Higgsless Glashow's and Quark-Gluon Theories and Gravity without Superstrings

Gunn Alex Quznetsov

Chelyabinsk State University, Chelyabinsk, Ural, Russia
E-mail: gunn@mail.ru, quznets@yahoo.com

This is the probabilistic explanation of some laws of physics (gravitation, red shift, electroweak, confinement, asymptotic freedom phenomenons).

1 Introduction

I do not construct any models because Physics does not need any strange hypotheses. Electroweak, quark-gluon, and gravity phenomenons are explained purely logically from spinor expression of probabilities:

Denote:

$$1_2 := \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, 0_2 := \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix},$$

$$\beta^{[0]} := -\begin{bmatrix} 1_2 & 0_2 \\ 0_2 & 1_2 \end{bmatrix} = -1_4,$$

the Pauli matrices:

$$\sigma_1 = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}, \sigma_2 = \begin{bmatrix} 0 & -\mathrm{i} \\ \mathrm{i} & 0 \end{bmatrix}, \sigma_3 = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}.$$

A set $\widetilde{C}$ of complex $n \times n$ matrices is called *a Clifford set of rank n* if the following conditions are fulfilled [1]:
if $\alpha_k \in \widetilde{C}$ and $\alpha_r \in \widetilde{C}$ then $\alpha_k \alpha_r + \alpha_r \alpha_k = 2\delta_{k,r}$;
if $\alpha_k \alpha_r + \alpha_r \alpha_k = 2\delta_{k,r}$ for all elements α_r of set $\widetilde{C}$ then $\alpha_k \in \widetilde{C}$.

If $n = 4$ then a Clifford set either contains 3 (*a Clifford triplet*) or 5 matrices (*a Clifford pentad*).

Here exist only six Clifford pentads [1]: one which I call *light pentad* β:

• *light pentad* β:

$$\beta^{[1]} := \begin{bmatrix} \sigma_1 & 0_2 \\ 0_2 & -\sigma_1 \end{bmatrix}, \quad \beta^{[2]} := \begin{bmatrix} \sigma_2 & 0_2 \\ 0_2 & -\sigma_2 \end{bmatrix}, \quad \beta^{[3]} := \begin{bmatrix} \sigma_3 & 0_2 \\ 0_2 & -\sigma_3 \end{bmatrix}, \tag{1}$$

$$\gamma^{[0]} := \begin{bmatrix} 0_2 & 1_2 \\ 1_2 & 0_2 \end{bmatrix}, \tag{2}$$

$$\beta^{[4]} := \mathrm{i} \cdot \begin{bmatrix} 0_2 & 1_2 \\ -1_2 & 0_2 \end{bmatrix}; \tag{3}$$

three *coloured* pentads:

• *the red pentad* ζ:

$$\zeta^{[1]} := \begin{bmatrix} -\sigma_1 & 0_2 \\ 0_2 & \sigma_1 \end{bmatrix}, \quad \zeta^{[2]} := \begin{bmatrix} \sigma_2 & 0_2 \\ 0_2 & \sigma_2 \end{bmatrix},$$

$$\zeta^{[3]} := \begin{bmatrix} -\sigma_3 & 0_2 \\ 0_2 & -\sigma_3 \end{bmatrix},$$

$$\gamma_\zeta^{[0]} := \begin{bmatrix} 0_2 & -\sigma_1 \\ -\sigma_1 & 0_2 \end{bmatrix}, \zeta^{[4]} := \mathrm{i}\begin{bmatrix} 0_2 & \sigma_1 \\ -\sigma_1 & 0_2 \end{bmatrix}; \tag{4}$$

• *the green pentad* η:

$$\eta^{[1]} := \begin{bmatrix} -\sigma_1 & 0_2 \\ 0_2 & -\sigma_1 \end{bmatrix}, \quad \eta^{[2]} := \begin{bmatrix} -\sigma_2 & 0_2 \\ 0_2 & \sigma_2 \end{bmatrix},$$

$$\eta^{[3]} := \begin{bmatrix} \sigma_3 & 0_2 \\ 0_2 & \sigma_3 \end{bmatrix},$$

$$\gamma_\eta^{[0]} := \begin{bmatrix} 0_2 & -\sigma_2 \\ -\sigma_2 & 0_2 \end{bmatrix}, \quad \eta^{[4]} := \mathrm{i}\begin{bmatrix} 0_2 & \sigma_2 \\ -\sigma_2 & 0_2 \end{bmatrix}; \tag{5}$$

• *the blue pentad* θ:

$$\theta^{[1]} := \begin{bmatrix} \sigma_1 & 0_2 \\ 0_2 & \sigma_1 \end{bmatrix}, \quad \theta^{[2]} := \begin{bmatrix} -\sigma_2 & 0_2 \\ 0_2 & -\sigma_2 \end{bmatrix},$$

$$\theta^{[3]} := \begin{bmatrix} -\sigma_3 & 0_2 \\ 0_2 & \sigma_3 \end{bmatrix},$$

$$\gamma_\theta^{[0]} := \begin{bmatrix} 0_2 & -\sigma_3 \\ -\sigma_3 & 0_2 \end{bmatrix}, \quad \theta^{[4]} := \mathrm{i}\begin{bmatrix} 0_2 & \sigma_3 \\ -\sigma_3 & 0_2 \end{bmatrix}; \tag{6}$$

two *gustatory* pentads (about these pentads in detail, please, see in [2]):

• *the sweet pentad* $\underline{\Delta}$:

$$\underline{\Delta}^{[1]} := \begin{bmatrix} 0_2 & -\sigma_1 \\ -\sigma_1 & 0_2 \end{bmatrix}, \quad \underline{\Delta}^{[2]} := \begin{bmatrix} 0_2 & -\sigma_2 \\ -\sigma_2 & 0_2 \end{bmatrix},$$

$$\underline{\Delta}^{[3]} := \begin{bmatrix} 0_2 & -\sigma_3 \\ -\sigma_3 & 0_2 \end{bmatrix},$$

$$\underline{\Delta}^{[0]} := \begin{bmatrix} -1_2 & 0_2 \\ 0_2 & 1_2 \end{bmatrix}, \quad \underline{\Delta}^{[4]} := \mathrm{i}\begin{bmatrix} 0_2 & 1_2 \\ -1_2 & 0_2 \end{bmatrix}.$$

• *the bitter pentad* $\underline{\Gamma}$:

$$\underline{\Gamma}^{[1]} := \mathrm{i}\begin{bmatrix} 0_2 & -\sigma_1 \\ \sigma_1 & 0_2 \end{bmatrix}, \quad \underline{\Gamma}^{[2]} := \mathrm{i}\begin{bmatrix} 0_2 & -\sigma_2 \\ \sigma_2 & 0_2 \end{bmatrix},$$

$$\underline{\Gamma}^{[3]} := \mathrm{i}\begin{bmatrix} 0_2 & -\sigma_3 \\ \sigma_3 & 0_2 \end{bmatrix},$$

$$\underline{\Gamma}^{[0]} := \begin{bmatrix} -1_2 & 0_2 \\ 0_2 & 1_2 \end{bmatrix}, \quad \underline{\Gamma}^{[4]} := \begin{bmatrix} 0_2 & 1_2 \\ 1_2 & 0_2 \end{bmatrix}.$$

Denote: if A is a 2×2 matrix then

$$A1_4 := \begin{bmatrix} A & 0_2 \\ 0_2 & A \end{bmatrix} \text{ and } 1_4 A := \begin{bmatrix} A & 0_2 \\ 0_2 & A \end{bmatrix}.$$

And if B is a 4×4 matrix then

$$A + B := A1_4 + B,\ AB := A1_4 B$$

etc.

$$\underline{x} := \langle x_0, \mathrm{x} \rangle := \langle x_0, x_1, x_2, x_3 \rangle,$$
$$x_0 := \mathrm{c}t,$$

with $\mathrm{c} = 299792458$.

2 Probabilities' movement equations

Let $\rho_{\mathrm{A}}(\underline{x})$ be a probability density [4] of a point event $\mathrm{A}(\underline{x})$. And let real functions

$$u_{\mathrm{A},1}(\underline{x}), u_{\mathrm{A},2}(\underline{x}), u_{\mathrm{A},3}(\underline{x})$$

satisfy conditions

$$u_{\mathrm{A},1}^2 + u_{\mathrm{A},2}^2 + u_{\mathrm{A},3}^2 < \mathrm{c}^2,$$

and if $j_{\mathrm{A},s} := \rho_{\mathrm{A}} u_{\mathrm{A},s}$ then

$$\rho_{\mathrm{A}} \to \rho'_{\mathrm{A}} = \frac{\rho_{\mathrm{A}} - \frac{v}{\mathrm{c}^2} j_{\mathrm{A},k}}{\sqrt{1 - \left(\frac{v}{\mathrm{c}}\right)^2}},$$
$$j_{\mathrm{A},k} \to j'_{\mathrm{A},k} = \frac{j_{\mathrm{A},k} - v\rho_{\mathrm{A}}}{\sqrt{1 - \left(\frac{v}{\mathrm{c}}\right)^2}},$$
$$j_{\mathrm{A},s} \to j'_{\mathrm{A},s} = j_{\mathrm{A},s} \text{ for } s \neq k$$

for $s \in \{1, 2, 3\}$ and $k \in \{1, 2, 3\}$ under the Lorentz transformations:

$$t \to t' = \frac{t - \frac{v}{\mathrm{c}^2} x_k}{\sqrt{1 - \frac{v^2}{\mathrm{c}^2}}},$$
$$x_k \to x'_k = \frac{x_k - vt}{\sqrt{1 - \frac{v^2}{\mathrm{c}^2}}},$$
$$x_s \to x'_s = x_s, \text{ if } s \neq k.$$

In that case $\mathbf{u}_{\mathrm{A}} \langle u_{\mathrm{A},1}, u_{\mathrm{A},2}, u_{\mathrm{A},3} \rangle$ is called *a vector of local velocity* of an event A *probability propagation* and

$$\mathbf{j}_{\mathrm{A}} \langle j_{\mathrm{A},1}, j_{\mathrm{A},2}, j_{\mathrm{A},3} \rangle$$

is called *a current vector* of an event A probability.

Let us consider the following set of four real equations with eight real unknowns:

$$b^2 \text{ with } b > 0,\ \alpha,\ \beta,\ \chi,\ \theta,\ \gamma,\ \upsilon,\ \lambda:$$

$$\left.\begin{array}{l} b^2 = \rho_{\mathrm{A}} \\ b^2 \begin{pmatrix} \cos^2(\alpha)\sin(2\beta)\cos(\theta - \gamma) \\ -\sin^2(\alpha)\sin(2\chi)\cos(\upsilon - \lambda) \end{pmatrix} = -\frac{j_{\mathrm{A},1}}{\mathrm{c}} \\ b^2 \begin{pmatrix} \cos^2(\alpha)\sin(2\beta)\sin(\theta - \gamma) \\ -\sin^2(\alpha)\sin(2\chi)\sin(\upsilon - \lambda) \end{pmatrix} = -\frac{j_{\mathrm{A},2}}{\mathrm{c}} \\ b^2 \begin{pmatrix} \cos^2(\alpha)\cos(2\beta) \\ -\sin^2(\alpha)\cos(2\chi) \end{pmatrix} = -\frac{j_{\mathrm{A},3}}{\mathrm{c}} \end{array}\right\}. \tag{7}$$

This set has solutions for any ρ_{A} and $j_{\mathrm{A},k}$. For example, one of these solutions is placed in [4].

If

$$\begin{aligned} \varphi_1 &:= b \cdot \exp(\mathrm{i}\gamma)\cos(\beta)\cos(\alpha), \\ \varphi_2 &:= b \cdot \exp(\mathrm{i}\theta)\sin(\beta)\cos(\alpha), \\ \varphi_3 &:= b \cdot \exp(\mathrm{i}\lambda)\cos(\chi)\sin(\alpha), \\ \varphi_4 &:= b \cdot \exp(\mathrm{i}\upsilon)\sin(\chi)\sin(\alpha) \end{aligned} \tag{8}$$

then

$$\begin{aligned} \rho_{\mathrm{A}} &= \sum_{s=1}^{4} \varphi_s^* \varphi_s, \\ \frac{j_{\mathrm{A},r}}{\mathrm{c}} &= -\sum_{k=1}^{4}\sum_{s=1}^{4} \varphi_s^* \beta_{s,k}^{[r]} \varphi_k \end{aligned} \tag{9}$$

with $r \in \{1, 2, 3\}$. These functions φ_s are called *functions of event* A *state*.

If $\rho_{\mathrm{A}}(\underline{x}) = 0$ for all $\underline{x}$ such that $|\underline{x}| > (\pi\mathrm{c}/\mathrm{h})$ with $\mathrm{h} := 6.6260755 \cdot 10^{-34}$ then $\varphi_s(\underline{x})$ are Planck's functions [3]. And if

$$\varphi := \begin{bmatrix} \varphi_1 \\ \varphi_2 \\ \varphi_3 \\ \varphi_4 \end{bmatrix}$$

then these functions obey [5] the following equation:

$$\sum_{k=0}^{3} \beta^{[k]} \left(\partial_k + \mathrm{i}\Theta_k + \mathrm{i}\Upsilon_k \gamma^{[5]} \right) \varphi + + \begin{pmatrix} + \mathrm{i}M_0 \gamma^{[0]} + \mathrm{i}M_4 \beta^{[4]} - \\ - \mathrm{i}M_{\zeta,0} \gamma_\zeta^{[0]} + \mathrm{i}M_{\zeta,4} \zeta^{[4]} - \\ - \mathrm{i}M_{\eta,0} \gamma_\eta^{[0]} - \mathrm{i}M_{\eta,4} \eta^{[4]} + \\ + \mathrm{i}M_{\theta,0} \gamma_\theta^{[0]} + \mathrm{i}M_{\theta,4} \theta^{[4]} \end{pmatrix} \varphi = 0 \tag{10}$$

with real $\Theta_k(\underline{x})$, $\Upsilon_k(\underline{x})$, $M_0(\underline{x})$, $M_4(\underline{x})$, $M_{\zeta,0}(\underline{x})$, $M_{\zeta,4}(\underline{x})$, $M_{\eta,0}(\underline{x})$, $M_{\eta,4}(\underline{x})$, $M_{\theta,0}(\underline{x})$, $M_{\theta,4}(\underline{x})$ and with

$$\gamma^{[5]} := \begin{bmatrix} 1_2 & 0_2 \\ 0_2 & -1_2 \end{bmatrix}. \tag{11}$$

2.1 Lepton movement equation

If $M_{\zeta,0}(\underline{x}) = 0$, $M_{\zeta,4}(\underline{x}) = 0$, $M_{\eta,0}(\underline{x}) = 0$, $M_{\eta,4}(\underline{x}) = 0$, $M_{\theta,0}(\underline{x}) = 0$, $M_{\theta,4}(\underline{x}) = 0$ then the following equation is deduced from (10):

$$\left(\begin{array}{c}\beta^{[0]}\left(\frac{1}{c}\mathrm{i}\partial_t - \Theta_0 - \Upsilon_0\gamma^{[5]}\right)\\ +\sum_{\alpha=1}^{3}\beta^{[\alpha]}\left(\mathrm{i}\partial_\alpha - \Theta_\alpha - \Upsilon_\alpha\gamma^{[5]}\right)\\ -M_0\gamma^{[0]} - M_4\beta^{[4]}\end{array}\right)\widetilde{\varphi} = 0 \quad (12)$$

I call it *lepton movement equation* [6].

If similar to (9):

$$j_{\mathcal{A},5} := -\mathrm{c}\cdot\varphi^\dagger\gamma^{[0]}\varphi \text{ and } j_{\mathcal{A},4} := -\mathrm{c}\cdot\varphi^\dagger\beta^{[4]}\varphi$$

and:

$$u_{\mathcal{A},4} := j_{\mathcal{A},4}/\rho_{\mathcal{A}} \text{ and } u_{\mathcal{A},5} := j_{\mathcal{A},5}/\rho_{\mathcal{A}} \quad (13)$$

then from (8):

$$-\frac{u_{\mathcal{A},5}}{\mathrm{c}} = \sin 2\alpha\left(\begin{array}{c}\sin\beta\sin\chi\cos(-\theta+\upsilon)\\ +\cos\beta\cos\chi\cos(\gamma-\lambda)\end{array}\right),$$

$$-\frac{u_{\mathcal{A},4}}{\mathrm{c}} = \sin 2\alpha\left(\begin{array}{c}-\sin\beta\sin\chi\sin(-\theta+\upsilon)\\ +\cos\beta\cos\chi\sin(\gamma-\lambda)\end{array}\right).$$

Hence from (7):

$$u^2_{\mathcal{A},1} + u^2_{\mathcal{A},2} + u^2_{\mathcal{A},3} + u^2_{\mathcal{A},4} + u^2_{\mathcal{A},5} = \mathrm{c}^2.$$

Thus only all five elements of a Clifford pentad provide an entire set of speed components and, for completeness, yet two "space" coordinates x_5 and x_4 should be added to our three x_1, x_2, x_3. These additional coordinates can be selected so that

$$-\frac{\pi\mathrm{c}}{\mathrm{h}} \leqslant x_5 \leqslant \frac{\pi\mathrm{c}}{\mathrm{h}}, \quad -\frac{\pi\mathrm{c}}{\mathrm{h}} \leqslant x_4 \leqslant \frac{\pi\mathrm{c}}{\mathrm{h}}.$$

Coordinates x_4 and x_5 are not coordinates of any events. Hence, our devices do not detect them as actual space coordinates.

Let us denote:

$$\widetilde{\varphi}(t,x_1,x_2,x_3,x_5,x_4) := \varphi(t,x_1,x_2,x_3)\times$$
$$\times\left(\exp\left(\mathrm{i}\left(x_5M_0(t,x_1,x_2,x_3) + x_4M_4(t,x_1,x_2,x_3)\right)\right)\right).$$

In this case a lepton movement equation (12) shape is the following:

$$\left(\sum_{s=0}^{3}\beta^{[s]}\left(\mathrm{i}\partial_s - \Theta_s - \Upsilon_s\gamma^{[5]}\right) - \gamma^{[0]}\mathrm{i}\partial_5 - \beta^{[4]}\mathrm{i}\partial_4\right)\widetilde{\varphi} = 0$$

This equation can be transformated into the following form [7]:

$$\left(\begin{array}{c}\sum_{s=0}^{3}\beta^{[s]}\left(\mathrm{i}\partial_s + F_s + 0.5g_1YB_s\right)\\ -\gamma^{[0]}\mathrm{i}\partial_5 - \beta^{[4]}\mathrm{i}\partial_4\end{array}\right)\widetilde{\varphi} = 0 \quad (14)$$

with real F_s, B_s, a real positive constant g_1, and with *charge matrix* Y:

$$Y := -\left[\begin{array}{cc}1_2 & 0_2\\ 0_2 & 2\cdot 1_2\end{array}\right]. \quad (15)$$

If $\chi(t,x_1,x_2,x_3)$ is a real function and:

$$\widetilde{U}(\chi) := \left[\begin{array}{cc}\exp\left(\mathrm{i}\frac{\chi}{2}\right)1_2 & 0_2\\ 0_2 & \exp(\mathrm{i}\chi)1_2\end{array}\right]. \quad (16)$$

then equation (14) is invariant under the following transformations [8]:

$$\begin{array}{l}x_4 \to x'_4 := x_4\cos\frac{\chi}{2} - x_5\sin\frac{\chi}{2};\\ x_5 \to x'_5 := x_5\cos\frac{\chi}{2} + x_4\sin\frac{\chi}{2};\\ x_\mu \to x'_\mu := x_\mu \text{ for } \mu\in\{0,1,2,3\};\\ \widetilde{\varphi} \to \widetilde{\varphi}' := \widetilde{U}\widetilde{\varphi},\\ B_\mu \to B'_\mu := B_\mu - \frac{1}{g_1}\partial_\mu\chi,\\ F_\mu \to F'_\mu := \widetilde{U}F_s\widetilde{U}^\dagger.\end{array} \quad (17)$$

Therefore, B_μ are similar to components of the Standard Model gauge field B.

Further $\Im_{\mathbf{J}}$ is the space spanned by the following basis [9]:

$$\mathbf{J} :=$$

$$\left\langle\begin{array}{c}\frac{\mathrm{h}}{2\pi\mathrm{c}}\exp\left(-\mathrm{i}\frac{\mathrm{h}}{\mathrm{c}}(s_0x_4)\right)\epsilon_k,\ldots\\ \frac{\mathrm{h}}{2\pi\mathrm{c}}\exp\left(-\mathrm{i}\frac{\mathrm{h}}{\mathrm{c}}(n_0x_5)\right)\epsilon_r,\ldots\end{array}\right\rangle \quad (18)$$

with some integer numbers s_0 and n_0 and with

$$\epsilon_1 := \left[\begin{array}{c}1\\0\\0\\0\end{array}\right],\ \epsilon_2 := \left[\begin{array}{c}0\\1\\0\\0\end{array}\right],\ \epsilon_3 := \left[\begin{array}{c}0\\0\\1\\0\end{array}\right],\ \epsilon_4 := \left[\begin{array}{c}0\\0\\0\\1\end{array}\right].$$

Further in this subsection U is any linear transformation of space $\Im_{\mathbf{J}}$ so that for every $\widetilde{\varphi}$: if $\widetilde{\varphi}\in\Im_{\mathbf{J}}$ then:

$$\begin{array}{l}\int_{-\frac{\pi\mathrm{c}}{\mathrm{h}}}^{\frac{\pi\mathrm{c}}{\mathrm{h}}} dx_4\int_{-\frac{\pi\mathrm{c}}{\mathrm{h}}}^{\frac{\pi\mathrm{c}}{\mathrm{h}}} dx_5\cdot(U\widetilde{\varphi})^\dagger(U\widetilde{\varphi}) = \rho_{\mathrm{A}},\\ \int_{-\frac{\pi\mathrm{c}}{\mathrm{h}}}^{\frac{\pi\mathrm{c}}{\mathrm{h}}} dx_4\int_{-\frac{\pi\mathrm{c}}{\mathrm{h}}}^{\frac{\pi\mathrm{c}}{\mathrm{h}}} dx_5\cdot(U\widetilde{\varphi})^\dagger\beta^{[s]}(U\widetilde{\varphi}) = -\frac{j_{\mathrm{A},s}}{\mathrm{c}}\end{array} \quad (19)$$

for $s\in\{1,2,3\}$.

Matrix U is factorized as the following:

$$U = \exp(\mathrm{i}\varsigma)\widetilde{U}U^{(-)}U^{(+)}$$

with real ς, with $\widetilde{U}$ from (16), and with

$$U^{(+)} := \begin{bmatrix} 1_2 & 0_2 & 0_2 & 0_2 \\ 0_2 & (u+\mathrm{i}v)\,1_2 & 0_2 & (k+\mathrm{i}s)\,1_2 \\ 0_2 & 0_2 & 1_2 & 0_2 \\ 0_2 & (-k+\mathrm{i}s)\,1_2 & 0_2 & (u-\mathrm{i}v)\,1_2 \end{bmatrix} \quad (20)$$

and

$$U^{(-)} := \begin{bmatrix} (a+\mathrm{i}b)\,1_2 & 0_2 & (c+\mathrm{i}q)\,1_2 & 0_2 \\ 0_2 & 1_2 & 0_2 & 0_2 \\ (-c+\mathrm{i}q)\,1_2 & 0_2 & (a-\mathrm{i}b)\,1_2 & 0_2 \\ 0_2 & 0_2 & 0_2 & 1_2 \end{bmatrix} \quad (21)$$

with real a, b, c, q, u, v, k, s.

Matrix $U^{(+)}$ refers to antiparticles (About antiparticles in detail, please, see [10] and about neutrinos - [11]). And transformation $U^{(-)}$ reduces equation (14) to the following shape:

$$\left(\begin{array}{c} \sum_{\mu=0}^{3} \beta^{[\mu]}\mathrm{i} \left(\begin{array}{c} \partial_\mu - \mathrm{i}0.5 g_1 B_\mu Y \\ -\mathrm{i}\frac{1}{2} g_2 W_\mu - \mathrm{i}F_\mu \end{array} \right) \\ +\gamma^{[0]}\mathrm{i}\partial_5 + \beta^{[4]}\mathrm{i}\partial_4 \end{array} \right) \widetilde{\varphi} = 0. \quad (22)$$

with a real positive constant g_2 and with

$$W_\mu := \begin{bmatrix} W_{0,\mu}1_2 & 0_2 & (W_{1,\mu} - \mathrm{i}W_{2,\mu})\,1_2 & 0_2 \\ 0_2 & 0_2 & 0_2 & 0_2 \\ (W_{1,\mu} + \mathrm{i}W_{2,\mu})\,1_2 & 0_2 & -W_{0,\mu}1_2 & 0_2 \\ 0_2 & 0_2 & 0_2 & 0_2 \end{bmatrix}$$

with real $W_{0,\mu}$, $W_{1,\mu}$ and $W_{2,\mu}$.

Equation (22) is invariant under the following transformation:

$$\begin{aligned} &\varphi \to \varphi' := U\varphi, \\ &x_4 \to x_4' := (\ell_\circ + \ell_*)\, a x_4 + (\ell_\circ - \ell_*)\, \sqrt{1-a^2} x_5, \\ &x_5 \to x_5' := (\ell_\circ + \ell_*)\, a x_5 - (\ell_\circ - \ell_*)\, \sqrt{1-a^2} x_4, \\ &x_\mu \to x_\mu' := x_\mu, \text{ for } \mu \in \{0,1,2,3\}, \\ &B_\mu \to B_\mu' := B_\mu, \\ &W_\mu \to W_\mu' := U W_\mu U^\dagger - \frac{2\mathrm{i}}{g_2} (\partial_\mu U)\, U^\dagger \end{aligned}$$

with

$$\ell_\circ := \frac{1}{2\sqrt{(1-a^2)}} \times \times \begin{bmatrix} \left(b + \sqrt{(1-a^2)}\right) 1_4 & (q - \mathrm{i}c)\, 1_4 \\ (q + \mathrm{i}c)\, 1_4 & \left(\sqrt{(1-a^2)} - b\right) 1_4 \end{bmatrix},$$

$$\ell_* := \frac{1}{2\sqrt{(1-a^2)}} \times \times \begin{bmatrix} \left(\sqrt{(1-a^2)} - b\right) 1_4 & (-q + \mathrm{i}c)\, 1_4 \\ (-q - \mathrm{i}c)\, 1_4 & \left(b + \sqrt{(1-a^2)}\right) 1_4 \end{bmatrix}.$$

Hence W_μ behaves the same way as components of the weak field W of Standard Model.

Field $W_{0,\mu}$ obeys the following equation [12]:

$$\left(-\frac{1}{\mathrm{c}^2}\,\partial_t^2 + \sum_{s=1}^{3} \partial_s^2 \right) W_{0,\mu} = = g_2^2 \left(\widetilde{W}_0^2 - \widetilde{W}_1^2 - \widetilde{W}_2^2 - \widetilde{W}_3^2 \right) W_{0,\mu} + \Lambda \quad (23)$$

with

$$\widetilde{W}_\nu := \begin{bmatrix} W_{0,\nu} \\ W_{1,\nu} \\ W_{2,\nu} \end{bmatrix}$$

and Λ is the action of other components of field W on $W_{0,\mu}$.

Equation (23) looks like the Klein-Gordon equation of field $W_{0,\mu}$ with mass

$$m := \frac{\mathrm{h}}{\mathrm{c}}\, g_2 \sqrt{\widetilde{W}_0^2 - \sum_{s=1}^{3} \widetilde{W}_s^2} \quad (24)$$

and with additional terms of the $W_{0,\mu}$ interactions with other components of $\widetilde{W}$. Fields $W_{1,\mu}$ and $W_{2,\mu}$ have similar equations.

The "mass" (24) is invariant under the Lorentz transformations

$$\widetilde{W}_0' := \frac{\widetilde{W}_0 - \frac{v}{\mathrm{c}} \widetilde{W}_k}{\sqrt{1 - \left(\frac{v}{\mathrm{c}}\right)^2}}, \quad \widetilde{W}_k' := \frac{\widetilde{W}_k - \frac{v}{\mathrm{c}} \widetilde{W}_0}{\sqrt{1 - \left(\frac{v}{\mathrm{c}}\right)^2}},$$

$$\widetilde{W}_s' := \widetilde{W}_s, \text{ if } s \neq k,$$

is invariant under the turns of the $\left\langle \widetilde{W}_1, \widetilde{W}_2, \widetilde{W}_3 \right\rangle$ space

$$\left\{ \begin{array}{l} \widetilde{W}_r' := \widetilde{W}_r \cos\lambda - \widetilde{W}_s \sin\lambda \\ \widetilde{W}_s' := \widetilde{W}_r \sin\lambda + \widetilde{W}_s \cos\lambda \end{array} \right|$$

and invariant under a global weak isospin transformation $U^{(-)}$:

$$W_\nu \to W_\nu' := U^{(-)} W_\nu U^{(-)\dagger},$$

but is not invariant for a local transformation $U^{(-)}$. But local transformations for $W_{0,\mu}$, $W_{1,\mu}$ and $W_{2,\mu}$ are insignificant since all three particles are very short-lived.

The form (24) can vary in space, but locally acts like mass - i.e. it does not allow particles of this field to behave the same way as massless ones.

If

$$\begin{aligned} Z_\mu &:= (W_{0,\mu} \cos\alpha - B_\mu \sin\alpha), \\ A_\mu &:= (B_\mu \cos\alpha + W_{0,\mu} \sin\alpha) \end{aligned}$$

with

$$\alpha := \arctan \frac{g_1}{g_2}$$

then masses of Z and W fulfill the following ratio:

$$m_Z = \frac{m_W}{\cos\alpha}.$$

If

$$\mathrm{e} := \frac{g_1 g_2}{\sqrt{g_1^2 + g_2^2}},$$

and

$$\widehat{Z}_\mu := Z_\mu \frac{1}{\sqrt{g_2^2+g_1^2}} \times$$

$$\times \begin{bmatrix} \left(g_2^2+g_1^2\right)1_2 & 0_2 & 0_2 & 0_2 \\ 0_2 & 2g_1^2 1_2 & 0_2 & 0_2 \\ 0_2 & 0_2 & \left(g_2^2-g_1^2\right)1_2 & 0_2 \\ 0_2 & 0_2 & 0_2 & 2g_1^2 1_2 \end{bmatrix},$$

$$\widehat{W}_\mu := g_2 \times$$

$$\times \begin{bmatrix} 0_2 & 0_2 & \left(W_{1,\mu} - \mathrm{i}W_{2,\mu}\right)1_2 & 0_2 \\ 0_2 & 0_2 & 0_2 & 0_2 \\ \left(W_{1,\mu} + \mathrm{i}W_{2,\mu}\right)1_2 & 0_2 & 0_2 & 0_2 \\ 0_2 & 0_2 & 0_2 & 0_2 \end{bmatrix},$$

$$\widehat{A}_\mu := A_\mu \begin{bmatrix} 0_2 & 0_2 & 0_2 & 0_2 \\ 0_2 & 1_2 & 0_2 & 0_2 \\ 0_2 & 0_2 & 1_2 & 0_2 \\ 0_2 & 0_2 & 0_2 & 1_2 \end{bmatrix}.$$

then equation (22) has the following form:

$$\left(\begin{array}{c} \sum_{\mu=0}^{3} \beta^{[\mu]}\mathrm{i} \left(\begin{array}{c} \partial_\mu + \mathrm{i}\mathrm{e}\widehat{A}_\mu \\ -\mathrm{i}0.5\left(\widehat{Z}_\mu + \widehat{W}_\mu\right) \end{array} \right) \\ +\gamma^{[0]}\mathrm{i}\partial_5 + \beta^{[4]}\mathrm{i}\partial_4 \end{array} \right) \widetilde{\varphi} = 0. \quad (25)$$

Here [13] the vector field A_μ is similar to *the electromagnetic potential* and $\left(\widehat{Z}_\mu + \widehat{W}_\mu\right)$ is similar to *the weak potential*.

2.2 Colored equations

The following part of (10) I call *colored movement equation* [3]:

$$\left(\begin{array}{c} \sum_{k=0}^{3} \beta^{[k]}\left(-\mathrm{i}\partial_k + \Theta_k + \Upsilon_k \gamma^{[5]}\right) - \\ -M_{\zeta,0}\gamma_\zeta^{[0]} + M_{\zeta,4}\zeta^{[4]} + \\ -M_{\eta,0}\gamma_\eta^{[0]} - M_{\eta,4}\eta^{[4]} + \\ +M_{\theta,0}\gamma_\theta^{[0]} + M_{\theta,4}\theta^{[4]} \end{array} \right) \varphi = 0. \quad (26)$$

Here (4), (5), (6):

$$\gamma_\zeta^{[0]} = -\begin{bmatrix} 0&0&0&1 \\ 0&0&1&0 \\ 0&1&0&0 \\ 1&0&0&0 \end{bmatrix}, \quad \zeta^{[4]} = \begin{bmatrix} 0&0&0&\mathrm{i} \\ 0&0&\mathrm{i}&0 \\ 0&-\mathrm{i}&0&0 \\ -\mathrm{i}&0&0&0 \end{bmatrix}$$

are mass elements of red pentad;

$$\gamma_\eta^{[0]} = \begin{bmatrix} 0&0&0&\mathrm{i} \\ 0&0&-\mathrm{i}&0 \\ 0&\mathrm{i}&0&0 \\ -\mathrm{i}&0&0&0 \end{bmatrix}, \quad \eta^{[4]} = \begin{bmatrix} 0&0&0&1 \\ 0&0&-1&0 \\ 0&-1&0&0 \\ 1&0&0&0 \end{bmatrix}$$

are mass elements of green pentad;

$$\gamma_\theta^{[0]} = \begin{bmatrix} 0&0&-1&0 \\ 0&0&0&1 \\ -1&0&0&0 \\ 0&1&0&0 \end{bmatrix}, \quad \theta^{[4]} = \begin{bmatrix} 0&0&-\mathrm{i}&0 \\ 0&0&0&\mathrm{i} \\ -\mathrm{i}&0&0&0 \\ 0&\mathrm{i}&0&0 \end{bmatrix}$$

are mass elements of blue pentad.

I call:

- $M_{\zeta,0}$, $M_{\zeta,4}$ *red lower and upper mass members*;
- $M_{\eta,0}$, $M_{\eta,4}$ *green lower and upper mass members*;
- $M_{\theta,0}$, $M_{\theta,4}$ *blue lower and upper mass members*.

The mass members of this equation form the following matrix sum:

$$\widehat{M} := \left(\begin{array}{c} -M_{\zeta,0}\gamma_\zeta^{[0]} + M_{\zeta,4}\zeta^{[4]} - \\ -M_{\eta,0}\gamma_\eta^{[0]} - M_{\eta,4}\eta^{[4]} + \\ +M_{\theta,0}\gamma_\theta^{[0]} + M_{\theta,4}\theta^{[4]} \end{array} \right) =$$

$$= \begin{bmatrix} 0 & 0 & -M_{\theta,0} & M_{\zeta,\eta,0} \\ 0 & 0 & M_{\zeta,\eta,0}^* & M_{\theta,0} \\ -M_{\theta,0} & M_{\zeta,\eta,0} & 0 & 0 \\ M_{\zeta,\eta,0}^* & M_{\theta,0} & 0 & 0 \end{bmatrix} +$$

$$+\mathrm{i} \begin{bmatrix} 0 & 0 & -M_{\theta,4} & M_{\zeta,\eta,4}^* \\ 0 & 0 & M_{\zeta,\eta,4} & M_{\theta,4} \\ -M_{\theta,4} & -M_{\zeta,\eta,4}^* & 0 & 0 \\ -M_{\zeta,\eta,4} & M_{\theta,4} & 0 & 0 \end{bmatrix}$$

with $M_{\zeta,\eta,0} := M_{\zeta,0} - \mathrm{i}M_{\eta,0}$ and $M_{\zeta,\eta,4} := M_{\zeta,4} - \mathrm{i}M_{\eta,4}$.

Elements of these matrices can be turned by formula of shape [14]:

$$\begin{pmatrix} \cos\frac{\theta}{2} & \mathrm{i}\sin\frac{\theta}{2} \\ \mathrm{i}\sin\frac{\theta}{2} & \cos\frac{\theta}{2} \end{pmatrix} \begin{pmatrix} Z & X - \mathrm{i}Y \\ X + \mathrm{i}Y & -Z \end{pmatrix} \times$$

$$\times \begin{pmatrix} \cos\frac{\theta}{2} & -\mathrm{i}\sin\frac{\theta}{2} \\ -\mathrm{i}\sin\frac{\theta}{2} & \cos\frac{\theta}{2} \end{pmatrix} =$$

$$= \begin{pmatrix} Z\cos\theta - Y\sin\theta & X - \mathrm{i}\begin{pmatrix} Y\cos\theta \\ +Z\sin\theta \end{pmatrix} \\ X + \mathrm{i}\begin{pmatrix} Y\cos\theta \\ +Z\sin\theta \end{pmatrix} & -Z\cos\theta + Y\sin\theta \end{pmatrix}.$$

Hence, if:

$$U_{2,3}(\alpha) := \begin{bmatrix} \cos\alpha & \mathrm{i}\sin\alpha & 0 & 0 \\ \mathrm{i}\sin\alpha & \cos\alpha & 0 & 0 \\ 0 & 0 & \cos\alpha & \mathrm{i}\sin\alpha \\ 0 & 0 & \mathrm{i}\sin\alpha & \cos\alpha \end{bmatrix}$$

and

$$\widehat{M}' := \begin{pmatrix} -M'_{\zeta,0}\gamma_\zeta^{[0]} + M'_{\zeta,4}\zeta^{[4]} - \\ -M'_{\eta,0}\gamma_\eta^{[0]} - M'_{\eta,4}\eta^{[4]} + \\ +M'_{\theta,0}\gamma_\theta^{[0]} + M'_{\theta,4}\theta^{[4]} \end{pmatrix} := U_{2,3}^{-1}(\alpha)\,\widehat{M}U_{2,3}(\alpha)$$

then

$$\begin{aligned} M'_{\zeta,0} &= M_{\zeta,0}\,, \\ M'_{\eta,0} &= M_{\eta,0}\cos 2\alpha + M_{\theta,0}\sin 2\alpha\,, \\ M'_{\theta,0} &= M_{\theta,0}\cos 2\alpha - M_{\eta,0}\sin 2\alpha\,, \\ M'_{\zeta,4} &= M_{\zeta,4}\,, \\ M'_{\eta,4} &= M_{\eta,4}\cos 2\alpha + M_{\theta,4}\sin 2\alpha\,, \\ M'_{\theta,4} &= M_{\theta,4}\cos 2\alpha - M_{\eta,4}\sin 2\alpha\,. \end{aligned}$$

Therefore, matrix $U_{2,3}(\alpha)$ makes an oscillation between green and blue colours.

If α is an arbitrary real function of time-space variables ($\alpha = \alpha(t, x_1, x_2, x_3)$) then the following expression is received from equation (10) under transformation $U_{2,3}(\alpha)$ [3]:

$$\left(\frac{1}{c}\partial_t + U_{2,3}^{-1}(\alpha)\frac{1}{c}\partial_t U_{2,3}(\alpha) + i\Theta_0 + i\Upsilon_0\gamma^{[5]}\right)\varphi =$$

$$= \begin{pmatrix} \beta^{[1]}\begin{pmatrix} \partial_1 + U_{2,3}^{-1}(\alpha)\,\partial_1 U_{2,3}(\alpha) \\ +i\Theta_1 + i\Upsilon_1\gamma^{[5]} \end{pmatrix} \\ +\beta^{[2]}\begin{pmatrix} \partial'_2 + U_{2,3}^{-1}(\alpha)\,\partial'_2 U_{2,3}(\alpha) \\ +i\Theta'_2 + i\Upsilon'_2\gamma^{[5]} \end{pmatrix} \\ +\beta^{[3]}\begin{pmatrix} \partial'_3 + U_{2,3}^{-1}(\alpha)\,\partial'_3 U_{2,3}(\alpha) \\ +i\Theta'_3 + i\Upsilon'_3\gamma^{[5]} \end{pmatrix} \\ +iM_0\gamma^{[0]} + iM_4\beta^{[4]} + \widehat{M}' \end{pmatrix}\varphi\,.$$

Here

$$\begin{aligned} \Theta'_2 &:= \Theta_2\cos 2\alpha - \Theta_3\sin 2\alpha\,, \\ \Theta'_3 &:= \Theta_2\sin 2\alpha + \Theta_3\cos 2\alpha\,, \\ \Upsilon'_2 &:= \Upsilon_2\cos 2\alpha - \Upsilon_3\sin 2\alpha\,, \\ \Upsilon'_3 &:= \Upsilon_3\cos 2\alpha + \Upsilon_2\sin 2\alpha\,, \end{aligned}$$

and x'_2 and x'_3 are elements of an another coordinate system so that:

$$\begin{aligned} \frac{\partial x_2}{\partial x'_2} &= \cos 2\alpha\,, \\ \frac{\partial x_3}{\partial x'_2} &= -\sin 2\alpha\,, \\ \frac{\partial x_2}{\partial x'_3} &= \sin 2\alpha\,, \\ \frac{\partial x_3}{\partial x'_3} &= \cos 2\alpha\,, \\ \frac{\partial x_0}{\partial x'_2} &= \frac{\partial x_1}{\partial x'_2} = \frac{\partial x_0}{\partial x'_3} = \frac{\partial x_1}{\partial x'_3} = 0\,. \end{aligned}$$

Therefore, the oscillation between blue and green colours curves the space in the x_2, x_3 directions.

Similarly, matrix

$$U_{1,3}(\vartheta) := \begin{bmatrix} \cos\vartheta & \sin\vartheta & 0 & 0 \\ -\sin\vartheta & \cos\vartheta & 0 & 0 \\ 0 & 0 & \cos\vartheta & \sin\vartheta \\ 0 & 0 & -\sin\vartheta & \cos\vartheta \end{bmatrix}$$

with an arbitrary real function $\vartheta(t, x_1, x_2, x_3)$ describes the oscillation between blue and red colours which curves the space in the x_1, x_3 directions. And matrix

$$U_{1,2}(\varsigma) := \begin{bmatrix} e^{-i\varsigma} & 0 & 0 & 0 \\ 0 & e^{i\varsigma} & 0 & 0 \\ 0 & 0 & e^{-i\varsigma} & 0 \\ 0 & 0 & 0 & e^{i\varsigma} \end{bmatrix}$$

with an arbitrary real function $\varsigma(t, x_1, x_2, x_3)$ describes the oscillation between green and red colours which curves the space in the x_1, x_2 directions.

Now, let

$$U_{0,1}(\sigma) := \begin{bmatrix} \cosh\sigma & -\sinh\sigma & 0 & 0 \\ -\sinh\sigma & \cosh\sigma & 0 & 0 \\ 0 & 0 & \cosh\sigma & \sinh\sigma \\ 0 & 0 & \sinh\sigma & \cosh\sigma \end{bmatrix}.$$

and

$$\widehat{M}'' := \begin{pmatrix} -M''_{\zeta,0}\gamma_\zeta^{[0]} + M''_{\zeta,4}\zeta^{[4]} - \\ -M''_{\eta,0}\gamma_\eta^{[0]} - M''_{\eta,4}\eta^{[4]} + \\ +M''_{\theta,0}\gamma_\theta^{[0]} + M''_{\theta,4}\theta^{[4]} \end{pmatrix} := U_{0,1}^{-1}(\sigma)\,\widehat{M}U_{0,1}(\sigma)$$

then:

$$\begin{aligned} M''_{\zeta,0} &= M_{\zeta,0}\,, \\ M''_{\eta,0} &= \left(M_{\eta,0}\cosh 2\sigma - M_{\theta,4}\sinh 2\sigma\right)\,, \\ M''_{\theta,0} &= M_{\theta,0}\cosh 2\sigma + M_{\eta,4}\sinh 2\sigma\,, \\ M''_{\zeta,4} &= M_{\zeta,4}\,, \\ M''_{\eta,4} &= M_{\eta,4}\cosh 2\sigma + M_{\theta,0}\sinh 2\sigma\,, \\ M''_{\theta,4} &= M_{\theta,4}\cosh 2\sigma - M_{\eta,0}\sinh 2\sigma\,. \end{aligned}$$

Therefore, matrix $U_{0,1}(\sigma)$ makes an oscillation between green and blue colours with an oscillation between upper and lower mass members.

If σ is an arbitrary real function of time-space variables ($\sigma = \sigma(t, x_1, x_2, x_3)$) then the following expression is received from equation (10) under transformation $U_{0,1}(\sigma)$ [3]:

$$\left(\begin{array}{l} \beta^{[0]}\left(\begin{array}{c} \frac{1}{c}\partial'_t + U^{-1}_{0,1}(\sigma)\frac{1}{c}\partial'_t U_{0,1}(\sigma) \\ +\mathrm{i}\Theta''_0 + \mathrm{i}\Upsilon''_0\gamma^{[5]} \end{array}\right) \\ +\beta^{[1]}\left(\begin{array}{c} \partial'_1 + U^{-1}_{0,1}(\sigma)\partial'_1 U_{0,1}(\sigma) \\ +\mathrm{i}\Theta''_1 + \mathrm{i}\Upsilon''_1\gamma^{[5]} \end{array}\right) \\ +\beta^{[2]}\left(\begin{array}{c} \partial_2 + U^{-1}_{0,1}(\sigma)\partial_2 U_{0,1}(\sigma) \\ +\mathrm{i}\Theta_2 + \mathrm{i}\Upsilon_2\gamma^{[5]} \end{array}\right) \\ +\beta^{[3]}\left(\begin{array}{c} \partial_3 + U^{-1}_{0,1}(\sigma)\partial_3 U_{0,1}(\sigma) \\ +\mathrm{i}\Theta_3 + \mathrm{i}\Upsilon_3\gamma^{[5]} \end{array}\right) \\ +\mathrm{i}M_0\gamma^{[0]} + \mathrm{i}M_4\beta^{[4]} + \widehat{M}'' \end{array}\right)\varphi = 0$$

with

$$\Theta''_0 := \Theta_0 \cosh 2\sigma + \Theta_1 \sinh 2\sigma\,,$$
$$\Theta''_1 := \Theta_1 \cosh 2\sigma + \Theta_0 \sinh 2\sigma\,,$$
$$\Upsilon''_0 := \Upsilon_0 \cosh 2\sigma + \Upsilon_1 \sinh 2\sigma\,,$$
$$\Upsilon''_1 := \Upsilon_1 \cosh 2\sigma + \Upsilon_0 \sinh 2\sigma$$

and t' and x'_1 are elements of an another coordinate system so that:

$$\left.\begin{array}{l} \frac{\partial x_1}{\partial x'_1} = \cosh 2\sigma \\ \frac{\partial t}{\partial x'_1} = \frac{1}{c}\sinh 2\sigma \\ \frac{\partial x_1}{\partial t'} = c\sinh 2\sigma \\ \frac{\partial t}{\partial t'} = \cosh 2\sigma \\ \frac{\partial x_2}{\partial t'} = \frac{\partial x_3}{\partial t'} = \frac{\partial x_2}{\partial x'_1} = \frac{\partial x_3}{\partial x'_1} = 0 \end{array}\right\}. \quad (27)$$

Therefore, the oscillation between blue and green colours with the oscillation between upper and lower mass members curves the space in the t, x_1 directions.

Similarly, matrix

$$U_{0,2}(\phi) := \begin{bmatrix} \cosh\phi & \mathrm{i}\sinh\phi & 0 & 0 \\ -\mathrm{i}\sinh\phi & \cosh\phi & 0 & 0 \\ 0 & 0 & \cosh\phi & -\mathrm{i}\sinh\phi \\ 0 & 0 & \mathrm{i}\sinh\phi & \cosh\phi \end{bmatrix}$$

with an arbitrary real function $\phi(t, x_1, x_2, x_3)$ describes the oscillation between blue and red colours with the oscillation between upper and lower mass members curves the space in the t, x_2 directions. And matrix

$$U_{0,3}(\iota) := \begin{bmatrix} e^{\iota} & 0 & 0 & 0 \\ 0 & e^{-\iota} & 0 & 0 \\ 0 & 0 & e^{-\iota} & 0 \\ 0 & 0 & 0 & e^{\iota} \end{bmatrix}$$

with an arbitrary real function $\iota(t, x_1, x_2, x_3)$ describes the oscillation between green and red colours with the oscillation between upper and lower mass members curves the space in the t, x_3 directions.

From (27):

$$\frac{\partial x_1}{\partial t'} = c\sinh 2\sigma\,,$$
$$\frac{\partial t}{\partial t'} = \cosh 2\sigma\,.$$

Because

$$\sinh 2\sigma = \frac{v}{\sqrt{1-\frac{v^2}{c^2}}}\,,$$
$$\cosh 2\sigma = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$$

where v is a velocity of system $\{t', x'_1\}$ as respects system $\{t, x_1\}$ then

$$v = \tanh 2\sigma\,.$$

Let

$$2\sigma := \omega(x_1)\frac{t}{x_1}$$

with

$$\omega(x_1) := \frac{\lambda}{|x_1|}\,,$$

where λ is a real constant bearing positive numerical value.

In that case

$$v(t, x_1) = \tanh\left(\omega(x_1)\frac{t}{x_1}\right)$$

and if g is an acceleration of system $\{t', x'_1\}$ as respects system $\{t, x_1\}$ then

$$g(t, x_1) = \frac{\partial v}{\partial t} = \frac{\omega(x_1)}{x_1 \cosh^2\left(\omega(x_1)\frac{t}{x_1}\right)}\,.$$

Figure 1 shows the dependency of a system $\{t', x'_1\}$ velocity $v(t, x_1)$ on x_1 in system $\{t, x_1\}$.

This velocity in point A is not equal to one in point B. Hence, an oscillator, placed in B has a nonzero velocity in respects an observer placed in point A. Therefore, from the Lorentz transformations this oscillator frequency for observer placed in point A is less than own frequency of this oscillator (*red shift*).

Figure 2 shows the dependency of a system $\{t', x'_1\}$ acceleration $g(t, x_1)$ on x_1 in system $\{t, x_1\}$.

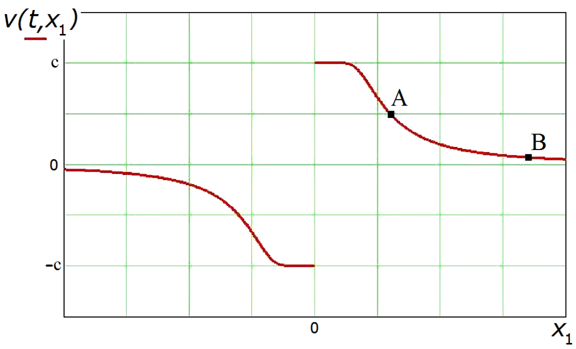

Fig. 1: Dependency of $v(t, x_1)$ from x_1 [3].

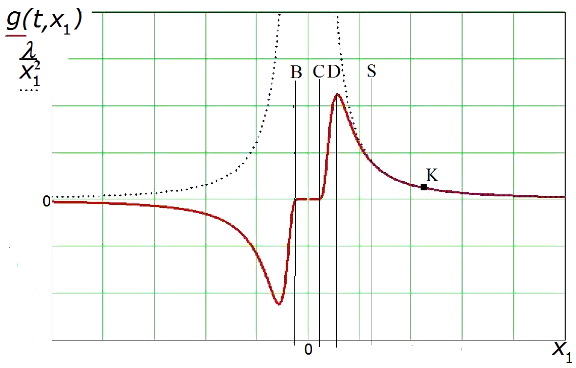

Fig. 2: Dependency of $g(t, x_1)$ from x_1 [3].

If an object immovable in system $\{t, x_1\}$ is placed in point K then in system $\{t', x'_1\}$ this object must move to the left with acceleration g and $g \simeq \lambda/x_1^2$.

I call:

- interval from S to ∞: *Newton Gravity Zone*,
- interval from B to C: *Asymptotic Freedom Zone*,
- and interval from C to D: *Confinement Force Zone*.

Now let

$$\widetilde{U}(\chi) := \begin{bmatrix} e^{i\chi} & 0 & 0 & 0 \\ 0 & e^{i\chi} & 0 & 0 \\ 0 & 0 & e^{2i\chi} & 0 \\ 0 & 0 & 0 & e^{2i\chi} \end{bmatrix}$$

and

$$\widehat{M}' := \begin{pmatrix} -M'_{\zeta,0}\gamma_\zeta^{[0]} + M'_{\zeta,4}\zeta^{[4]} - \\ -M'_{\eta,0}\gamma_\eta^{[0]} - M'_{\eta,4}\eta^{[4]} + \\ +M'_{\theta,0}\gamma_\theta^{[0]} + M'_{\theta,4}\theta^{[4]} \end{pmatrix}$$

$$:= \widetilde{U}^{-1}(\chi)\,\widehat{M}\widetilde{U}(\chi)$$

then:

$$\begin{aligned} M'_{\zeta,0} &= (M_{\zeta,0}\cos\chi - M_{\zeta,4}\sin\chi)\,, \\ M'_{\zeta,4} &= (M_{\zeta,4}\cos\chi + M_{\zeta,0}\sin\chi)\,, \\ M'_{\eta,4} &= (M_{\eta,4}\cos\chi - M_{\eta,0}\sin\chi)\,, \\ M'_{\eta,0} &= (M_{\eta,0}\cos\chi + M_{\eta,4}\sin\chi)\,, \\ M'_{\theta,0} &= (M_{\theta,0}\cos\chi + M_{\theta,4}\sin\chi)\,, \\ M'_{\theta,4} &= (M_{\theta,4}\cos\chi - M_{\theta,0}\sin\chi)\,. \end{aligned}$$

Therefore, matrix $\widetilde{U}(\chi)$ makes an oscillation between upper and lower mass members.

If χ is an arbitrary real function of time-space variables ($\chi = \chi(t, x_1, x_2, x_3)$) then the following expression is received from equation (26) under transformation $\widetilde{U}(\chi)$ [3]:

$$\left(\frac{1}{c}\partial_t + \frac{1}{c}\widetilde{U}^{-1}(\chi)\left(\partial_t\widetilde{U}(\chi)\right) + i\Theta_0 + i\Upsilon_0\gamma^{[5]}\right)\varphi =$$

$$= \left(\sum_{k=1}^{3}\beta^{[k]}\begin{pmatrix} \partial_k + \widetilde{U}^{-1}(\chi)\left(\partial_k\widetilde{U}(\chi)\right) \\ +i\Theta_k + i\Upsilon_k\gamma^{[5]} \end{pmatrix} + \atop + \widetilde{U}^{-1}(\chi)\,\widehat{M}\widetilde{U}(\chi)\right)\varphi\,.$$

Now let:

$$\widehat{U}(\kappa) := \begin{bmatrix} e^{\kappa} & 0 & 0 & 0 \\ 0 & e^{\kappa} & 0 & 0 \\ 0 & 0 & e^{2\kappa} & 0 \\ 0 & 0 & 0 & e^{2\kappa} \end{bmatrix}$$

and

$$\widehat{M}' := \begin{pmatrix} -M'_{\zeta,0}\gamma_\zeta^{[0]} + M'_{\zeta,4}\zeta^{[4]} - \\ -M'_{\eta,0}\gamma_\eta^{[0]} - M'_{\eta,4}\eta^{[4]} + \\ +M'_{\theta,0}\gamma_\theta^{[0]} + M'_{\theta,4}\theta^{[4]} \end{pmatrix} := \widehat{U}^{-1}(\kappa)\,\widehat{M}\widehat{U}(\kappa)$$

then:

$$\begin{aligned} M'_{\theta,0} &= (M_{\theta,0}\cosh\kappa - iM_{\theta,4}\sinh\kappa)\,, \\ M'_{\theta,4} &= (M_{\theta,4}\cosh\kappa + iM_{\theta,0}\sinh\kappa)\,, \\ M'_{\eta,0} &= (M_{\eta,0}\cosh\kappa - iM_{\eta,4}\sinh\kappa)\,, \\ M'_{\eta,4} &= (M_{\eta,4}\cosh\kappa + iM_{\eta,0}\sinh\kappa)\,, \\ M'_{\zeta,0} &= (M_{\zeta,0}\cosh\kappa + iM_{\zeta,4}\sinh\kappa)\,, \\ M'_{\zeta,4} &= (M_{\zeta,4}\cosh\kappa - iM_{\zeta,0}\sinh\kappa)\,. \end{aligned}$$

Therefore, matrix $\widehat{U}(\kappa)$ makes an oscillation between upper and lower mass members, too.

If κ is an arbitrary real function of time-space variables ($\kappa = \kappa(t, x_1, x_2, x_3)$) then the following expression is received from equation (26) under transformation $\widehat{U}(\kappa)$ [3]:

$$\left(\frac{1}{c}\partial_t + \widehat{U}^{-1}(\kappa)\left(\frac{1}{c}\partial_t\widehat{U}(\kappa)\right) + i\Theta_0 + i\Upsilon_0\gamma^{[5]}\right)\varphi =$$

$$= \left(\sum_{s=1}^{3}\beta^{[s]}\begin{pmatrix} \partial_s + \widehat{U}^{-1}(\kappa)\left(\partial_s\widehat{U}(\kappa)\right) \\ +i\Theta_s + i\Upsilon_s\gamma^{[5]} \end{pmatrix} \atop + \widehat{U}^{-1}(\kappa)\,\widehat{M}\widehat{U}(\kappa)\right)\varphi\,.$$

Denote: $U_{0,1} := U_1$, $U_{2,3} := U_2$, $U_{1,3} := U_3$, $U_{0,2} := U_4$, $U_{1,2} := U_5$, $U_{0,3} := U_6$, $\widehat{U} := U_7$, $\widetilde{U} := U_8$.

In that case for every natural k $(1 \leqslant k \leqslant 8)$ there a 4×4 constant complex matrix Λ_k exists [3] so that:

$$U_k^{-1}(\beta)\,\partial_s U_k(\beta) = \Lambda_k \partial_s \beta$$

and if $r \neq k$ then for every natural r $(1 \leqslant r \leqslant 8)$ there real functions $a_s^{k,r}(\alpha)$ exist so that:

$$U_k^{-1}(\alpha)\,\Lambda_r U_k(\alpha) = \sum_{s=1}^{8} a_s^{k,r}(\alpha) \cdot \Lambda_s.$$

Hence, if $\grave{U}$ is the following set:

$$\grave{U} := \left\{U_{0,1}, U_{2,3}, U_{1,3}, U_{0,2}, U_{1,2}, U_{0,3}, \widehat{U}, \widetilde{U}\right\}$$

then for every product U of $\grave{U}$'s elements real functions $G_s^r(t, x_1, x_2, x_3)$ exist so that

$$U^{-1}(\partial_s U) = \frac{g_3}{2} \sum_{r=1}^{8} \Lambda_r G_s^r$$

with some real constant g_3 (similar to 8 gluons).

3 Conclusion

Therefore, higgsless electroweak and quark-gluon theories and gravity without superstrings can be deduced from properties of probability.

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