Symmetry and simplest quantum field gravity idea

Tomasz Kobierzycki
shizykfizyk@gmail.com

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Abstract

In this paper [1] i will present simplest possible quantum gravity. It uses wave like equation and energy tensor to produce metric. Metric is dependent on energy, basic units are Planck's units, it gives results close to General Relativity but is a full quantum theory with probabilities. It has spin and replace Standard Model particles with symmetries.

Contents

1 Basic units

In this whole paper i will be using basic Plancks units, of energy, time , space and momentum. It means i can write any unit as $U = \frac{U_B}{U_P}$, where U is the unit used in theory and U_B, U_P are base units and Planck units. I will use special notation for non tensors [2] that is bracket $T^{[ab]}$ that is object made from tensor T^{ab} that has special properties when transformed. It does transform from one base to another as tensor but it adds and multiplies as scalar. Formally its equal to:

$$T^{ab} = T^{ab}\hat{e}_a \otimes \hat{e}_b \tag{1}$$

$$T^{[ab]} = T^{ab}\left(\frac{1}{4}\left(\sum_{a,b}(\hat{e}_a \cdot \hat{e}_b) \cdot \left(\hat{e}^a \cdot \hat{e}^b\right)\right)\right) = T^{ab}\left(\frac{1}{4}\sum_{a,b} g_{ab}g^{ab}\right) = T^{ab}\left(\frac{1}{4}\sum_{a,b} I^a_b\right) = T^{ab} \cdot 1 = T^{ab} \tag{2}$$

$$T_{[ab]} = T_{ab}\left(\frac{1}{4}\left(\sum_{a,b}\left(\hat{e}^a \cdot \hat{e}^b\right) \cdot (\hat{e}_a \cdot \hat{e}_b)\right)\right) = T_{ab}\left(\frac{1}{4}\sum_{a,b} g^{ab}g_{ab}\right) = T_{ab}\left(\frac{1}{4}\sum_{a,b} I^a_b\right) = T_{ab} \cdot 1 = T_{ab} \tag{3}$$

There can't be less than one unit of distance and time, so it means that objects that move less than Planck length in one Planck time will move eventually by Planck length when enough of time passes. It means change in position Δx and corresponding change in time Δt cant have values less than one in Planck units. I can write it as:

$$\left|\frac{\Delta x}{\Delta t}\right| = \frac{nl_P}{mt_P} \tag{4}$$

$$n \leq m \tag{5}$$

Where n and m are natural numbers and l_P is Planck length and t_P is Planck time. In whole paper i will use notation $(\mathbf{x})$ that means space and time scalar components so for base coordinates its $(\mathbf{x}) = (x^0, x^1, x^2, x^3)$. Not only one unit of change in position in one unit of time is maximum, another part is energy limit. Energy for given Planck length can't be more than one. It means if i have body of radius r its maximum energy can't be more than two per each radius- it comes from that a sphere of radius r have as same mass to center and from center to another part of sphere- it means energy doubles (so does mass) it means for given radius r there is maximum $2r$ energy in Planck units where radius is in Planck length units. Any natural unit like second or meter can be converted to units used here by equation:

$$U_{nm} = \prod_n \prod_m \frac{U_{B_n} U_{P_m}}{U_{B_m} U_{P_n}} \tag{6}$$

Where n subscript means unit put into counter and m means unit put into denominator, B means base SI units and P means Planck's units. For many expressions with other units i need to add sum to it:

$$U_{n_g m_g} = \sum_g \prod_n \prod_m \frac{U_{B_{ng}} U_{P_{mg}}}{U_{B_{mg}} U_{P_{ng}}} \tag{7}$$

Where it means i can add units that are normally would be not compatible. And get a unit that is correct from point of view of this model.

2 Basic concepts

Probability of particle begin in spin state is probability that has to be equal to one when summed for each spin state components:

$$\sum_{\phi} c^{[\phi]} c^{[\phi *]} = \sum_{\phi} c^{[\phi]} c^{[\phi *]} = 1 \tag{8}$$

And last one is wave function probability that has to be equal to one [4]:

$$\int_{x_0}^{x_{max}} \int_{y_0}^{y_{max}} \int_{z_0}^{z_{max}} c(\mathbf{x^a}) c^*(\mathbf{x^a}) d^3x = 1 \tag{9}$$

For any given area in space probability is:

$$\int_{x_0}^{x_1} \int_{y_0}^{y_1} \int_{z_0}^{z_1} c(\mathbf{x^a}) c^*(\mathbf{x^a}) d^3x = \rho_{01} \tag{10}$$

And same with spin for each given axis and each given spin state for that state i get probability :

$$c^{[\phi]} c^{[\phi *]} = \rho_{\phi} \tag{11}$$

And last probability is symmetry state probability i will explain later:

$$\sum_{E=E_0}^{E_P} \sum_{k,l} \sum_{n,m} \sum_{i,j \neq n,m} A_{nmijklE} A^*_{nmijklE} = 1 \tag{12}$$

Each wave field has to have those two probabilities. So i can write all probabilities as multiplication of each of them :

$$\rho_F = \rho_{\phi} \rho = c^{[\phi]} c^{[\phi *]} c(\mathbf{x^a}) c^*(\mathbf{x^a}) \tag{13}$$

For a given wave field its multiplication with its complex conjugate it has to be equal to ρ_F for all its components:

$$\Psi^{[\alpha\beta]} \Psi^{[\alpha\beta *]} = \rho_{\phi} \rho = c^{[\phi]} c^{[\phi *]} c(\mathbf{x^a}) c^*(\mathbf{x^a}) \tag{14}$$

Change in energy is equal to change that is related to speed by:

$$\Delta E = \frac{E_0}{\sqrt{(1 - \dot{x}^2)}} = E_0 \gamma \leq 1 \tag{15}$$

Sum of speed in all space direction is $|\dot{x}|$ and base speed $|\dot{x}_0|$ is equal to (in units of speed light equal to one $[\frac{t_p}{l_p} = \frac{1}{c}]$) that is total speed ($|\dot{x}_T|$):

$$|\dot{x}_T| = \Big(|\dot{x}| + \Delta E \left(1 - |\dot{x}|\right) \Big) \tag{16}$$

From it i can finally write energy-momentum relation as equality between energy and momentum for gravity system:

$$E^2_{\text{gravity}} = E_0^2 + p^2 \tag{17}$$

$$E^2_{\text{gravity}} = E_0^2 \gamma^2 \left(1 + \Big(|\dot{x}| + \Delta E \left(1 - |\dot{x}|\right) \Big)^2 \right) \tag{18}$$

Base speed does not account for change in energy in γ factor but it does account for calculation of total speed of body so its total energy.

3 Lorentz quantum transformation

From idea of quantize space-time, Lorentz transformation [5][6] come naturally. Now i will use this idea to create transformation of coordinates. First i will use special form of rotation matrix:

$$L_{\alpha}^{\alpha'}(\varphi_0,\varphi_a)=\begin{cases} L_0^{0'}=\cos(\varphi_a)\\ L_{aa}^{a'}=\sin(\varphi_a)\\ L_0^{a'}=-\sin(\varphi_0)\\ L_a^{0'}=\cos(\varphi_0)\\ L_{\alpha}^{\alpha}|_{\alpha\neq0\neq a}=1\\ L_{\alpha}^{\alpha'}|_{\alpha\neq\alpha'\neq0\neq a}=0\end{cases} \tag{19}$$

$$\varphi(x^0,\mathbf{x^a})\Big|_{x_0^0}^{x_1^0}=\left(\frac{1}{x_1^0}\sum_{x_0^0=1}^{x_1^0}\left(\sqrt{\sum_{a=1}^{3}\left(x^a(x_0^0+1,\mathbf{x^a})-x^a(x_0^0,\mathbf{x^a})\right)^2}\right)\right)\frac{\pi}{4}=\dot{x}\frac{\pi}{4} \tag{20}$$

Now i can create basic transforms, first one says how stationary observer see moving observer in positive direction of axis and negative direction of axis, then how moving observer sees stationary observer in positive and negative direction - finally how light see all observers. Those transformation are:

$$\text{Stationary observer sees moving observer in positive direction:}\quad x^{\alpha'}=L_{\alpha}^{\alpha'}(-\varphi_0,\varphi_a)x^{\alpha} \tag{21}$$

$$\text{Stationary observer sees moving observer in negative direction:}\quad x^{\alpha'}=L_{\alpha}^{\alpha'}(\varphi_0,-\varphi_a)x^{\alpha} \tag{22}$$

$$\text{Moving observer in positive direction sees stationary observer :}\quad x^{\alpha'}=L_{\alpha}^{\alpha'}(\varphi_0,-\varphi_a)x^{\alpha} \tag{23}$$

$$\text{Moving observer in negative direction sees stationary observer:}\quad x^{\alpha'}=L_{\alpha}^{\alpha'}(-\varphi_0,\varphi_a)x^{\alpha} \tag{24}$$

Photon:

$$x^{\alpha'}:=\left\{L_{\alpha}^{\alpha'}(\pm\varphi_0\frac{\pi}{4},\mp\varphi_a\frac{\pi}{4})x^{\alpha};L_{\alpha}^{\alpha'}(\pm\varphi_0\frac{\pi}{4}+\pi,\mp\varphi_a\frac{\pi}{4}+\pi)x^{\alpha};L_{\alpha}^{\alpha'}(\pm\varphi_0\frac{\pi}{4}+\pi,\mp\varphi_a\frac{\pi}{4})x^{\alpha};L_{\alpha}^{\alpha'}(\pm\varphi_0\frac{\pi}{4},\mp\varphi_a\frac{\pi}{4}+\pi)x^{\alpha}\right\} \tag{25}$$

It means that moving observer sees all observers as moving in opposite direction of its movement, those rotations can be preform in two ways, in steps where it goes from kx^0 to $(k-1)x^0$, or as a range. Each time observer moves by one Planck length axis is rotated by 45 degree to match light cone in direction of movement- so when it does emit a photon at any point it will still move at speed of light so speed of light stays constant and when it stops moving it will see rest observer as stationary but moved away from him by Planck length. Stationary observer sees the opposite, object does move with speed of light then it stops and is Planck length away from stationary observer. Second way of preforming rotations is to sum over many times and positions and take an speed of many space-time points and rotate axis by that value. It means that photon does feel time, time for a photon ticks normally, only change is that all space-time moves away from it with speed of light, where all time moves away with speed $\frac{1}{\sqrt{2}}$ and any space-coordinate moves with same speed so if i sum that speeds i get moving with away with speed of light. Faster object moves- from photon point of view its moves away slower from photon. Still from massive particle of view speed of light is always constant- but form photon point of view speed of any massive object is not constant it moves away with its speed. Photon point of view is even more complex- it has twelve transformation components of frame of reference for three directions of motion and another twelve for opposite direction motion. So it has twenty four components of transformation in four dimensions space-time, it represents each possible rotation for each possible direction. So photon has twenty four vectors as direction, where each direction moves with speed of light. And any not stationary object is gets closer to those direction axis so speed of moving away from event slows down. And there are two points of view - first one is rotations as sum of each Planck time movement that means rotation of axis when object moves is always turning it in photon for that Planck time- or a when summed over many times it never gets to speed of light, both are true depending on view but on fundamental scale any movement is speed of light movement.

4 Metric tensor and geometry

Goal of Quantum Gravity is to explain gravity in quantum way, if this model is correct its very simple i just need to use idea that energy tensor makes coordinates getting shorter. First I need to put energy factor equal to:

$$G(\alpha', \beta') = w(\alpha', \beta')\sqrt{1 - \sqrt{T^{[\alpha'\beta']}}} \tag{26}$$

$$w(\alpha', \beta') := \begin{cases} 1 \to T^{[\alpha'\beta']} > 0 \\ 0 \to T^{[\alpha'\beta']} = 0 \end{cases} \tag{27}$$

Where object $T^{[\alpha\beta]}$ is energy tensor in special form, so it means its a scalar function that depends on indexes of a tensor its put in and its made from a tensor that was explain in first section. To create metric i need to create three not one matrix of metric coefficient [7], i can write them as:

$$\eta^1_{\mu\nu} = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & -1 \end{pmatrix} \quad \eta^2_{\mu\nu} = \begin{pmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix} \quad \eta^3_{\mu\nu} = \begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & -1 \\ 0 & -1 & 0 & -1 \\ 0 & -1 & -1 & 0 \end{pmatrix} \tag{28}$$

Next step is to define base vectors that there will be four for each base:

$$\hat{e}^1_{0'} = \begin{pmatrix} G(0', 0') \\ 0 \\ 0 \\ 0 \end{pmatrix} \quad \hat{e}^1_{1'} = \begin{pmatrix} 0 \\ G(1', 1') \\ 0 \\ 0 \end{pmatrix} \quad \hat{e}^1_{2'} = \begin{pmatrix} 0 \\ 0 \\ G(2', 2') \\ 0 \end{pmatrix} \quad \hat{e}^1_{3'} = \begin{pmatrix} 0 \\ 0 \\ 0 \\ G(3', 3') \end{pmatrix} \tag{29}$$

$$\hat{e}^2_{0'} = \begin{pmatrix} 0 \\ G(1', 1') \\ G(2', 2') \\ G(3', 3') \end{pmatrix} \quad \hat{e}^2_{1'} = \begin{pmatrix} 0 \\ G(1', 1') \\ 0 \\ 0 \end{pmatrix} \quad \hat{e}^2_{2'} = \begin{pmatrix} 0 \\ 0 \\ G(2', 2') \\ 0 \end{pmatrix} \quad \hat{e}^2_{3'} = \begin{pmatrix} 0 \\ 0 \\ 0 \\ G(3', 3') \end{pmatrix} \tag{30}$$

$$\hat{e}^3_{0'} = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \quad \hat{e}^3_{1'} = \begin{pmatrix} 0 \\ 0 \\ G(3',' 1) \\ G(2', 1') \end{pmatrix} \quad \hat{e}^3_{2'} = \begin{pmatrix} 0 \\ G(2', 3') \\ 0 \\ G(2', 1') \end{pmatrix} \quad \hat{e}^3_{3'} = \begin{pmatrix} 0 \\ G(3', 2') \\ G(3', 1') \\ 0 \end{pmatrix} \tag{31}$$

Now i can calculate metric tensor as:

$$g_{\alpha'\beta'} = \sum_{h=1}^{3} \eta^h_{\mu\nu} \frac{\partial \xi^\mu_h}{\partial x^{\alpha'}} \frac{\partial \xi^\nu_h}{\partial x^{\beta'}} \tag{32}$$

This is formula for metric in this model of quantum gravity. In next sections i will explain what is energy tensor and field equation and how it all connects to form one possible model of quantum gravity.

5 Field Equation

Equation for tensor field $F^{\alpha'\beta'\phi}(\mathbf{x})$ that is itself equal to:

$$
\begin{aligned}
F^{\alpha'\beta'\phi}(\mathbf{x}) \equiv R^{\alpha'\beta'}_{\alpha\beta}(|S(\mathbf{x})|\theta_{k(\phi)})\ddot{\Psi}^{\alpha\beta}(\mathbf{x})S^{\phi}\hat{e}_{\alpha'}\otimes\hat{e}_{\beta'}\otimes\hat{s}_{\phi} + 4\pi^2 T^{[\alpha'\beta']}(\mathbf{x})R^{\alpha'\beta'}_{\alpha\beta}(|S(\mathbf{x})|\theta_{k(\phi)})\Psi^{\alpha\beta}(\mathbf{x})S^{\phi}\hat{e}_{\alpha'}\otimes\hat{e}_{\beta'}\otimes\hat{s}_{\phi} \\
= 2R^{\alpha'\beta'}_{\alpha\beta}(|S(\mathbf{x})|\theta_{k(\phi)})\Psi^{\alpha\beta}(\mathbf{x})S^{\phi}\partial_t\hat{e}_{\alpha'}\otimes\partial_t\hat{e}_{\beta'}\otimes\hat{s}_{\phi} + R^{\alpha'\beta'}_{\alpha\beta}(|S(\mathbf{x})|\theta_{k(\phi)})\Psi^{\alpha\beta}(\mathbf{x})S^{\phi}\partial_t^2\hat{e}_{\alpha'}\otimes\hat{e}_{\beta'}\otimes\hat{s}_{\phi} + \\
R^{\alpha'\beta'}_{\alpha\beta}(|S(\mathbf{x})|\theta_{k(\phi)})\Psi^{\alpha\beta}(\mathbf{x})S^{\phi}\hat{e}_{\alpha'}\otimes\partial_t^2\hat{e}_{\beta'}\otimes\hat{s}_{\phi} + \\
+4\pi i\sqrt{T^{[\alpha'\beta']}(\mathbf{x})}R^{\alpha'\beta'}_{\alpha\beta}(|S(\mathbf{x})|\theta_{k(\phi)})\Psi^{\alpha\beta}(\mathbf{x})S^{\phi}\partial_t\hat{e}_{\alpha'}\otimes\hat{e}_{\beta'}\otimes\hat{s}_{\phi} \\
+4\pi i\sqrt{T^{[\alpha'\beta']}(\mathbf{x})}R^{\alpha'\beta'}_{\alpha\beta}(|S(\mathbf{x})|\theta_{k(\phi)})\Psi^{\alpha\beta}(\mathbf{x})S^{\phi}\hat{e}_{\alpha'}\otimes\partial_t\hat{e}_{\beta'}\otimes\hat{s}_{\phi}
\end{aligned}
\tag{33}
$$

Where S^{ϕ} is symmetry-spin vector, $\Psi^{\alpha\beta}(\mathbf{x})$ is wave tensor field , energy tensor in special form is $T^{[\alpha'\beta']}(\mathbf{x})$ and $R^{\alpha'\beta'}_{\alpha\beta}(|S(\mathbf{x})|\theta_{k(\phi)}) = \hat{R}^{\alpha'}_{\alpha}(\theta|S(\mathbf{x})|)\hat{R}^{\beta'}_{\beta}(\theta|S(\mathbf{x})|)$ is rotation tensor [8] with respect to axis of spin φ and time axis, where $\theta_{k(\phi)}(\mathbf{x})$ is function of angle that can give positive or negative rotation angle depending on spin state ϕ . That function for positive value of spin generates positive rotation angle and for negative spin value generates negative rotation angle:

$$
\theta_{k(\phi)F}(\mathbf{x}) = \begin{cases} \theta_{k(\phi)}(\mathbf{x}) = +\theta(\mathbf{x}) \rightarrow \phi = 1, ..., N/2 \rightarrow (Y_{F_m} > 0) \\ \theta_{k(\phi)}(\mathbf{x}) = -\theta(\mathbf{x}) \rightarrow \phi = N/2+1, ..., N \rightarrow (Y_{F_m} < 0) \end{cases} \tag{34}
$$

For bosons its same but i need to add zero energy state that is equal to:

$$
\theta_{k(\phi)B}(\mathbf{x}) = \begin{cases} \theta_{k(\phi)}(\mathbf{x}) = +\theta(\mathbf{x}) \rightarrow \phi = 1, ..., N/2 \rightarrow (Y_{B_m} > 0) \\ \theta_{k(\phi)}(\mathbf{x}) = 0 \rightarrow \phi = N/2+1 \rightarrow (Y_{B_m} = 0) \\ \theta_{k(\phi)}(\mathbf{x}) = -\theta(\mathbf{x}) \rightarrow \phi = N/2+2, ..., N+1 \rightarrow (Y_{B_m} < 0) \end{cases} \tag{35}
$$

Now i can write rotation operators for basic (t, x, y, z) coordinates in matrix form as [9]:

$$
\hat{R}^{\alpha'}_{\alpha}(\theta|S(\mathbf{x})|)_{0x} = \hat{R}^{\alpha'}_{\alpha}(\gamma)_{0x} = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & \cos(\theta|S(\mathbf{x})|) & -\sin(\theta|S(\mathbf{x})|) \\ 0 & 0 & \sin(\theta|S(\mathbf{x})|) & \cos(\theta|S(\mathbf{x})|) \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & \cos(\gamma) & -\sin(\gamma) \\ 0 & 0 & \sin(\gamma) & \cos(\gamma) \end{pmatrix} \tag{36}
$$

$$
\hat{R}^{\alpha'}_{\alpha}(\theta|S(\mathbf{x})|)_{0y} = \hat{R}^{\alpha'}_{\alpha}(\gamma)_{0y} = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos(\theta|S(\mathbf{x})|) & 0 & \sin(\theta|S(\mathbf{x})|) \\ 0 & 0 & 1 & 0 \\ 0 & -\sin(\theta|S(\mathbf{x})|) & 0 & \cos(\theta|S(\mathbf{x})|) \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos(\gamma) & 0 & \sin(\gamma) \\ 0 & 0 & 1 & 0 \\ 0 & -\sin(\gamma) & 0 & \cos(\gamma) \end{pmatrix} \tag{37}
$$

$$
\hat{R}^{\alpha'}_{\alpha}(\theta|S(\mathbf{x})|)_{0z} = \hat{R}^{\alpha'}_{\alpha}(\gamma)_{0z} = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos(\theta|S(\mathbf{x})|) & -\sin(\theta|S(\mathbf{x})|) & 0 \\ 0 & \sin(\theta|S(\mathbf{x})|) & \cos(\theta|S(\mathbf{x})|) & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos(\gamma) & -\sin(\gamma) & 0 \\ 0 & \sin(\gamma) & \cos(\gamma) & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \tag{38}
$$

From speed i can calculate energy - or from change in energy from base energy i can calculate sum of all speed vector components:

$$
\left(\sum_{\alpha}\dot{x}^{\alpha}\dot{x}^{\alpha}\right)^{1/2} = 1 + \left(\sqrt{1 - \frac{E_0^2}{\left(\sum_{i,j\neq n,m}\frac{1}{\delta x^0_{nmij}}\right)^2}} + \left(\sum_{i,j\neq n,m}\frac{1}{\delta x^0_{nmij}}\right)\left(1 - \sqrt{1 - \frac{E_0^2}{\left(\frac{1}{\sum_{i,j\neq n,m}\delta x^0_{nmij}}\right)^2}}\right)\right) \tag{39}
$$

6 Symmetries and spin

Base idea is that all elementary particles can be produced out of symmetries states. There are two symmetries i will use in this model, that can have positive value S_{+1}, S_{+2} or negative value S_{-1}, S_{-2}. Positive value means that symmetry is fulfilled , negative that its not. There are four possible combinations of spin values that can be represented as a matrix, where v_{nm} represents state and can be equal to one , zero or negative one:

$$\hat{S}(\mathbf{x}) = \begin{pmatrix} \frac{1}{2}v_{11}S_{+1}(\mathbf{x}) & \frac{1}{2}v_{12}S_{+2}(\mathbf{x}) \\ \frac{1}{2}v_{21}S_{-1}(\mathbf{x}) & \frac{1}{2}v_{22}S_{+2}(\mathbf{x}) \\ \frac{1}{2}v_{31}S_{+1}(\mathbf{x}) & \frac{1}{2}v_{32}S_{-2}(\mathbf{x}) \\ \frac{1}{2}v_{41}S_{-1}(\mathbf{x}) & \frac{1}{2}v_{42}S_{-2}(\mathbf{x}) \end{pmatrix} = \begin{pmatrix} \frac{1}{2}v_{11}S_{+1}(\mathbf{x}) & \frac{1}{2}v_{12}S_{+2}(\mathbf{x}) \\ -\frac{1}{2}v_{21}S_{+1}(\mathbf{x}) & \frac{1}{2}v_{22}S_{+2}(\mathbf{x}) \\ \frac{1}{2}v_{31}S_{+1}(\mathbf{x}) & -\frac{1}{2}v_{32}S_{+2}(\mathbf{x}) \\ -\frac{1}{2}v_{41}S_{+1}(\mathbf{x}) & -\frac{1}{2}v_{42}S_{+2}(\mathbf{x}) \end{pmatrix} \tag{40}$$

Symmetry number for a given system is equal to sum of this matrix elements $S(\mathbf{x}) = \sum_{n,m} S_{nm}(\mathbf{x})$, if first symmetry is fulfilled it means that system is massless $ds^2 = 0$ second symmetry is fulfilled when energy states change so for given system there is not one energy state E but many E_n and they are not equal $(E_0 \neq E_1 ... \neq E_n)$, when first symmetry is not fulfilled then system has mass $ds^2 \neq 0$ and when second is not fulfilled all energy states are equal $(E_0 = E_1 ... = E_n)$. Spin number for a given system is equal to its absolute value of symmetry $|S(\mathbf{x})|$ and from it i can create symmetry-spin vector S^{ϕ_N} that has n states, for each state it has positive value only with n entry of vector and zero everywhere else. For bosons i can have states of spin number that is equal to $N = 2|S(\mathbf{x})| + 1$ where they go from positive spin $|S(\mathbf{x})|$ then positive spin $|S(\mathbf{x})| - 1$ and so on till they get to zero $(|S(\mathbf{x})| - n = 0)$, then they go from negative $-|S(\mathbf{x})| + n \neq 0$ till $-|S(\mathbf{x})| + 0$ and for fermions they go from $|S(\mathbf{x})|$ to $|S(\mathbf{x})| - 1/2n \neq 0$ and then from $-|S(\mathbf{x})| + 1/2n$ to $-|S(\mathbf{x})| + 0$. So now i can write symmetry-spin vector with all states as for fermions and bosons (where subscript in one means what spin state it represents):

$$S_F^{\phi} = \begin{pmatrix} 1_{|S(\mathbf{x})|} \\ 0 \\ ... \\ 0 \end{pmatrix}_1, \begin{pmatrix} 0 \\ 1_{|S(\mathbf{x})|-1} \\ ... \\ 0 \end{pmatrix}_2 ..., ..., \begin{pmatrix} 0 \\ ... \\ 1_{-|S(\mathbf{x})|+1} \\ 0 \end{pmatrix}_{N-1}, \begin{pmatrix} 0 \\ ... \\ 0 \\ 1_{-|S(\mathbf{x})|} \end{pmatrix}_N \tag{41}$$

$$S_B^{\phi} = \begin{pmatrix} 1_{|S(\mathbf{x})|} \\ 0 \\ ... \\ 0 \end{pmatrix}_1, \begin{pmatrix} 0 \\ 1_{|S(\mathbf{x})|-1} \\ ... \\ 0 \end{pmatrix}_2 ..., ..., \begin{pmatrix} 0 \\ ... \\ 1_0 \\ ... \end{pmatrix}_{N/2+1} \begin{pmatrix} 0 \\ ... \\ 1_{-|S(\mathbf{x})|+1} \\ 0 \end{pmatrix}_N, \begin{pmatrix} 0 \\ ... \\ 0 \\ 1_{-|S(\mathbf{x})|} \end{pmatrix}_{N+1} \tag{42}$$

Where for bosons $|S(\mathbf{x})| = 0, 1, 2...$ for fermions $|S(\mathbf{x})| = 1/2, 3/2...$,each state has one where column number is equal to N state. So its not one vector but N vectors for spin 1/2 particles its $N = 2$ where they get positive and negative spin states. Generally N is number of all states, for bosons its easy to calculate its just $N = 2|S(\mathbf{x})| + 1 = 2p + 1$ where $|S(\mathbf{x})|$ is symmetry number, for fermions its more complex for each spin state there is one number so if i have N states where $N/2$ are positive states and $N/2 + 1...N$ are negative states this number N is number of all possible negative and positive states. It connects to spin number by $|S(\mathbf{x})| - 1/2n \geq 0$ so i get $N = 2p$ where $n = 1, 3..., 2p - 1$. So from spin number i can get possible spin state number by (subscript F means fermions, B bosons):

$$Y_{F_p} = \begin{cases} 1/2(2p-1) \wedge p > 0 \\ 1/2(2p+1) \wedge p < 0 \end{cases}_{-|S(\mathbf{x})| \leq 1/2(2p+1) \leq |S(\mathbf{x})|} \tag{43}$$

$$Y_{B_p} = p \wedge p \in \mathbb{Z}|_{-|S(\mathbf{x})| \leq p \leq |S(\mathbf{x})|} \tag{44}$$

7 Energy from symmetry exchange

Energy by rotation of tensor field is generated by rate of change in symmetries. For given system symmetry number stays constant but it allows for changing in symmetry state, rule is that only positive symmetry state can exchange to positive, negative state exchange to negative they do not change state of symmetry but have energy, when negative symmetry changes to positive or positive to negative they change state of system and carry energy. First symmetry is scalar field of space and time, so it can be threat as scalar function of space and time, for each given point it has value, if i take symmetry in state $S(x^0+\delta x^0,\mathbf{x^a})$ i want to get state of symmetry so just $S(\mathbf{x})$, that time where symmetry changes by unit of symmetry is exchange time and it generates energy :

$$S(\mathbf{x}) = S(x^0+\delta x^0,\mathbf{x^a}) \tag{45}$$

$$E(\mathbf{x}) = \sum_{n,m}\sum_{i,j\neq n,m}\frac{S_{nmij}(x^0+\delta x^0_{nmij},\mathbf{x^a})}{\delta x^0_{nmij}} \tag{46}$$

$$J(\mathbf{x}) = \frac{Y_p}{|Y_p|}\sum_{n,m}\sum_{i,j\neq n,m}\frac{S_{nmij}(x^0+\delta x^0_{nmij},\mathbf{x^a})}{\delta x^0_{nmij}} \tag{47}$$

Energy of symmetry exchange is connected to change in angle in rotation operator. If i take rotation operator for given axis φ its angle of rotation is function of space and time its derivative with respect to time divided by 2π and multiply by absolute value of symmetry $|S(\mathbf{x}))|$ is equal to energy of symmetry exchange , where final angle is equal to $\gamma = |S(\mathbf{x})|\theta$ where θ is physical rotation angle it means for example for spin one half particles rotation by 2π has effect as rotation by π first represents θ angle and second γ angle:

$$J(\mathbf{x}) = \frac{Y_p|S(\mathbf{x})|\dot{\theta}(\mathbf{x})}{2\pi} = \frac{Y_p\dot{\gamma}(\mathbf{x})}{2\pi} = \frac{Y_p}{|Y_p|}\sum_{n,m}\sum_{i,j\neq n,m}\frac{S_{nmij}(x^0+\delta x^0_{nmij},\mathbf{x^a})}{\delta x^0_{nmij}} \tag{48}$$

If symmetry energy state is positive S_+ i will get same sign as angle , if its negative S_- i will get opposite sign as angle, it means negative symmetry energy states have opposite spin states, for positive spin state they have negative symmetry energy state and for negative symmetry energy state they have positive spin state. Positive angle represents positive spin $Y_p > 0$ state and negative angle represents negative spin $Y_p < 0$ state. So i can write full angle as:

$$\dot{\gamma} = |S(\mathbf{x})|\dot{\theta}(\mathbf{x}) = \frac{|S(\mathbf{x})|\theta(x^0+\delta x^0,\mathbf{x^a}) - |S(\mathbf{x})|\theta(\mathbf{x})}{dt} = \frac{\gamma(x^0+\delta x^0,\mathbf{x^a})-\gamma(\mathbf{x})}{dt} \tag{49}$$

Where time that state is changed is equal to T_+ and time when state is not change is equal to T_-:

$$T_- = x^0\left(1-\sum_{n,m}\sum_{i,j\neq n,m}\frac{1}{\delta x^0_{nmij}}\right)\wedge x^0 \geq \sum_{n,m}\sum_{i,j\neq n,m}\delta x^0_{nmij} \tag{50}$$

$$T_+ = x^0\left(\sum_{n,m}\sum_{i,j\neq n,m}\frac{1}{\delta x^0_{nmij}}\right)\wedge x^0 \geq \sum_{n,m}\sum_{i,j\neq n,m}\delta x^0_{nmij} \tag{51}$$

Where angular speed is defined :

$$\omega = \frac{|S(\mathbf{x})|\dot{\theta}(\mathbf{x})}{2\pi} \tag{52}$$

8 Energy tensor and many system symmetry interaction

Energy tensor is key component of field equation, it has simple form that can be written as rotations energy and movement energy. Those rotations come from spin of particle or sum of spins for many particles. Now i can write energy tensor components as:

$$T^{\alpha'\beta'}(\mathbf{x}) = \left(\frac{E(\mathbf{x})\dot{X}^{\alpha'}\dot{X}^{\beta'} + J(\mathbf{x})\cos(\phi)\left(\frac{|S(\mathbf{x})|\dot{\theta}(\mathbf{x})}{2\pi}\right)^2 \delta_p^\alpha \delta_q^\beta - \left|\Phi(\mathbf{x})\right|}{R} \right)^2 \tag{53}$$

$$\dot{X}^{\alpha'}\dot{X}^{\beta'} = R_\alpha^{\alpha'}(\gamma)_{pq}\frac{dx^\alpha}{dt}R_\beta^{\beta'}(\gamma)_{pq}\frac{dx^\beta}{dt}\hat{u}^{\alpha'}\cdot\hat{u}^{\beta'} \tag{54}$$

$$\hat{u}^{0'} = \begin{pmatrix}1\\0\\0\\0\end{pmatrix} \quad \hat{u}^{1'} = \begin{pmatrix}0\\1\\0\\0\end{pmatrix} \quad \hat{u}^{2'} = \begin{pmatrix}0\\0\\1\\0\end{pmatrix} \quad \hat{u}^{3'} = \begin{pmatrix}0\\0\\0\\1\end{pmatrix} \tag{55}$$

Where $\dot{\varphi}^\alpha, \dot{\varphi}^\beta$ is angular speed , energy and rotation energy (J) is created out of symmetry states, i presented how they work for one body system but for many bodies its more complex. I can write E and J for many bodies as:

$$E_{kl}(\mathbf{x}) = \sum_{k,l}\sum_{n,m}\sum_{i,j\neq n,m} V(n,m)\frac{S_{nmijkl}(x^0 + \delta x^0_{nmijkl}R_{kl}, \mathbf{x^a})}{\delta x^0_{nmijkl}R_{kl}} \tag{56}$$

$$J_{kl}(\mathbf{x}) = \sum_{k,l}\sum_{n,m}\sum_{i,j\neq n,m} f(k,l)V(n,m)\frac{S_{nmijkl}(x^0 + \delta x^0_{nmijkl}R_{kl}, \mathbf{x^a})}{\delta x^0_{nmijkl}R_{kl}} \tag{57}$$

Now only thing left is to calculate interaction time and time where there is no interaction, it depends on how all objects exchange energy, most simple way is just sum of all individual interaction times, more complex picture is sum of all interaction for given system k with interaction l:

$$T_{-k} = x^0\left(1 - \sum_{l}\sum_{n,m}\sum_{i,j\neq n,}\frac{1}{\delta x^0_{nmijkl}}\right) \wedge x^0 \geq \sum_{l}\sum_{n,m}\sum_{i,j\neq n,m}\delta x^0_{nmij} \tag{58}$$

$$T_{+k} = x^0\left(\sum_{l}\sum_{n,m}\sum_{i,j\neq n,m}\frac{1}{\delta x^0_{nmijkl}}\right) \wedge x^0 \geq \sum_{l}\sum_{n,m}\sum_{i,j\neq n,m}\delta x^0_{nmijkl} \tag{59}$$

Where function $f(k,l)$ and $V(n,m)$ is equal to:

$$f(k,l) := \begin{cases} +1 \Rightarrow k = l \\ -1 \Rightarrow k \neq l \wedge Y_{l_p} < 0 \wedge Y_{k_p} > 0 \vee Y_{l_p} > 0 \wedge Y_{k_p} < 0 \\ +1 \Rightarrow k \neq l \wedge Y_{l_p} < 0 \wedge Y_{k_p} < 0 \vee Y_{l_p} > 0 \wedge Y_{k_p} > 0 \\ 0 \Rightarrow Y_{l_p} = 0 \end{cases} \tag{60}$$

$$V(n,m) := \begin{cases} +1 \rightarrow S_{nmijkl} = S_{nmijlk} \\ -1 \rightarrow S_{nmijkl} \neq S_{nmijlk} \end{cases} \tag{61}$$

9 Particles of Standard Model

From symmetry model i can map all particles of Standard Model to symmetry states. I will use a table with matter (symmetrical state) and anti-matter (anti-symmetrical), where i use matrix S_{nm} elements with v_{nm} states as a sign :

Elementary Particles		
Particle	Matter State (symmetrical)	Anti-Matter State (anti-symmetrical)
Photon	$+S_{11}, +S_{12}$	$-S_{11}, -S_{12}$
Electron/Muon/Tau	$-S_{11}, +S_{21}, +S_{22}$	$+S_{11}, -S_{21}, -S_{22}$
Quarks (up, charm, top)	$-S_{11}, -S_{12}, -S_{21}, +S_{31}, -S_{32}$	$+S_{11}, +S_{12}, +S_{21}, -S_{31}, +S_{32}$
Quarks (down, strange, bottom)	$+S_{11}, +S_{12}, +S_{21}, -S_{31}, +S_{32}$	$-S_{11}, -S_{12}, -S_{21}, +S_{31}, -S_{32}$
Graviton	$+S_{11}, +S_{12}, -S_{41}, -S_{42}$	$-S_{11}, -S_{12}, +S_{41}, +S_{42}$
Higgs Boson	$+S_{11}, -S_{12}$	$-S_{11}, +S_{12}$
$W^{\pm}$ Boson	$-S_{11}, +S_{12}, -S_{21}, +S_{22}$	$+S_{11}, -S_{12}, +S_{21}, -S_{22}$
Z Boson	$+S_{41}, +S_{42}$	$+S_{41}, +S_{42}$
Neutrino	$+S_{12}, +S_{41}, -S_{42}$	$-S_{12}, -S_{41}, +S_{42}$
Gluon	$+S_{11}, +S_{12}, -S_{41}, +S_{42}$	$-S_{11}, -S_{12}, +S_{41}, -S_{42}$

From it there is electric charge calculation:

$$Q(\mathbf{x}) = \frac{S(\mathbf{x})}{|S(\mathbf{x})|}\left(\sum_{n=2,3}\sum_{i=2,3,j\neq n=1,2}\left|\frac{S_{n1ij}(x^0+\delta x^0_{n1ij},\mathbf{x^a})}{\delta x^0_{n1ij}}\right| + \left|\frac{S_{n2ij}(x^0+\delta x^0_{n2ij},\mathbf{x^a})}{\delta x^0_{n2ij}}\right|\right) \tag{62}$$

Total charge for quarks is one third or two third it mean that exchange of symmetry state that generate charge does not happen in Planck time but slower to give one third or two third $(1/6+1/6+1/3) = 2/3; (1/6+1/12+1/12) = 1/3$). Idea is that each particle can exchange symmetry with another particle positive ones to positive ones and negative ones for negative ones, exchange of negative symmetry and positive symmetry states carries energy and does change state of particle, it can change negative symmetry to positive or positive to negative then it not only carries energy but changes state of system. Change in symmetries carries energy that is shown in detail in previous chapter. Locally symmetry is always conserved that leads to:

$$\sum_k \delta S_k(\mathbf{x}) = 0 \tag{63}$$

In any exchange situation, that conservation of symmetry law is extended to space, if i take a region of space that is represented as integral symmetry states constant:

$$\sum_k \int S_k(\mathbf{x})dx^3 = const \tag{64}$$

$$\sum_k \int \delta S_k(\mathbf{x})dx^3 = 0 \tag{65}$$

Electric field created by charges energy is equal to (where α is fine structure constant):

$$\Phi_k(\mathbf{x}) = \sum_l q(k,l)\frac{\alpha}{R_{kl}}Q_{kl}(\mathbf{x}) \tag{66}$$

$$q(k,l) = \begin{cases} + \rightarrow \frac{Q_k}{|Q_k|} = \frac{Q_l}{|Q_l|} \\ - \rightarrow \frac{Q_k}{|Q_k|} \neq \frac{Q_l}{|Q_l|} \end{cases} \quad Q_{kl}(\mathbf{x}) = \begin{cases} Q_k \rightarrow k = l \\ Q_l \rightarrow k \neq l \end{cases} \tag{67}$$

10 Many systems field equation

Field equation can be extended to many systems, by expanding 4 dimension space-time to $4N$ dimension space-time where N is number of bodies in a system. First i write metric tensor for many bodies:

$$g_{\alpha'_k\beta'_l} = \begin{pmatrix} g_{\alpha'_1\beta'_1} & g_{\alpha'_1\beta'_2} & \cdots & g_{\alpha'_1\beta'_l} \\ g_{\alpha'_2\beta'_1} & g_{\alpha'_2\beta'_2} & & \cdots \\ \cdots & & \cdots & \cdots \\ g_{\alpha'_k\beta'_1} & \cdots & \cdots & g_{\alpha'_k\beta'_l} \end{pmatrix} \tag{68}$$

Each metric tensor is connect to energy tensor that has same way of being created:

$$T^{\alpha'_k\beta'_l} = \begin{pmatrix} T^{\alpha'_1\beta'_1} & T^{\alpha'_1\beta''_2} & \dots & T^{\alpha'_1\beta'_l} \\ T^{\alpha'_2\beta'_1} & T^{\alpha'_2\beta'_2} & & \dots \\ \dots & & \dots & \dots \\ T^{\alpha'_k\beta'_1} & \dots & \dots & T^{\alpha'_k\beta'_l} \end{pmatrix} \tag{69}$$

Same applies to wave field:

$$\Psi^{\alpha_k\beta_l} = \begin{pmatrix} \Psi^{\alpha_1\beta_1} & \Psi^{\alpha_1\beta_2} & \dots & \Psi^{\alpha_1\beta_l} \\ \Psi^{\alpha_2\beta_1} & \Psi^{\alpha_2\beta_2} & & \dots \\ \dots & & \dots & \dots \\ \Psi^{\alpha_k\beta_1} & \dots & \dots & \Psi^{\alpha_k\beta_l} \end{pmatrix} \tag{70}$$

Where each energy tensor part is coming from symmetry interaction kl part:

$$T^{\alpha'_k\beta'_l} \leftrightarrow (E_{kl}, J_{kl}, \Phi_k) \tag{71}$$

Both indexes (k, l) go from 1 to N where N is number of bodies. Cross terms are interaction terms. And there are k, l corresponding probability numbers:

$$\forall_{k,l} \sum_{\phi} c^{[\phi_k\phi_l]} c^{[\phi_k\phi_l *]} = 1 \tag{72}$$

$$\forall_{k,l} \int_{x_0}^{x_{max}} \int_{y_0}^{y_{max}} \int_{z_0}^{z_{max}} c_{kl}(\mathbf{x^a}) c^*_{kl}(\mathbf{x^a}) d^3x = 1 \tag{73}$$

I can add kl indexes to create many system field equation:

$$\begin{aligned} F^{\alpha'_{kl}\beta'_{kl}\phi_k\phi_l} &\equiv R^{\alpha'_{kl}\beta'_{kl}}_{\alpha_{kl}\beta_{kl}}(|S_{kl}(\mathbf{x})|\theta_{k(\phi)})\ddot{\Psi}^{\alpha_{kl}\beta_{kl}}(\mathbf{x})S^{\phi_k\phi_l}\hat{e}_{\alpha'_{kl}} \otimes \hat{e}_{\beta'_{kl}} \otimes \hat{s}_{\phi_k} \otimes \hat{s}_{\phi_l} \\ &+4\pi^2 T^{[\alpha'_{kl}\beta'_{kl}]}(\mathbf{x}) R^{\alpha'_{kl}\beta'_{kl}}_{\alpha_{kl}\beta_{kl}}(|S_{kl}(\mathbf{x})|\theta_{k(\phi)})\Psi^{\alpha_{kl}\beta_{kl}}(\mathbf{x})S^{\phi_k\phi_l}\hat{e}_{\alpha'_{kl}} \otimes \hat{e}_{\beta'_{kl}} \otimes \hat{s}_{\phi_k} \otimes \hat{s}_{\phi_l} \\ &= 2R^{\alpha'_{kl}\beta'_{kl}}_{\alpha_{kl}\beta_{kl}}(|S_{kl}(\mathbf{x})|\theta_{k(\phi)})\Psi^{\alpha_{kl}\beta_{kl}}(\mathbf{x})S^{\phi_k\phi_l}\partial_t\hat{e}_{\alpha'_{kl}} \otimes \partial_t\hat{e}_{\beta'_{kl}} \otimes \hat{s}_{\phi_k} \otimes \hat{s}_{\phi_l} \\ &+R^{\alpha'_{kl}\beta'_{kl}}_{\alpha_{kl}\beta_{kl}}(|S_{kl}(\mathbf{x})|\theta_{k(\phi)})\Psi^{\alpha_{kl}\beta_{kl}}(\mathbf{x})S^{\phi_k\phi_l}\partial_t^2\hat{e}_{\alpha'_{kl}} \otimes \hat{e}_{\beta'_{kl}} \otimes \hat{s}_{\phi_k} \otimes \hat{s}_{\phi_l} \\ &+R^{\alpha'_{kl}\beta'_{kl}}_{\alpha_{kl}\beta_{kl}}(|S_{kl}(\mathbf{x})|\theta_{k(\phi)})\Psi^{\alpha_{kl}\beta_{kl}}(\mathbf{x})S^{\phi_k\phi_l}\hat{e}_{\alpha'_{kl}} \otimes \partial_t^2\hat{e}_{\beta'_{kl}} \otimes \hat{s}_{\phi_k} \otimes \hat{s}_{\phi_l} \\ &+4\pi i\sqrt{T^{[\alpha'_{kl}\beta'_{kl}]}(\mathbf{x})} R^{\alpha'_{kl}\beta'_{kl}}_{\alpha_{kl}\beta_{kl}}(|S_{kl}(\mathbf{x})|\theta_{k(\phi)})\Psi^{\alpha_{kl}\beta_{kl}}(\mathbf{x})S^{\phi_k\phi_l}\partial_t\hat{e}_{\alpha'_{kl}} \otimes \hat{e}_{\beta'_{kl}} \otimes \hat{s}_{\phi_k} \otimes \hat{s}_{\phi_l} \\ &+4\pi i\sqrt{T^{[\alpha'_{kl}\beta'_{kl}]}(\mathbf{x})} R^{\alpha'_{kl}\beta'_{kl}}_{\alpha_{kl}\beta_{kl}}(|S_{kl}(\mathbf{x})|\theta_{k(\phi)})\Psi^{\alpha_{kl}\beta_{kl}}(\mathbf{x})S^{\phi_k\phi_l}\hat{e}_{\alpha'_{kl}} \otimes \partial_t\hat{e}_{\beta'_{kl}} \otimes \hat{s}_{\phi_k} \otimes \hat{s}_{\phi_l} \end{aligned} \tag{74}$$

11 Measurement

Quantum measurement is does change the state of system in opposition to classical measurement, here it does it to. First i need to start by idea that wave field has scalar part (constant functions of probability) that are length of each wave field at any point. They depend on space coordinates (x, y, z) general idea behind those functions is that probability moves as a sphere with increasing radius (that sphere represents highest probability) movement of sphere is depended on speed of quantum system. Rest places where sphere is not located have lower probability. So there is not one function of probability but for each time when system moves by one Planck length there is new one- it does not depend on time but it changes every time position of particle changes. Simplest probability function i will present is (where c_{xyz} is some compext number that depend on position):

$$c(x, y, z) = \frac{1}{N_C(x, y, z)} \left(\frac{c_{xyz}}{1 + \frac{|\sqrt{x^2+y^2+z^2}-s|}{f_A}} \right) \tag{75}$$

$$N_C(x, y, z) = \int_{x_0}^{x_1} \int_{y_0}^{y_1} \int_{y_0}^{y_1} \left(\frac{c_{xyz}}{1 + \frac{|\sqrt{x^2+y^2+z^2}-s|}{f_A}} \right) dxdydz \tag{76}$$

$$\sqrt{x_0^2 + y_0^2 + z_0^2} = r_0 \tag{77}$$

$$\sqrt{x_1^2 + y_1^2 + z_1^2} = r_{max} \tag{78}$$

Where , s is distance travel by particle and f_A is constant of probability amplitude that says how much does probability change with change of distance. Measurement does change state of system in certain way i can use complex conjugate of probability constant and i get change from function to another function that is defined:

$$c(x, y, z)c^*(x, y, z) : c(x, y, z) \to c_M(x, y, z) \wedge c^*(x, y, z) \to c^*_M(x, y, z) \tag{79}$$

$$c_M(x, y, z) = \begin{cases} (x, y, z) = (x_M, y_M, z_M) \to 1 \\ (x, y, z) \neq (x_M, y_M, z_M) \to 0 \end{cases} \Bigg|_{x^0}^{x^0+1} \tag{80}$$

$$c_M(x, y, z) = c(x - x_M, y - y_M, z - z_M) \wedge s \to (s - s_M)\Big|_{x^0+1}^{x^0+n} \tag{81}$$

It means that wave function does change to be in one point in space, for one Planck time and then in starts to spread again but from that place. So summarize it, wave constant probability field moves always like a sphere so its probability is same for each radius, and when it travels distance s function changes each time it travels one unit of distance (distance travel can't be less than one) and highest probability is where radius is equal to distance travel. When measurement is done it changes to one point of space equal to one and rest equal to zero so its in one position in space, later is spreads again but from that point and it starts from again position change. Because distance less than one can't be defined it means that particle can be thought as sphere of Planck length radius with infinite number of vectors of radius one and energy that is equal to energy of wave tensor field. Last part to explain is symmetry state probability:

$$\sum_{k,l} \sum_{n,m} \sum_{i,j \neq n,m} A_{nmijklE} = \frac{1}{N_{A_{nmijklE}}} \left(\frac{c_{nmijklp}}{1 + \frac{|E_{nmijklp}-E_0|}{f_E}} \right) \tag{82}$$

$$N_{A_{nmijklE}} = \sum_{p=1}^{N} \sum_{k,l} \sum_{n,m} \sum_{i,j \neq n,m} \left(\frac{c_{nmijklp}}{1 + \frac{|E_{nmijklp}-E_0|}{f_E}} \right) \tag{83}$$

12 Symmetry field

In this paper i presented simple and possible idea how to quantize gravity and put all particles and forces of Standard Model as one model that comes out of spin states. Last part is to put symmetry field into play, to do it first i start with energy levels. There is base energy level for each symmetry interaction that can't be lower than it E_0, next energy level is increased by change in interaction time that can be put us frequency $\nu_P = \frac{1}{R_{klp}\delta x^0_{nmijklp}} - E_0$ that change can be zero or can be done in any steps but with limit of maximum Planck Energy, each step is multiplication of Planck time and can be any natural number (of Planck Times). Now i need to add probability and i can write Symmetry field as:

$$K(\mathbf{x}) = \sum_{p=1}^{N} \sum_{k,l} \sum_{n,m} \sum_{i,j \neq n,m} \frac{1}{N_{A_{nmijklE}}} \left(\frac{c_{nmijklp}}{1 + \frac{|E_{nmijklp} - E_0|}{f_E}} \right) \frac{S_{nmijklp}(x^0 + \delta x^0_{nmijklp} R_{klp}, \mathbf{x^a})}{\delta x^0_{nmijklp} R_{klp}} \tag{84}$$

Probability of field being in energy state E is equal to:

$$A_{nmijklE} A^*_{nmijklE} = \left(\frac{1}{N_{A_{nmijklE}}} \left(\frac{c_{nmijklp}}{1 + \frac{|E_{nmijklp} - E_0|}{f_E}} \right) \right) \left(\frac{1}{N^*_{A_{nmijklE}}} \left(\frac{c^*_{nmijklp}}{1 + \frac{|E_{nmijklp} - E_0|}{f_E}} \right) \right) \tag{85}$$

$$\sum_{E=E_0}^{E_P} A_{nmijklE} A^*_{nmijklE} = \sum_{p=1}^{N} \left(\frac{1}{N_{A_{nmijklE}}} \left(\frac{c_{nmijklp}}{1 + \frac{|E_{nmijklp} - E_0|}{f_E}} \right) \right) \left(\frac{1}{N^*_{A_{nmijklE}}} \left(\frac{c^*_{nmijklp}}{1 + \frac{|E_{nmijklp} - E_0|}{f_E}} \right) \right) = 1 \tag{86}$$

Where state p is defined as each of them is bigger than previous one, and biggest p state plus base energy is equal to Planck Energy:

$$E_0 + \nu_p = E_0 + p\nu_1 \leq 1 \tag{87}$$

$$\nu_P = \frac{1}{R_{klp}\delta x^0_{nmijklp}} - E_0 \tag{88}$$

For given symmetry field- symmetry must be always conserved, it means that sum of all symmetry number after and before interaction has to be equal:

$$\sum_{k,l} \sum_{n,m} \sum_{i,j \neq n,m} S_{nmijkl}(x^0 + \delta x^0_{nmijkl} R_{kl}, \mathbf{x^a}) = \sum_{k,l} \sum_{n,m} \sum_{i,j \neq n,m} S_{nmijkl}(x^0, \mathbf{x^a}) \tag{89}$$

And so for all space they have to be equal before and after interaction:

$$\int \sum_{k,l} \sum_{n,m} \sum_{i,j \neq n,m} S_{nmijkl}(x^0 + \delta x^0_{nmijkl} R_{kl}, \mathbf{x^a}) dx^3 = \int \sum_{k,l} \sum_{n,m} \sum_{i,j \neq n,m} S_{nmijkl}(x^0, \mathbf{x^a}) dx^3 \tag{90}$$

13 Solutions to field equation

Field equation is very easy to solve, only unknown is energy tensor that comes from symmetry field. In this section i will present simplest solutions to field equations. First i start with one body system and field itself:

$$F^{\alpha'\beta'\phi}(\mathbf{x}) = R^{\alpha'\beta'}_{\alpha\beta}(|S(\mathbf{x})|\theta_{k(\phi)})\frac{c^{\phi}}{N_C(x,y,z)}\left(\frac{c_{xyz}}{1+\frac{|\sqrt{x^2+y^2+z^2}-s|}{f_A}}\right)\exp\left(\pm 2\pi i t\sqrt{T^{[\alpha'\beta']}}\right)\hat{e}_{\alpha'}\otimes\hat{e}_{\beta'}\otimes\hat{s}_{\phi} \tag{91}$$

$$F^{\alpha'\beta'\phi *}(\mathbf{x}) = R^{\alpha'\beta'}_{\alpha\beta}(|S(\mathbf{x})|\theta_{k(\phi)})\frac{c^{\phi *}}{N^*_C(x,y,z)}\left(\frac{c^*_{xyz}}{1+\frac{|\sqrt{x^2+y^2+z^2}-s|}{f_A}}\right)\exp\left(\mp 2\pi i t\sqrt{T^{[\alpha'\beta']}}\right)\hat{e}_{\alpha'}\otimes\hat{e}_{\beta'}\otimes\hat{s}_{\phi} \tag{92}$$

Next i can write metric by using simplest solutions that energy tensor is equal to mass as energy source, first metric tensor without rotations:

$$g_{\alpha'\beta'} = \begin{pmatrix} \left(1-\frac{2M}{R}\right) & 0 & 0 & 0 \\ 0 & -\left(1-\frac{2M\left(\dot{X}^2\right)^2}{R}\right) & 0 & 0 \\ 0 & 0 & -\left(1-\frac{2M\left(\dot{X}^3\right)^2}{R}\right) & 0 \\ 0 & 0 & 0 & -\left(1-\frac{2M\left(\dot{X}^3\right)^2}{R}\right) \end{pmatrix} \tag{93}$$

Now i can calculate metric, if speed can be reduced to just one direction and this metric just gets simply:

$$ds^2 = \left(1-\frac{2M}{R}\right)\left(dx^{0'}\right)^2 - \left(1-\frac{2M\left(\dot{X}^1\right)^2}{R}\right)\left(dx^{1'}\right)^2 \tag{94}$$

Those are simplest solutions fo field equation. Energy tensor is equal to:

$$T^{\alpha'\beta'} = \left(\frac{2M\dot{X}^{\alpha}\dot{X}^{\beta}}{R}\right)^2\hat{e}_{\alpha'}\otimes\hat{e}_{\beta'} \tag{95}$$

14 Complex space-time

Field im using is not a real field but a complex field- to proper application of that field i need to use complex metric. I do it simply by taking metric tensor dimensions from four dimension space-time (real) to eight dimension space-time (complex). It does not change metric tensor components but it does change space-time interval because i use imaginary numbers. So let me write metric tensor and then metric for complex space-time (where subscripts mean R- real and I imaginary):

$$g_{\alpha'_C\beta'_C} = \begin{pmatrix} g_{\alpha'_R\beta'_R} & g_{\alpha'_R\beta'_I} \\ g_{\alpha'_I\beta'_R} & g_{\alpha'_I\beta'_I} \end{pmatrix} \tag{96}$$

$$ds^2 = 2ig_{\alpha'_R\beta'_R}dx^{\alpha'}dx^{\beta'} \tag{97}$$

$$ds = \sqrt{2ig_{\alpha'_R\beta'_R}dx^{\alpha'}dx^{\beta'}} \tag{98}$$

$$ds = (1+i)\sqrt{g_{\alpha'_R\beta'_R}dx^{\alpha'}dx^{\beta'}} \tag{99}$$

$$ds = \sqrt{g_{\alpha'_R\beta'_R}dx^{\alpha'}dx^{\beta'}} + i\sqrt{g_{\alpha'_R\beta'_R}idx^{\alpha'}idx^{\beta'}} \tag{100}$$

$$ds = \sqrt{g_{\alpha'_R\beta'_R}dx^{\alpha'}dx^{\beta}} + \sqrt{-g_{\alpha'_R\beta'_R}dx^{\alpha'}dx^{\beta'}} \tag{101}$$

From those equations follows that complex space-time has square root of space-time interval equal to imaginary part plus real part that is very important result because it means there is movement in both real and imaginary coordinates. It means that wave field changes from oscillation to rotation in complex plane. It creates a field that can have metric without directions, i can create this metric out of rotations using only base frequency- this metric is more fundamental than direction metric that fails at zero energy. If i take a point of space-time distance can be thought as one rotation at Planck time minus all sixteen components of frequency, i can use a simple calculation to derive this formula, i have a rotation that without directions is equal to:

$$\nu_{\alpha\beta}(\mathbf{x^a}) = \sqrt{T^{[\alpha'\beta']}(\mathbf{x})} \tag{102}$$

$$ds = \pm\frac{dt}{2\pi i}\partial_t\psi_\pm(\mathbf{x})\psi^*_\pm(\mathbf{x}) \tag{103}$$

$$\psi_\pm(\mathbf{x}) = \exp\left(\pm 2\pi it\left(\sum_{\alpha',\beta'} l(\alpha',\beta')\left(\left(1-\nu_{\alpha'\beta'}(\mathbf{x^a})\right)\dot{x}^{\alpha'}\dot{x}^{\beta'}\right)\right)^{1/2}\right) \tag{104}$$

$$ds = dt\left(\sum_{\alpha',\beta'} l(\alpha',\beta')\left(\left(1-\nu_{\alpha'\beta'}(\mathbf{x^a})\right)\dot{x}^{\alpha'}\dot{x}^{\beta'}\right)\right)^{1/2} \tag{105}$$

For many systems i can extend this idea:

$$ds = \pm\prod_{k=1}^{N}\prod_{l=1}^{N}\frac{\sqrt{dt_k dt_l}}{2\pi i}\partial_t\psi_{\pm N}(\mathbf{x})\psi^*_{\pm N}(\mathbf{x}) \tag{106}$$

$$\psi_{\pm N}(\mathbf{x}) = \exp\left(\pm 2\pi it\left(\sum_{k=1}^{N}\sum_{l=1}^{N}\sum_{\alpha',\beta'} l(\alpha',\beta')\left(\left(1-\nu_{\alpha'\beta'kl}(\mathbf{x^a})\right)\dot{x}^{\alpha'}_{kl}\dot{x}^{\beta'}_{kl}\right)\right)^{1/2}\right) \tag{107}$$

$$ds = \prod_{n=1}^{N}\prod_{m=1}^{N}\sqrt{dt_n dt_m}\left(\sum_{k=1}^{N}\sum_{l=1}^{N}\sum_{\alpha',\beta'} l(\alpha',\beta')\left(\left(1-\nu_{\alpha'\beta'kl}(\mathbf{x^a})\right)\dot{x}^{\alpha'}_{kl}\dot{x}^{\beta'}_{kl}\right)\right)^{1/2} \tag{108}$$

15 Summary

In this paper i presented simple way to quantize gravity. I did show that on fundamental level wave function is what generates space-time metric and from it distance. This model can explain all Standard Model particles using symmetry and it can predict existence of new ones that are: anti-photon, anti-graviton, anti-gluon and graviton, first three are so called dark matter particles in this model, they interact only by gravity. Workings of particle interaction here are very close to standard model, symmetry is exchanged (in SM its virtual force particle) that leads to change of energy state of particles interacting. Real force caring particles are created where there is change in field energy of particles so real force caring boson is created that takes energy. Where there is no real force caring bosons- symmetry exchange takes over virtual particle exchange in Standard Model. Space-time has two sides first is direction depended that is created out of metric tensor and base vectors and that fails to have any meaning when there is zero energy- and complex space-time that is a scalar version of space-time that does hold even for zero energy its just equal to:

$$ds_0 = \pm \frac{dt}{2\pi i} \partial_t \psi_\pm(\mathbf{x}) \psi^*_\pm(\mathbf{x}) = dt \tag{109}$$

So scalar version is more fundamental, it means that rotation in complex plane of wave tensor field gives a reduction in tick of a fundamental clock by equality to frequency of that field. Function $l(\alpha, \beta)$ from previous chapter is equal to:

$$l(\alpha, \beta) = \begin{cases} 1 \to (\alpha, \beta) = (0, \beta) = (\alpha, 0) \vee (\alpha, \beta) = (0, 0) \\ -1 \to (\alpha, \beta) = (a, a) \vee (\alpha, \beta) = (a, b) = (b, a)|_{a,b=1,2,3} \end{cases} \tag{110}$$

That is just a way of writing metric components with frequency. There are sixteen clocks and each tick frequency reduces that clock tick and time parts of ticking add to ticking and space parts subtract from ticking and all is multiplied by speed of moving of that direction. For many systems its just sum of all them that matches the metric, only change is that time is now a square root of metric tensor term (there are N^2 metric tensors in many systems metric tensor so time component for them is $dt_n dt_m$ but if i take square root of distance i will get square root of it). Field equation is easy to solve if i know the components of energy tensor thus symmetry states and their interactions. Use of rotation operators in solutions means that just i apply them to get from un-primed coordinates to primed coordinates, because there is for one system only rotation in one plane i just get one rotation tensor that acts on components of wave field tensor. Symmetry field is govern by probability, it means that for each Planck time i calculate a state of symmetry field with probability. Gravity does change state of symmetry field and state of symmetry field changes gravity, for example particle falling into black hole changes its symmetry states to match energy of a gravity of black hole and what is gravity around black hole matches symmetry states of object that did fall into it. In symmetry field equations there is zero energy term that exist only for massive particles and its their mass and can't be calculated from this model it has to be plug into it. There has to be always that state for massive particles or more than it, for massless particles there is no zero energy state so they can be at any energy level. Space-time in this model is always spherical, it means all matter has to have spherical symmetry in addition there can't be less distance that one Planck length and less time than one Planck time, it explains why for many systems there has to be used more dimensions there is no way to arrange particles so they have distance that is not some kind of square root, this problem is not present if there are more dimensions and each of four dimension represents particle and their interactions. I presented particles of Standard Model and from it there are need for four new ones, but there is possibility there are more of them but still i can't predict it from this model because zero energy of them is unknown in this model. Many systems equation does not use one vector spin states but a tensor product of them it comes from a fact that its interaction of two systems- from it entanglement states can be created. And as final word measurement changes particle state to be at one point but only for Planck time, then it spread for whole space-time again. But change in energy states in not instant it comes from fact of interaction time, longer it is longer it takes to change state of particle, particle is at some energy state for short time then for short time it is in that state again and so on, if energy is low its change time is shorter but it last longer so it is in one energy state for longer- interaction time and time in of being in state are opposites.

References

[1] For all used calculation here i used Wolfram Alpha
https://www.wolframalpha.com

[2] Tensors
https://www.ese.wustl.edu/~nehorai/Porat_A_Gentle_Introduction_to_Tensors_2014.pdf

[3] Position vector components sum is equal to one:

$$\sqrt{\sum_{a=1}^{3} (x^a)^2} = 1 \tag{111}$$

[4] Qunatum Physics
http://physics.mq.edu.au/~jcresser/Phys301/Chapters/Chapter13.pdf

[5] Lorentz Transformation
http://web.physics.ucsb.edu/~fratus/phys103/LN/SR2.pdf

[6] Metric tensor in special relativity
https://webhome.phy.duke.edu/~rgb/Class/phy319/phy319/node131.html

[7] Metric tensor
https://mathworld.wolfram.com/MetricTensor.html

[8] Tensor rotation matrix
https://www.astro.caltech.edu/~golwala/ph125ab/ph106ab_notes_sec5.1.pdf

[9] A new perspective on spacetime 4D rotations and the SO(4) transformation group
https://www.sciencedirect.com/science/article/pii/S221137971832076X