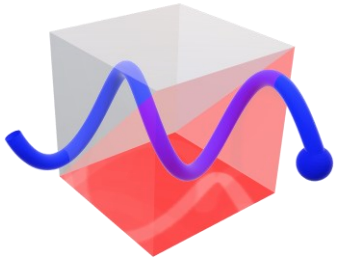
-(0, 1, 0) **-(0, 1, 0)**

Fig. 12: Vacuum polarization.

- Light has its own inertia, it travels at approximately 300.000 kilometers per second, but it slows down to 225.000 kilometers per second in water (it depends on the electromagnetic properties of the medium it's embedded in), recovering its speed when leaves the water.

  Neutrinos and photons are smaller than the frame base so they can be transported by the vacuum. The infinite amount of inertia accumulated in these particles comes from the energetic vacuum and maybe, if the frame base is small enough, they can fall in a 3D equilibrium and be stretched (to create for example the gravitational lensing effect).

  It can be considered as the smallest unit of time, where quarks are trying to be accelerated to the speed of light but they can't.



+(0, -1, 0)

Fig. 13: Particles transportation.

All different positions into space are related to these containers with next variations:

1. +(1, 0, 0), +(0, 1, 0), +(0, 0, 1)
2. -(1, 0, 0), -(0, 1, 0), -(0, 0, 1)
3. +(-1, 0, 0), +(0, -1, 0), +(0, 0, -1)
4. -(-1, 0, 0), -(0, -1, 0), -(0, 0, -1)

This energetic structure is compatible with behaviors like supersymmetry (group theory), Lorentz transformation and Minkowski diagram to explain the spacetime deformations (via rhomboidal deformations), photons creation due to the Dynamical Casimir effect, antimatter survival while others like pions are unstable, emerging patterns like fractals or crystal structures with its repeating arrangement of atoms…

4.3 Theory of Everything (ToE)

Considering the electromagnetic field as a flux extracted from the vacuum it's easy to guess the final component between the strong force and the vacuum, motion.

The Big Bang produced the initial state, all the necessary energy to provide motion to all matter was then created and everything began to interact as described via the quantum vacuum. Its properties could create the first conditions for life helping to create structures like the double helix in the chromosomes, gained by the quantum superposition.

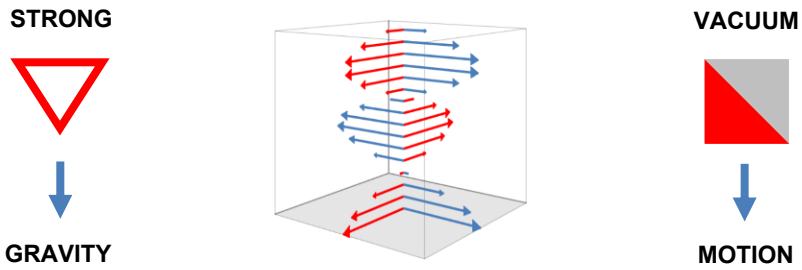


Fig. 14: Theory of Everything scheme.

So, if the scientific method is based on determinism and hidden variables don't exist, we could consider superdeterminism (neither chaos nor free will exist) and overcome resignation thinking about ways to break it, like overmuch information in the universe (all the photons from all the stars can't be predestined); this is the first cycle in the universe (we start from a blank canvas); God (if we are an expression from the vacuum, there is something that can feel inside it); or, we are a tool capable of breaking it (because the universe needs it).

5. Conclusions

It can explain:

- Unified field theory between gravity and strong nuclear force, the generation of electromagnetic fields generation, until obtain the Theory of Everything.

- SU(3) × SU(2) × U(1). The quarks possess color quantum numbers and form the fundamental (triplet) representation of an SU(3) group. The Pauli group is the matrix group which symmetric properties reproduce the spin of the particles via SU(2). The simplest internal symmetry group is U(1).

- Dark matter and black holes as a densities system. Matter and vacuum concentration become so close that the scope of the strong nuclear force can become weaker in comparation (Schwarzschild radius is about 4×10^{14} g / cm^3). Depending on the field length, photons could be attracted because its field can interact with the vacuum while smaller particles like neutrinos can escape.

- Dark energy and universe's expansion. The containers behavior implies some kind of spin-polarization helping its expansion, strong enough to avoid to get closer and reestablish its structure after any contraction, it creates the force to propagate over long distances.

- Gravitational time dilation. Each frame is the smallest unit of time, a bigger frame implies minor energy concentration and displacements takes less time because of the slowing frame rate.

- Planck length (ℓP = 1,616255(38) × 10^{-35} m) and Planck time (tP = 5.391247(60) × 10^{-44} s), are theoretically considered to be the quantization of space and time and may point to the vacuum structures by length as well as time. Planck referenced to relativistic values which may not be so accurate, for example, Gamma rays have one of the smallest wavelengths, shorter than 10^{-11} meters.

- Cosmic microwave background (CMB) and small modifications expected in the speed of light because of the vacuum density.

- Gravitational constant (G = 6,67408(31) × 10^{-11} $m^3kg^{-1}s^{-2}$) and its problem to measure with high accuracy since it can be related to the density exposed.

- Conservation of angular momentum at rotations into space with spherical and circular movements at planets and galaxies. Applying this conservation and removing antimatter from the Big Bang, could lead to less antimatter than 50% in the universe.

- Variations in $E = mc^2$ (for example, $E = AF_1$, where A is the nucleons number to indicate the rest energy of matter).

- Particles decay due to vacuum interaction.

- Schrödinger equation, to describe how the quantum state of a quantum system changes with time.

- Coulomb's law and Newton's law similarities.

- The unidirectional arrow of time

- …

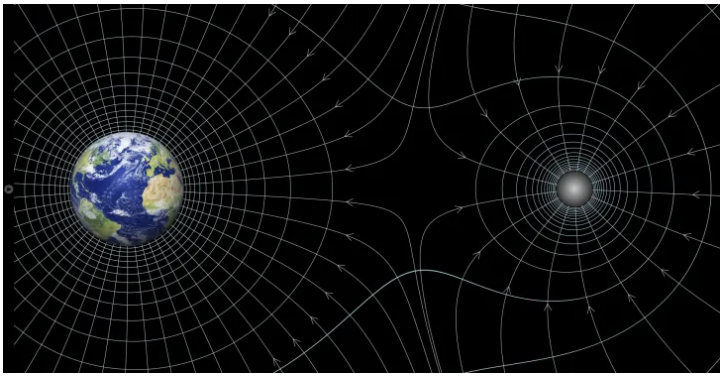


Fig. 15: All these variables help to create shapes in galaxies like the golden spiral (φ = 1,6180).

6. Considerations for the study

Accelerate matter using a cyclotron to transform into energy as much matter as possible. We need a material with maximum magnetic permeability on high magnetic fields as possible, pure iron can be a good reference but we can consider some other materials with high permeability.

Centripetal force, forces matter to the sides, so we need a magnetic field to keep dimensions. We need enough width to study how vacuum bends and enough height to concentrate energy along (it is very difficult to concentrate kinetic energy at one point).

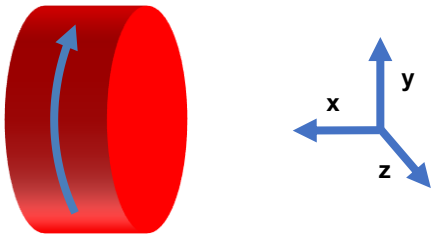


Fig. 16: Accelerate cylinder particles until 1/10 speed of light.

Calculate the energy of one disk in motion, a radius of 2 cm and a height of 2 cm are enough for the study.

$$V = \pi \times r^2 \times h \qquad (5.1)$$

$$V = 3'1416 \times 4 \times 2$$

$$V = 25,1328\ cm^3$$

Calculate the mass using iron density (ρ = 7,874 gr/cm^3) and consider a maximum speed reached.

$$m = 25,1328 \times 7,874 = 197,89\ gr = 0,197\ kg \qquad (5.2)$$

Compare kinetic energy reached, with the maximum energy which could be generated (using a relativistic approximation).

$$v = 300.000\ km/s = 3 \times 10^7\ m/s$$

$$E_k = ½mv^2 \qquad (5.3)$$

$$E_k = ½ \times 0,197 \times 9 \times 10^{14}$$

$$E_k = 0{,}8865 \times 10^{14}$$

$$E = mc^2 \qquad (5.4)$$

$$E = 0{,}197 \times 9 \times 10^{16}$$

$$E = 1{,}773 \times 10^{16}$$

The energy calculated in the disk periphery can have a magnetic relation with its motion, its charge(q) and magnetic field (B) are related with its velocity where v = qBr / m, so the output energy can be calculated when a speed is reached in a relativistic approximation.

$$E = ½\ mv^2 = q^2B^2r^2 / 2m$$

Anyway, more studies are needed to check the real correlation between the quantum vacuum and the gravitational force. Inertia is related with the weight increase, but the vacuum extraction should be related with a change in the vacuum density (anyway it returns again to the vacuum, so it's difficult to measure).

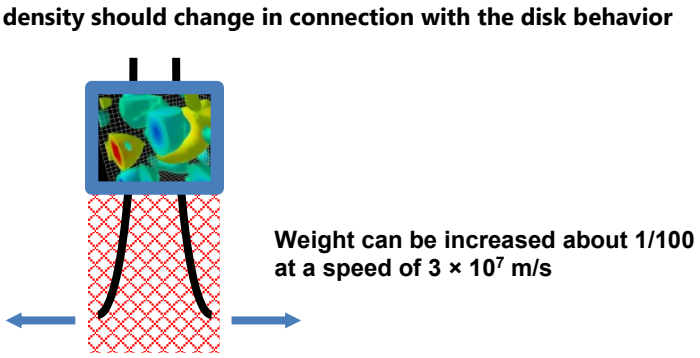


Fig. 17: Motion and relativity equivalence.

Other variations at QCD have been observed, for example, at baryon resonances.

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