# Space-time Oscillating Field Hypothesis

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**Abstract**

In this hypothesis I presented a possible mathematical model and physical foundations for quantizing gravity as a field satisfying the field equation (2.2), this equation is a differential equation similar to a wave equation when only indexes are included a = b , the effect is a wave in curved space-time. The basis of this hypothesis is that there is equality between the derivative of the scalar part of the wave function depending on time measured and derivative of curvilinear coordinates of this function. The field equation is independent of the space-time scale, so it is the same for the time scale where Planck time is the minimum time as when any of its powers is what is required to do not break Theory of Relativity.

Because the wave equation always gives some kind of cyclical function, it means that they will produce surfaces enclosed in four-dimensional space-time, they are loops in space-time which will occur for sure with Planck's energy or singularities. For smaller energies, the loop can be looped around because the Planck loop will not be able to perform a full turn only part of it. I did not provide any solutions in this hypothesis - but to predict most of the consequences of this exact equation they are not needed.

In this hypothesis there are symmetries that satisfy the field equation, these symmetries are related to solutions of equations and thus particles with interactions that exist in standard model. Although this is a gravity hypothesis, it describes the same interactions as consequences of field equations. From these symmetries you can count the spin and the electric charge of the particles. This hypothesis states that the wave function is a tensor and one needs to solve the field equation to calculate this tensor, although the equation is written in scalar form, the unknowns are energy tensors, metric tensor and wave function. The Planck scale is fundamental here and becomes most visible effects are at energies close to Planck's energy where this hypothesis does differ significantly from Theory of Relativity.

# Contents

# 1 Planck's scale

To quantify gravity, it is necessary to set up such a system of units that is the fundamental. According to current knowledge in physics, such units are Planck units in this hypothesis time, space and energy units will be the most important. The Planck scale is relatively small but fundamental and quantum gravity should show its effects there. In this hypothesis the key to understanding gravity is to relate Planck's time and length to physical phenomena and deriving from this physical laws that their principles are based on this scale. The key the assumption is that some field (wave function) has a limited number of oscillations and not may have more than one oscillation at one fundamental Planck time.

The main purpose of quantum gravity is to describe gravity according to the principles of quantum physics. This basic idea in quantum physics is the wave function or in a more modern quantum field. The gravitational field must also be a quantum field and hence be understood as a certain probability field of the event. Because gravity is tensor field (space-time) the quantum gravity field must also be a tensor field. Scale Planck imposes a certain limit on how this field may behave, the first property is that the field must be continuous but it cannot have more than one full oscillation at a time Planck, practically it means that the field frequency multiplied by Planck's time will give maximum unity. The second less obvious assumption is that despite the continuity of the field it cannot it locally has a length less than the Planck length or lasts less than the Planck time.

It is very important here to state as to the locality of this law, it can be derived field formations for smaller lengths and durations but locally these quantities always remain the lower limit, hence the speed of light also remains the highest. This is the maximum the speed is the speed of light is naturally due to the fact that in the least the smallest length will be the speed of light and because it cannot be less than one the length unit (local) the speed of light remains the limiting speed. The condition that says also imposes a limit on energy that can be maximally equal to Planck's energy because if I take a wave of frequency such that multiplied by Planck's time it would give one I will receive the inverse of Planck time as a frequency, and thus Planck energy

The well-known formula for photon energies is associated with the relativistic momentum formula, mass particles (of Planck's length) cannot be larger than the Planck's mass, which means that there is connection between momentum and energy on the Planck scale. Energy of one field fragment with long Planck length cannot be greater than photon energy with a frequency inverse of time Planck. This conclusion shows that the relativistic mass cannot grow for one fragment Planck fields more than to Planck mass. The energies of such a field can be treated as photon energies with a frequency maximally inversely of Planck's time, therefore, exist on the Planck scale, the relationship between the field frequency and the energy that the particle carries, and hence how much a Planck particle mass can grow. So recording the photon energy and I get its equivalence with the energy of oscillations at frequency f :

$$E^2 = h^2 \left(f^2 + f_0^2\right) \tag{1.1}$$

$$h^2 f_0^2 = m^2 c^4 \tag{1.2}$$

This means that the change in energy is equivalent to a change in field frequency and that mass is different understood as the initial field oscillation. This is the basic concept on which this whole hypothesis bases its assumption. The increase in energy (and hence mass) can never be greater than Planck energy and hence in one Planck length cannot be greater than Planck mass.

# 2 Idea of quantum field

Although the concept presented in the previous chapter is crucial for all this hypothesis thesis, this is a very simplified description, it does not describe the field but the relationship between the field and energy. Zero oscillation of the field can be treated as mass, but really this relationship is more complex because elementary particles are not necessary for Planck lengths but more (due to their interactions) the gravitational effect of these particles which I presented in the first chapter it is not visible, the particles are not very tight, i.e. their interactions make their size larger. However, at stronger gravity near the Planck scale effect this one is visible - it is impossible to distinguish resting mass from field oscillations, they are equally important. Equivalence of field oscillation and gravitational interaction is the foundation of this hypo- theses and before I present the exact mathematical model that describes this field, you have to understand the basic idea behind this field.

In General Theory of Relativity, inertial and gravitational mass are equivalent, in this there is another analogy to the hypothesis, the space-time geometry is equivalent to the measured time for own time but it is not one own time as in Relativity Theory but four because each coordinate has one assigned to it, so for four-dimensional space-time there are four measured times. The field (wave function) is also a tensor and has additional four degrees of freedom which are measured in time. Each coordinate has one time measured, so the geometry of this hypothesis is based on one scalar way of defining distance as in theory of relativity. The hypothesis is a differential equation that is fine defined.

The idea of this field requires that the scalar part of the field tensor the wave function - be equivalent to tensor part for only the gravitational system when all other interactions are omitted. Geometrically, this means that a change in curvature is equivalent to a change in the scalar part of the function wave, i.e. its measured time variables. Positive curvature equals positive change at the time measured for a given field wave function and analogously the negative curvature equals negative value of the field wave function in measured time. The scalar part is time measured. Exactly the equivalence lies in the fact that the derivative of the wave function for each curvilinear coordinate is the equivalent of the derivative for each coordinate of time measured. additional A factor in the equation is the metric tensor and the energy tensor , the metric tensor appears in the equation next to the part related to the measured time function and the energy tensor at the part related to curvilinear coordinates. I'll start since writing the equivalence on which the field equation is based:

$$\sum_{a,b} \frac{\partial}{\partial \zeta_a} \frac{\partial}{\partial \zeta_b} T^{ab} \psi_a \otimes \psi_b - \frac{\partial}{\partial \sigma_a} \frac{\partial}{\partial \sigma_b} g^{ab} \psi_a \otimes \psi_b = 0 \tag{2.1}$$

Where $\psi^a(\sigma^0, ..., \sigma^3), \psi^b(\sigma^0, ..., \sigma^3)$ is a wave function, while $T_{ab}$ is an energy tensor written in covariant form. This is an equation for one system that is only gravitational. Because zero on the right side of the equation occurs only for the gravitational system, it is necessary to enter of a new object on the right when the result is non-zero. The variables $\sigma^0, ..., \sigma^3$ are measured time variables and variables $\zeta^a, \zeta^b$ are curvilinear coordinates.

$$\sum_{a,b} \frac{\partial}{\partial \zeta_a} \frac{\partial}{\partial \zeta_b} T^{ab} \psi_a \otimes \psi_b - \frac{\partial}{\partial \sigma_a} \frac{\partial}{\partial \sigma_b} g^{ab} \psi_a \otimes \psi_b = \Psi^2 \tag{2.2}$$

# 3 Geometry of field equation

For the theory of gravity, since the emergence of Relativity Theory, field geometry - that is space-time. In the previous chapter I presented the field equation in this development geometrical properties. For a gravitational system only, this equation can be divided into two parts where there are two differential equations that for only components where $a = b$ looks like a wave equation. This equivalence states that the system only acts by gravity, it has none other type of energy accumulated in itself. Writing again:

$$\sum_{a,b} \frac{\partial}{\partial \zeta_a} \frac{\partial}{\partial \zeta_b} T^{ab} \psi_a \otimes \psi_b = \sum_{a,b} \frac{\partial}{\partial \sigma_a} \frac{\partial}{\partial \sigma_b} g^{ab} \psi_a \otimes \psi_b \tag{3.1}$$

However, if the system is not only gravitational, this equation does not occur as in equation (2.2) there is an additional term scalar function depending on the time measured in the square, this function he can join in two ways. Its definition is the tensor product of two dependent vectors since the measured time which are summed under the indices $a, b$ , writing it formally and combining it with field equation I will get:

$$\sum_{a,b} \frac{\partial}{\partial \zeta_a} \frac{\partial}{\partial \zeta_b} T^{ab} \psi_a \otimes \psi_b - \frac{\partial}{\partial \sigma_a} \frac{\partial}{\partial \sigma_b} g^{ab} \psi_a \otimes \psi_b = \Psi_-^2 \tag{3.2}$$

$$\sum_{a,b} \frac{\partial}{\partial \zeta_a} \frac{\partial}{\partial \zeta_b} T_{ab} \psi^a \otimes \psi^b - \frac{\partial}{\partial \sigma^a} \frac{\partial}{\partial \sigma_b} g_{ab} \psi^a \otimes \psi^b = \Psi_+^2 \tag{3.3}$$

$$\Psi_-^2 = \sum_{a,b} \Psi_a(\sigma^0, ..., \sigma^3) \otimes \Psi_b(\sigma^0, ..., \sigma^3) \tag{3.4}$$

$$\Psi_+^2 = \sum_{a,b} \Psi^a(\sigma^0, ..., \sigma^3) \otimes \Psi^b(\sigma^0, ..., \sigma^3) \tag{3.5}$$

For given vectors that are solutions to the field equation, the space-time metric is good known formula from the General Theory of Relativity:

$$ds^2 = \sum_{a,b} g_{ab} d\psi^a d\psi^b \tag{3.6}$$

The field equation results in a tensor field despite the fact that for not only gravitational systems the scalar function is the solution. The energy tensor, the metric tensor are unknown in the equation and the most important wave function as a tensor. The tensor product that will be used it's very important when many systems are considered. Because field equation for one system gives a fairly similar equation to a wave equation (except for the metric and energy tensor as unknown) the solution to this equation will be some cyclic four-dimensional surfaces upright, it means that it will be space-time as closed in time and space - more precisely a loop in space-time. This effect will only be visible either for a large spatial scale or for high energies close to Planck energies.

This is due to the cyclicity of the scalar part of the wave function because the wave equation always like a cyclical function, the effect will be cyclical, oscillating space-time. Exactly own time as a scalar variable in this case will be cyclically changing in the same way as curvilinear coordinates because for gravitational systems there is an equality between these two elements of the field equation. The scalar function $\Psi$ can also be mixed where is the product of tensor product of two functions with mixed indexes:

$$\Psi_+ \Psi_- = \sum_{a,b} \Psi^a(\sigma^0, ..., \sigma^3) \otimes \Psi_b(\sigma^0, ..., \sigma^3) \tag{3.7}$$

$$\Psi_- \Psi_+ = \sum_{a,b} \Psi_a(\sigma^0, ..., \sigma^3) \otimes \Psi^b(\sigma^0, ..., \sigma^3) \tag{3.8}$$

# 4 Field equation for many systems

The field equation (2.2) is an equation for one system, in physics there are complex phenomena that they contain much more than one system, in this chapter I will discuss the field equation for any number of systems which is an analogy for the equation for one system and uses the tensor product . The principle is the same, for each coordinate the derivative of this coordinate is equal to own time. However, the scalar function $\Psi^2$ will be multiplied by the functions of for the new system. Adding for two systems will not only be after indexes for one system $a, b$ but for the next $c, d...$ and so on. However, because the alphabet has a finite number of letters will use the notation $a_1, b_1...a_n, b_n$ for writing convenience. So the field equation for n systems will accept form where it will write it for all possible combinations of wave functions $\Psi$:

$$\sum_{a_1,b_1...a_n,b_n} \frac{\partial}{\partial \zeta_{a_1}} \frac{\partial}{\partial \zeta_{b_1}} ... \frac{\partial}{\partial \zeta_{a_n}} \frac{\partial}{\partial \zeta_{b_n}} T^{a_1 b_1} ... \otimes T^{a_n b_n} \psi_{a_1} \otimes \psi_{b_1} ... \otimes \psi_{a_n} \otimes \psi_{b_n}$$
$$- \sum_{a_1,b_1...a_n,b_n} \frac{\partial}{\partial \sigma_{a_1}} \frac{\partial}{\partial \sigma_{b_1}} ... \frac{\partial}{\partial \sigma_{a_n}} \frac{\partial}{\partial \sigma_{b_n}} g^{a_1 b_1} ... \otimes g^{a_n b_n} \psi_{a_1} \otimes \psi_{b_1} ... \otimes \psi_{a_n} \otimes \psi_{b_n} = \Psi^2_{1_-} ... \Psi^2_{n_-}$$
$$\sum_{a_1,b_1...a_n,b_n} \frac{\partial}{\partial \zeta_{a_1}} \frac{\partial}{\partial \zeta_{b_1}} ... \frac{\partial}{\partial \zeta_{a_n}} \frac{\partial}{\partial \zeta_{b_n}} T_{a_1 b_1} ... \otimes T_{a_n b_n} \psi^{a_1} \otimes \psi^{b_1} ... \otimes \psi^{a_n} \otimes \psi^{b_n}$$
$$- \sum_{a_1,b_1...a_n,b_n} \frac{\partial}{\partial \sigma_{a_1}} \frac{\partial}{\partial \sigma_{b_1}} ... \frac{\partial}{\partial \sigma_{a_n}} \frac{\partial}{\partial \sigma_{b_n}} g_{a_1 b_1} ... \otimes g_{a_n b_n} \psi^{a_1} \otimes \psi^{b_1} ... \otimes \psi^{a_n} \otimes \psi^{b_n} = \Psi^2_{1_+} ... \Psi^2_{n_+}$$

Because the wave function on the right side of the equation can appear in a mixed form it is also possible to write the field equation in a mixed form, but it should be remembered that for one system equation must have two indexes in the same form it is not possible for one the index in the field equation was contravariant and the other covariant, but it is possible to have two indices were in contravariant form and the next two were covariant. So saving the product of I will receive the combinations for the field equation:

$$\sum_{a_1,b_1,a_2,b_2} \frac{\partial}{\partial \zeta_{a_1}} \frac{\partial}{\partial \zeta_{b_1}} \frac{\partial}{\partial \zeta_{a_2}} \frac{\partial}{\partial \zeta_{b_2}} T^{a_1 b_1} \otimes T_{a_2 b_2} \psi_{a_1} \otimes \psi_{b_1} \otimes \psi^{a_2} \otimes \psi^{b_2}$$
$$- \sum_{a_1,b_1,a_2,b_2} \frac{\partial}{\partial \sigma_{a_1}} \frac{\partial}{\partial \sigma_{b_1}} \frac{\partial}{\partial \sigma_{a_2}} \frac{\partial}{\partial \sigma_{b_2}} g^{a_1 b_1} \otimes g_{a_2 b_2} \psi_{a_1} \otimes \psi_{b_1} \otimes \psi^{a_2} \otimes \psi^{b_2} = \Psi^2_{1_-} \Psi^2_{2_+}$$
$$\sum_{a_1,b_1,a_2,b_2} \frac{\partial}{\partial \zeta_{a_1}} \frac{\partial}{\partial \zeta_{b_1}} \frac{\partial}{\partial \zeta_{a_2}} \frac{\partial}{\partial \zeta_{b_2}} T_{a_1 b_1} \otimes T^{a_2 b_2} \psi^{a_1} \otimes \psi^{b_1} \otimes \psi_{a_2} \otimes \psi_{b_2}$$
$$- \sum_{a_1,b_1,a_2,b_2} \frac{\partial}{\partial \sigma_{a_1}} \frac{\partial}{\partial \sigma_{b_1}} \frac{\partial}{\partial \sigma_{a_2}} \frac{\partial}{\partial \sigma_{b_2}} g_{a_1 b_1} \otimes g^{a_2 b_2} \psi^{a_1} \otimes \psi^{b_1} \otimes \psi_{a_2} \otimes \psi_{b_2} = \Psi^2_{1_+} \Psi^2_{2_-}$$

This is an example for two systems for $n$ systems with scalar function $\Psi_+$ and $m$ systems with function scalar $\Psi_-$ this equation will take an analogous form:

$$\sum_{a_1,b_1...a_{n+m},b_{n+m}} \frac{\partial}{\partial \zeta_{a_1}} \frac{\partial}{\partial \zeta_{b_1}} ... \frac{\partial}{\partial \zeta_{a_{n+m}}} \frac{\partial}{\partial \zeta_{b_{n+m}}} T^{a_1 b_1} ... \otimes T^{a_n b_n} \otimes T_{a_{n+1} b_{n+1}} ... \otimes T_{a_{n+m} b_{n+m}} \psi_{a_1} \otimes \psi_{b_1} ...$$
$$\otimes \psi_{a_n} \otimes \psi_{b_n} \otimes \psi^{a_{n+1}} \otimes \psi^{b_{n+1}} ... \otimes \psi^{a_{n+m}} \otimes \psi^{b_{n+m}} - \sum_{a_1,b_1...a_{n+m},b_{n+m}} \frac{\partial}{\partial \sigma_{a_1}} \frac{\partial}{\partial \sigma_{b_1}} ... \frac{\partial}{\partial \sigma_{a_{n+m}}} \frac{\partial}{\partial \sigma_{b_{n+m}}}$$
$$g^{a_1 b_1} ... \otimes g^{a_n b_n} \otimes g_{a_{n+1} b_{n+1}} ... \otimes g_{a_{n+m} b_{n+m}} \psi_{a_1} \otimes \psi_{b_1} ... \otimes \psi_{a_n} \otimes \psi_{b_n} \otimes \psi^{a_{n+1}} \otimes \psi^{b_{n+1}} ... \otimes \psi^{a_{n+m}} \otimes \psi^{b_{n+m}}$$
$$= \Psi^2_{1_-} ... \Psi^2_{n_-} \Psi^2_{(n+1)_+} ... \Psi^2_{(n+m)_+}$$

# 5 Time scale lower than Planck's time

The Planck scale is the natural scale of quantum gravity, but nothing stands in the way of increasing the speed of light and hence the Planck scale to derive transformations that they do not break the speed of light locally and thus the Theory of Relativity. The basis of these transformation is the assumption that locally for each observer the speed limit is speed light, hence the scale below Planck's time for the observer on a scale where time is the limit Planck is not available - empty space has energies equal to Planck's energy for the observer with this limit. This scale must give a power light speed over the previous scale, this is because if I raise the minimum time to the second power (Planck time), hence I will raise the maximum frequency from the inverse of Planck time to the inverse of Planck time squared, all the laws of physics will be kept locally. An observer where sometimes a the square of Planck's time is smallest, it will not record any change in its laws of physics, it applies this is also the observer where Planck time is the time limit.

The field equation is a tensor equation so it is natural when curvilinear coordinates they will apply to a different limit of the speed of light, there will be a relationship between the old a new one that defines the laws of transforming tensors when switching to another frame of reference. So writing the field equation for the first system $a(1), b(1)$ where function $\Psi_{-(2)}$ is a function in a system where the minimum time limit is Planck's square of time, while $a(2), b(2)$ means the coordinates for the square of Planck's time I get the equation:

$$\sum_{a,b} \frac{\partial}{\partial \zeta_{a(1)}} \frac{\partial}{\partial \zeta_{b(1)}} \frac{\partial \zeta_{a(2)}}{\partial \zeta_{a(1)}} \frac{\partial \zeta_{b(2)}}{\partial \zeta_{b(1)}} T^{a(1)b(1)} \frac{\partial \zeta_{a(1)}}{\partial \zeta_{a(2)}} \psi_{a(1)} \otimes \frac{\partial \zeta_{b(1)}}{\partial \zeta_{b(2)}} \psi_{b(1)} - \frac{\partial}{\partial \sigma_{a(1)}} \frac{\partial}{\partial \sigma_{b(1)}} \frac{\partial \zeta_{a(2)}}{\partial \zeta_{a(1)}} \frac{\partial \zeta_{b(2)}}{\partial \zeta_{b(1)}} g^{ab} \frac{\partial \zeta_{a(1)}}{\partial \zeta_{a(2)}} \psi_{a(1)} \otimes \frac{\partial \zeta_{b(1)}}{\partial \zeta_{b(2)}} \psi_{b(1)} = \Psi^2_{-(2)} = \Psi^2_{-(1)}$$

These transformations can be applied to any light speed difference and will have the same character. This assumption shows that if the field equation is a valid equation, there is no smaller real scale of space-time, any limit on the power of light speed is allowed hence Planck's time and length, although locally always in a given frame of reference there is a limit for this system saying that the speed of light is the highest and hence the Planck's time and length are the smallest scale of space-time. The equation shows that the coordinate changes will cancel each other giving the initial field equation, which means that for each such space-time the field equation has the same form, despite the Planck time limit locality the field equation becomes the same and the properties of the particles remain the same. By recording distance transformations using the same notation as previously received:

$$ds^2_{(2)} = \sum_{a,b} \frac{\partial \zeta_{a(1)}}{\partial \zeta_{a(2)}} \frac{\partial \zeta_{b(1)}}{\partial \zeta_{b(2)}} g_{a(1)b(1)} \frac{\partial \zeta_{a(2)}}{\partial \zeta_{a(1)}} d\psi^{a(1)} \frac{\partial \zeta_{b(2)}}{\partial \zeta_{b(1)}} d\psi^{b(1)} = ds^2_{(1)}$$

Again, the distance will not change when switching from this frame of reference to another. Means that the field equations are independent of the limit of the speed of light and the minimum length is under consideration, the same rules apply everywhere. This means that two wave functions in different limits on the speed of light and the length of time and space if in one they are the same in another also. Although this conclusion may not be very intuitive, it is key to the whole hypothesis, certain invariability of the laws of physics for each time and space scale. This also applies to energy for a given scale, despite the fact that local energy is different and if we compare them Planck energy in one on the scale is the smallest energy on the scale with the space-time limit equal to Planck's time to squares relative to the previous one - the field equation and thus the laws of physics do not change.

# 6 Symmetry in field equation

The field equation has some naturally occurring symmetry, which I will present in this chapter. The first symmetry relates to the wave function on the right side of equation $\Psi$, if this function gives the result zero or greater, the symmetry is satisfied if the result less than zero is not. The second symmetry concerns the second term of the field equation, namely if the term $\sum_{a,b} \frac{\partial}{\partial\sigma_a}\frac{\partial}{\partial\sigma_b} g^{ab}\psi_a \otimes \psi_b$ is equal to zero, symmetry is satisfied, if not, it is not. Another state of symmetry is when it does not apply to a given solution, if it does not apply to the first symmetry, the equation is saved only with the second term excluding the first one, i.e. $\sum_{a,b} \frac{\partial}{\partial\sigma_a}\frac{\partial}{\partial\sigma_b} g^{ab}\psi_a \otimes \psi_b = \Psi_-^2$, if the symmetry system does not apply, the second analogy equation has only the first part of the equation $\sum_{a,b} \frac{\partial}{\partial\zeta_a}\frac{\partial}{\partial\zeta_b} T^{ab}\psi_a \otimes \psi_b = \Psi_-^2$, the states of this symmetry can be written using a matrix. Because there are two symmetries, there are four pairs of these symmetries.

If I write the $Q_{ij}$ matrix as symmetry states where each row of the matrix has two components or two symmetry states, this matrix will have four columns representing all pairs of symmetries, and the number $S_{1,2}$ representing the state of symmetry where the number this can be equal to one, minus one or zero which represents respectively: satisfying symmetry, not fulfilling, and not applicable to it. Each element of the matrix also represents a sign in the first pair, both signs are positive, which means that it is a matrix for two symmetries, in the next column it is a matrix where the first symmetry is not met while the second is similar for all pairs, despite the number $S_{1,2}$ is still multiplied by the sign for each pair of symmetries. I will write the matrix $Q_{ij}$ as:

$$Q_{ij} = \begin{bmatrix} +S_1 & +S_2 \\ -S_1 & +S_2 \\ +S_1 & -S_2 \\ -S_1 & -S_2 \end{bmatrix}$$

Knowing this matrix, one can count the spin and electric charge for a given particle of the standard model, which I will present in the next chapter. These symmetries are understood strictly as ways to solve field equations. Any solution of field equations must match these symmetries, which determines which quantum system the interaction is related to. Spin will write as $s$ and for a given symmetry group which satisfies the field equation I will get:

$$s = \sum_{i,j\in S} \frac{1}{2}\left|Q_{i1} + Q_{j2}\right| \tag{6.1}$$

Where spin is specified for each element of the $Q_{ij}$ matrix, it means that if the field equation has solutions that apply to some of these symmetry pairs, spin is the sum of these quantities. For example, if the photon satisfies only the first pair of symmetries and always has a positive state, i.e. the number $S_{1,2}$ is one, then its spin is one because it is the sum of these matrix elements, the rest of the pair of symmetries does not apply to it, so the result is zero. It should be remembered that symmetries are not the same as solutions of equations, pairs of symmetries say about the solutions of field equations - if a photon has only solutions of the first two elements of the first column, it cannot be said that the rest of the solutions do not apply to it, i.e. it has a value of zero only after solving equations, so that a given state does not apply to any equation, there must first be a solution that occurs for one element of the matrix and does not apply to the other. However, the electric charge that can be both positive and negative, and so only its value can be calculated from the formula:

$$e^{\pm} = \sum_{i=2\vee 3} \frac{1}{2}|Q_{i1}| + \frac{1}{2}|Q_{i2}| \tag{6.2}$$

# 7 Particles and fields of standard model

Particles of the standard model can be understood as symmetry groups that satisfy the (2.2) field equation. In this chapter I will present all the elementary particles and elements of the $Q_{ij}$ matrix that they meet. Each particle occurs in a symmetrical and anti-symmetrical state. The symmetrical state is the basic state for a given particle, the antisymmetrical state is opposite to it. The mechanism of particle interaction is very simple, a given particle breaks the state of symmetry and emits a particle that corresponds to this breaking of symmetry. For example, the electron changes the state $Q_{11}$ to a plus sign which creates a photon that changes the state of the electron. This principle can be applied to any other force. In the table below I present all the elementary particles and the corresponding groups of the $Q_{ij}$ matrix.

| Fundamental particles | | |
|---|---|---|
| Particle | Symmetrical state | Anti-symmetrical state |
| Neutrino | $+Q_{12}, Q_{42}; -Q_{41}$ | $+Q_{12}, Q_{42}, Q_{41}$ |
| Electron/Moun/Tau | $+Q_{21}, Q_{22}; -Q_{11}$ | $+Q_{21}, Q_{22}, Q_{11}$ |
| Quarks/Gluon | $+Q_{11}, Q_{31}, Q_{12}; -Q_{32}, Q_{21}$ | $+Q_{32}, Q_{21}; -Q_{11}, Q_{31}, Q_{12}$ |
| Graviton | $+Q_{11}, Q_{12}; -Q_{41}, Q_{42}$ | $-Q_{11}, Q_{12}; +Q_{41}, Q_{42}$ |
| Higgs Boson | $+Q_{11}; -Q_{12}$ | $+Q_{12}; -Q_{11}$ |
| Photon | $+Q_{11}, +Q_{12}$ | $+Q_{11}, +Q_{12}$ |
| Boson$W^{\pm}$ | $+Q_{11}, Q_{12}, Q_{22}; -Q_{21}$ | $+Q_{21}; -Q_{11}, Q_{12}, Q_{22}$ |
| Boson $Z$ | $+Q_{11}, Q_{12}$ | $-Q_{11}, Q_{12}$ |

This mechanism can be applied not only to particles but also to the interactions of the standard model. In addition to the symmetrical and antisymmetrical state, there is a condition in the interactions that must be met for a field particle to be emitted. For a given particle to interact through a given interaction, it must meet the field particle emission condition. This table does not present the energies necessary for these interactions, and the only conditions for a given particle of the field, and thus the interaction to occur. Although in this hypothesis the focus is mainly on the gravitational interaction, it is possible to explain other interactions that occur in the standard model by means of field symmetry. The table which presents the impacts has the form:

| Symmetry and standard model | | | |
|---|---|---|---|
| Force | Symmetrical state | Anti-symmetrical state | Emission |
| Strong | $+Q_{11}, Q_{31}, Q_{12}; -Q_{32}, Q_{21}$ | $+Q_{32}, Q_{21}; -Q_{11}, Q_{31}, Q_{12}$ | Both states |
| Electromagnetic | $\pm Q_{21}, \pm Q_{22}, \pm Q_{31}, \pm Q_{32}$ | $\pm Q_{21}, \pm Q_{22}, \pm Q_{31}, \pm Q_{32}$ | $-Q_{k\wedge l,1} \to Q_{k\wedge l,1}\big\|_{k\neq l}$ |
| Weak | $+Q_{11}, Q_{12}, Q_{22}; -Q_{21}$ | $-Q_{11}, Q_{12}, Q_{22}; +Q_{21}$ | $Q_{1\vee 2,1} \to -Q_{1\vee 2,1}$ $Q_{1\wedge 2,1} \to -Q_{1\wedge 2,1}$ |
| Gravity | $+Q_{11}, Q_{12}; -Q_{41}, Q_{42}$ | $-Q_{11}, Q_{12}; +Q_{41}, Q_{42}$ | Always/Breaking symmetry state |
| Higgs Field | $+Q_{11}; -Q_{12}$ | $+Q_{12}; -Q_{11}$ | Both states |

It should be remembered that the elements of the $Q_{ij}$ matrix are the number $S_{1,2}$ multiplied by a sign for a given symmetry group - which means that the final result in these tables is not the state of symmetry itself. The interactions of each particle can be understood as changes in the states of symmetry that cause the formation of field particles that affect the basic particle by changing its state and then disappearing. The emission state means that for a given interaction a field particle is emitted - however, it is not always a physical particle, just like in quantum physics it can be a virtual particle that changes the state of the system and more precisely its energies and then disappears. Symmetry one tells about whether the energy input is greater or equal to the gravitational interaction, graviton in antisymmetrical state breaks this symmetry, which means that its gravitational interaction does not depend on its energy.