



Article title: The force-lines field

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The force-lines field

Abstract— To describe gravity in the most precise way and to be able to add it to the Standard Model, furthermore consider it as a force instead of geometry of space-time. The existence of the force-lines is well defined as the field with resistance creating the mass of the particles and gravitational field. The gravitational force is divided into attractive force and compressive force. The report claims that when a particle moves in the field of the force-lines faces resistance against the trajectory of the particle and this supposedly slowing force is the mass of the particle. Therefore, the equation comes $m = kv^2$, where resistance coefficient multiplied to velocity in square. It means that photons which have 0 coefficient resistance have 0 mass $m = 0v^2$. However this report states that, photons also have resistance, therefore in this paper solution provided even if it's extremely difficult to measure it. The field of the force-lines explain the true reason of gravity and the formation of mass. In some cases, properties are as defined by Higgs mechanism $m_{f^2} = \xi f \cdot \phi_0$. The geometry of deformed force-lines defined as a force according to Hooke's law of deformation $F = kx$. "Field tells particle how to give mass, particle tells field how to give stress," (S.Fatkhullaev).

I. INTRODUCTION

Despite the fact Einstein described gravity as a geometry of so-called space-time, which doesn't fit in explanation with the other three forces of the Standard Model. Until today, there was no other theory that would represent gravity better than the theory of general relativity. On the other hand, all scientists know that there should be a theory, which will unite all forces. Theory of the force-lines field gives solutions for all of these problems. As we know Newton's law of universal gravitation explains gravity as a force, but not exactly as it is manifested. Therefore, Newtonian physics isn't providing us answers for some questions, for example: the anomalous shift of the perihelion of Mercury is a feature of the motion of the planet Mercury discovered in 1859, which played an exceptional role in the history of physics [1-2]. However, the search was crowned with success in 1915, when Albert Einstein developed the general theory of relativity [3]. The point of Einstein's equations is that their physics falls apart when you look at a small-scale system, much like Newtonian physics could not properly explain the motion of planetary bodies. Although relativity replaced Newtonian physics, it couldn't explain things at the quantum level, which is why we have quantum physics [4]. It is evident that to tackle these challenges, we must go beyond classical Newtonian physics and general relativity, as these theories alone cannot solve or avoid the problem.

First of all, to explain new concepts, we need to understand mass, which is the main reason for gravitation. Furthermore, the aim of this report is to define the formation of mass and justify gravity as a force. Existence of the force-lines is the key factor to reach it. Then the question is where does mass come from? The symmetries of the theories of the microcosm forbid fundamental particles to have masses, and the Higgs field violates these symmetries and provides the possibility of the existence of masses for fundamental particles [5]. This is the main role of the Higgs field. The answer to the question about the nature of the masses of fundamental particles was given by

the Standard Model. According to it, the masses of fundamental particles are the result of their interaction with the Higgs field. The quantum of this field is the Higgs boson [6-7]. This field is present everywhere in the universe. The main role of the Higgs field is to provide masses to all fundamental particles.

What are the properties of the Higgs field?

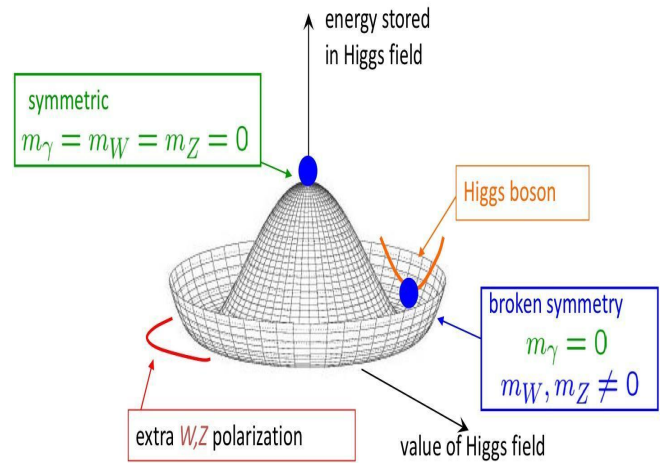


Figure 1: "Higgs field called: (Mexican hat)"

(Source: [5])

Firstly, this field is homogeneous, i.e., it is evenly "poured" over the entire space, and it is inextricably linked with the concept of physical vacuum. Physical vacuum is not absolute emptiness, it is the lowest energy state of fields penetrating space [6]. This vacuum field, having some properties of an ordinary material medium, does not create a dedicated reference frame associated with it, does not interfere with the movement of bodies and the propagation of other physical fields through the space filled with it.

The second unique property of the Higgs field is that its strength is non-zero everywhere. For ordinary fields (electromagnetic, strong and weak), the lowest energy state corresponds to zero field strength, i.e., its absence. The third feature of the Higgs field is that, interacting with fundamental particles, it endows them with masses, the values of which are proportional to the strength (or potential ϕ_0) of this field, multiplied by the strength (intensity) of the interaction. The stronger (more intense) this interaction, the greater the mass of the particle [7].

So, the Higgs field, interacting with fundamental particles, endows them with masses [8-9]. In this case, the value of the mass of the particle is determined by the intensity of this interaction or, which is the same, by the constant ξ of its connection with this field. According to modern data, the Higgs field constant in space is $\phi_0 = 174 \text{ GeV}$ [9]. The mass acquired by the fundamental particle f as a result of interaction with the Higgs field is given by the relation

$$m_{f^2} = \xi f \cdot \phi_0.$$

It follows from this expression that for an electron $\xi_e \approx 3 \cdot 10^{-6}$, for a top quark $\xi_t \approx 1$, for a neutrino this constant is in the

region of 10-13. Knowing the masses of fundamental fermions, it is easy to obtain the value of ξ for each of them. The Higgs field also gives masses to the W and Z bosons and to the Higgs boson H0 itself [8-9]. The photon and gluon remain massless.

Both the force-lines and the Higgs field can be represented as fields when particles move in it, the movement of particles becomes difficult. According to the Higgs mechanism, the field interacts with particles and the cause of the mass is the Higgs Boson [30]. However, by force-lines, the interaction of the field with particles is represented as a resistance force that faces a particle when moving in the field, it means the reason of the mass is force against the movement of the particle. The interaction of the Higgs boson with other particles, the force-lines define it as a manifestation of gravity [10]. For example: if we imagine planet earth as one of the particles moving at the velocity of 30 km/s facing resistance from the force-lines, then the Higgs boson will be one of the asteroids hitting the planet [11]. Answer to the question: why are asteroids attracted to the planet? - because the deformation of the force-lines creates the gravitational force. One object changes the uniform distribution of the resistance force by deformation of the force lines for another object in space [12].

After the analysis the study found that general relativity geometrically described the object's trajectory which is the result of the resistance force in the deformed force-lines field [13-15]. However, from this report's point of view the trajectory is not geodesic, because in our case space is static, but the force-lines field is deformed [16-17]. If we imagine curved space-time with negative stress-energy tensor, Einstein's tensor will be $-G_{\mu\nu}$ which is opposite of usually known space-time curvature with positive $T_{\mu\nu}$ [18]. Then if we look at the two-dimensional grid space.

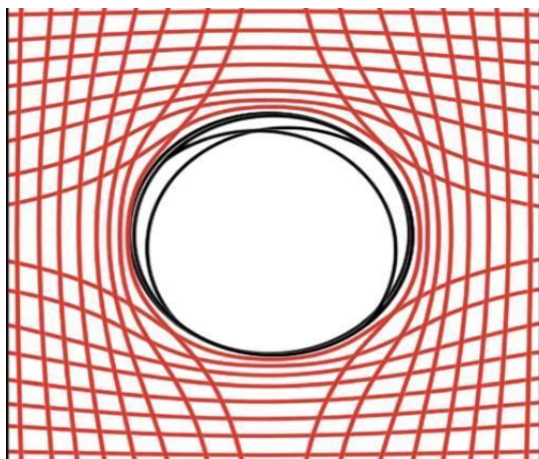


Figure 2: force-lines (two dimensions)

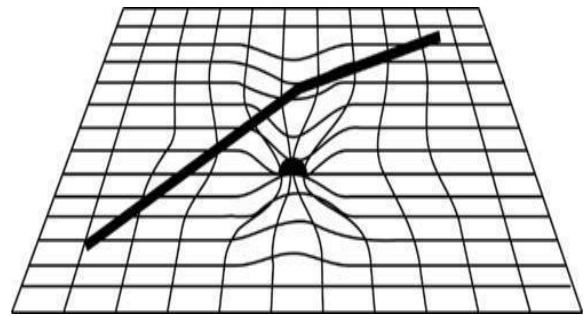


Figure 3: Einstein's curved space-time
(Source: [19])

It's clear that lines in Figure1 and in Figure 2 are geometrically opposite. In general relativity figure 1 is the way dark matter curves space-time [22]. But if we consider it as a force-lines field, it works as it was explained by Hooke's law of deformation [23]. Elasticity is a quality of an object or material that allows it to revert to its original shape after being deformed. The more exactly an object reverts to its previous state, the more elastic it is. When a spring is stretched, it produces a restoring force that causes it to return to its original length. The amount of stretch is often related to the amount of restoring force.

In 1660, the English physicist Robert Hooke discovered a rule that states that the load (deforming force) applied to a spring is directly proportional to its extension [24]. When the load is removed under these conditions, the item returns to its original shape and dimensions. Hooke's Law is the name given to it.

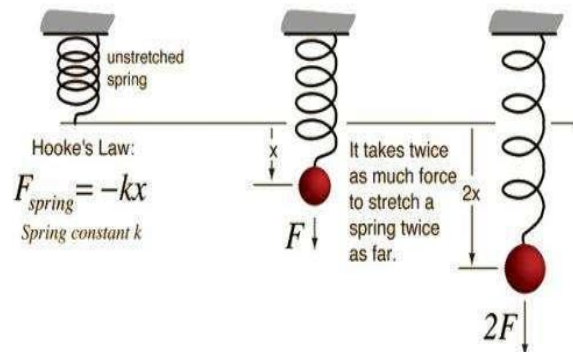


Figure 4: Hooke's law of deformation
(Source: [24])

Hooke's law states that the applied force F (N or kgm/s^2) equals the displacement or change in length x (metres) times a constant k (N/m or kg/s^2), or $F = kx$. Hooke's law is sometimes written as $F = kx$ [24]. F no longer refers to the applied force, but to the equal and oppositely directed restoring force that allows elastic materials to return to their original dimensions.

As long as the load does not exceed the material's elastic limit, many materials will obey this law. The line, when displayed on a graph, reveals a direct variation. Stress is the force that occurs as a result of an externally applied force on unit areas within a material. The relative deformation caused by stress is known as strain. Hooke's law is also known as the law of stress and strain [25]. In simple words, Hooke's law states that strain is proportional to stress.

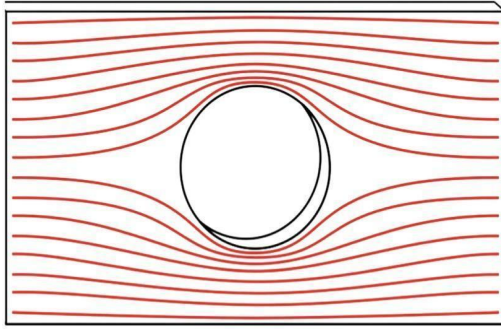


Figure 5: “Forcelines” (one dimension)

Hooke's law is frequently observed in objects that swiftly return to their original shape after being bent by a force. Hooke's law only applies to particular materials and loading circumstances. Throughout its elastic range, steel follows Hooke's law [24]. Hooke's law only applies to a fraction of the elastic range for aluminium. Rubber is considered a "non-Hookean" material since its elasticity is stress dependent and temperature and loading rate sensitive. Hooke's law is used in spring-operated weighing machines, stress analysis, and material modelling [25]. However, after the appearance of the object between the force-lines, distance is increasing between them according to Hooke's law of deformation. Furthermore, the resistance of the force-lines to other additional objects is unbalanced, because the biggest object deformed the field. It's clear that resistance is less on the wider side than on the tighter side for additional smaller objects, so it means the smaller object will move to the less resistant region [23-25]. This manifestation explains gravity and how objects move in space.

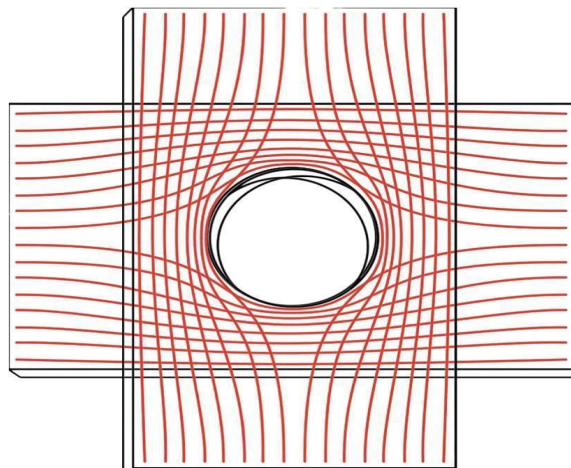


Figure 6: “Forcelines” (two dimensions)

Further, in the two-dimensional grid, due to the form of the deformation the ring of resistance has been formed by “forcelines”. The form of the object becomes spherical in a three-dimensional world [27]. Figure 6 shows that objects in the field will face two kinds of force:

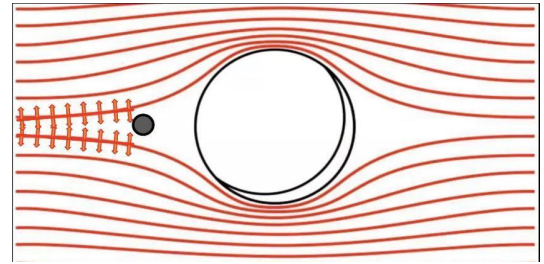


Figure 7: “Example of attractive force in one dimensional grid”

Attractive force

In figure 7 we can see that Black object moves from the left side to the right towards the bigger White object according to the deformation of the force-lines. Force-lines deformation shows direction to the object in space. Overall, this force tells objects how to move.

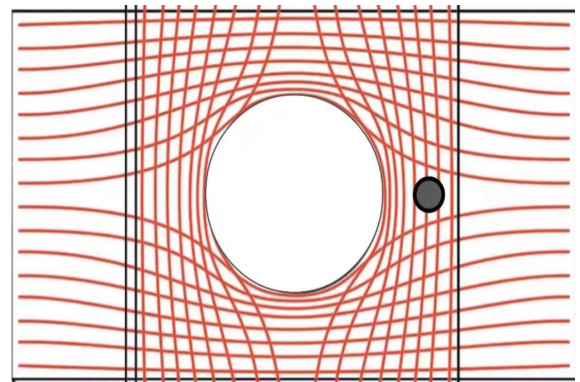


Figure 8: “example of compressive force in two-dimensional grid”

Compressive force

On the other hand, in figure 8 we can see that due to the additional force-lines the Black object compresses at the moment of movement towards the bigger White object. The closer the Black object gets, the more it will be compressed by the field of the White object. Overall, this force tells how to form the object

Also, if an object is added like a ray of light between the “forcelines”, it will be divided into two parts at the beginning and united at the end. According to the geometry of deformed force-lines, the easiest way to move forward for light is splitting around the object [28-29]. At this point resistance to the “forcelines” with the gravitational lens in general relativity predicts the trajectory of objects in the same way, but reasons in both theories are different [8]. This report claims that photons also have resistance and speed estimated by equation

$$2AB / (t'A - tA) = c$$

Obviously can't give us the speed results of the photon in one direction. It is possible photons speed could be faster forward and slower backward. Einstein in his paper “on the electrodynamics of moving bodies” published in 1905 said: “Is neither supposition, nor a hypothesis about the physical nature of light but a stipulation that I can make of my own free will to arrive at a definition of simultaneity”. The force-lines field claims that every particle should have resistance in the field, otherwise our world couldn't exist. But how can we prove that photons have resistance (mass) and their speed is not

universal?

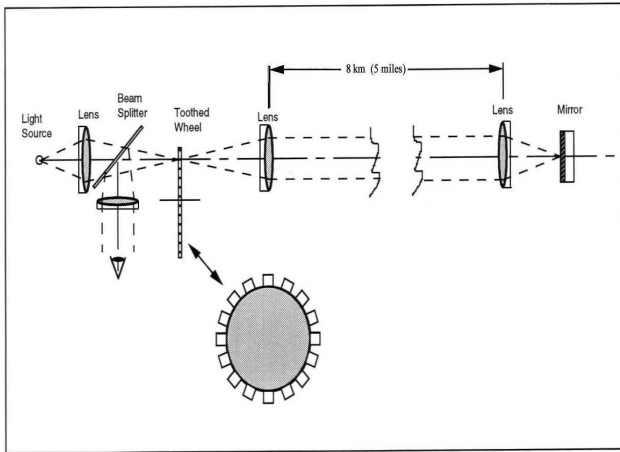


Figure 9: Interferometer arrangement

When Fizeau projected a pulsed beam of light onto a far mirror in 1849, he made the first terrestrial measurement of the speed of light. He calculated the speed of 315,000 km/h based on the number of teeth and rotational speed of the toothed wheel, as well as the distance to the mirror [31]. French physicist Jean Léon Foucault (1819-1868) updated Fizeau's experiment by replacing the toothed wheel with a revolving mirror. Foucault calculated the speed of light to be 298,000 km/s with this new arrangement, which is substantially closer to the accepted number today [32]. Furthermore, there is the way to find the difference in speed of light according to the equation

$$m = kv^2$$

where objects have mass due to resistance in the field. We need to find the resistance of the photons in the field by experiments. Nowadays there is no solution to test the speed of light only forward, but we can find the speed of the light by equation $2AB / (t'A - tA) = c$ in different resistance force fields [32].

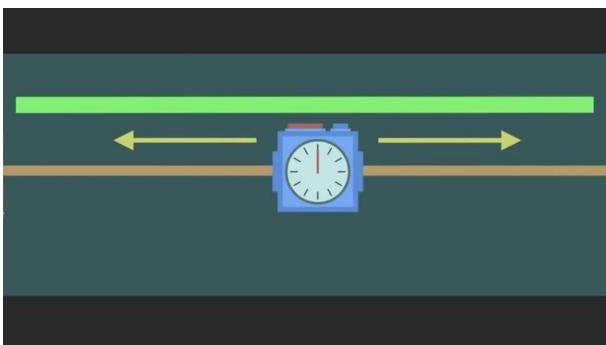


Figure 10: Arrangement to detect speed of light

In figure 10 possible solutions are provided to find differences in speed of light. Between two mirrors in the middle-located timer from where light projected to a mirror, where it was collected and then reflected back to the point of origin. One mirror is located in the field of higher resistance and the second mirror in the field of less resistance. If there is a difference in the speed of light, then it means that photons have resistance, which causes the speed reduction and formation of mass. Automatically we can say that the speed of light backward is different from speed forward due to facing

resistance on the way of movement [33]

BASIC EQUATIONS

To calculate the speed of light the equation below is provided

$$2AB / (t'A - tA) = c$$

[34]

To construct a geometry of the force-lines field, Einstein's field equations given by

$$G_{\mu\nu} = T_{\mu\nu}$$

[35]

where $T_{\mu\nu}$ is the energy- momentum tensor of the nonlinear electrodynamics field, $G_{\mu\nu}$ is the Einstein tensor and [29]. The coefficient 8π has been absorbed in the energy-momentum tensor in Eq.(2) for simplicity.

To describe geometrically forcelines deformation it should be negative

$$-G_{\mu\nu} = -T_{\mu\nu}$$

[35]

However, according to Hooke's law, the force due to the distance of the deformation in any direction will be equal.

To define gravitation according to Hooke's law of deformation written as

$$F = kx$$

[36]

Where F equals a constant k times the displacement or change in length x. To find gravitational force by Hooke's law, equation should be in the form as

$$F = -pG_{\mu\nu}$$

[35-36]

Where p is the density of the force-lines and $-G_{\mu\nu}$ is Einstein's tensor as a geometry of the deformed force-lines.

The resistance of the particle in the force-lines field is given in the form

$$m = kv^2$$

Where m is the mass of the object, k is the resistance coefficient, which firstly depends on the level of the resistance facing each particle, which is different for all particles and secondly depends on density of the force-lines field, v is the velocity in square. Obviously for a photon it will be the speed of light in square, however as photons almost don't have resistance in a field of low density, their mass is close to zero.

However, this theory predicts that the force-lines field can become so dense that non-computable resistance of the photons can be visible near the black holes.

II. PREDICTIONS

There are the following predictions:

- Resistance force endows mass to the particle[figure:6]
- Photons have resistance in the field, which means the speed of light is not universal.
- Equation: $m = kv^2$ where mass is equal to the

resistance coefficient multiplied to velocity in square

- Time resists and slows down due to resistance of the force-lines field and the level of time dilation depends on deformation of the field[25-36].
- Manifestation of the force-lines waves [35].
- The shape of the planets and other space objects are formed according to the deformation of the force-lines in space [24].

III. CONCLUSION

In this paper, we went more deeply into the understanding of gravity, than the theory of general relativity and Newtonian gravity. The gravitational force has been divided into attractive and compressive forces, which are giving an object its shape and direction of motion. Especially the movement of objects and the formation of mass due to resistance. Therefore, it is well described the existence of the force-lines field, which gives explanation to a lot of manifestations of physical processes. In the course of the study, according to Hooke's law, it was established that the curvature of the force-lines field leads to the formation of an uneven distribution of forces, which thus shows the object the direction to the region of maximum deformation. The characters of the Higgs field were refined[6-9], which gives mass to the particle. It is defined in the form as the mass is the result of the resistance force that a particle feels at the moment of movement in the field from one point to another in space. If an object is left without the object that creates a gravitational mass, then there will be only inertial mass. However, if the body is left without a field of force-lines, then there will be no mass at all. Based on this, we found out that photons must also have a mass, because otherwise photons without any restrictions would leave the field of the object formation and nothing couldn't be formed in our space without attraction and compression. To identify the mass of a photon, a solution was presented to find the deceleration of the speed of light around massive objects relative to a field with less deformation.

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