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On the Possible Torsion Effects on Observables at Hadron Colliders

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Abstract: *In frames of the conformal gauge theory of gravitation (CGTG), incorporating gravitation with torsion space-time into Standard Model of electro-weak interaction, it is studied of multi-muon events produced at the Fermilab Tevatron collider. Theory gives the value of the torsion pseudotrace – spinor (muon) universal coupling* $f_T = 4.388\cdot 10^{-17} = 4.4\cdot 10^{-12}\, G_F$, *and with limits from known experiments - torsion mass* $m_T = 0.4700\cdot 10^{-7}$ *eV or* $m_T = 0.445\cdot 10^{-15}$ *muon mass. So the value of the constant of effective 4-fermions interaction* $f_T/m_T = 0.988$, *that indeed may leads to multy-muon events production. Model of interaction of quantum oscillator with the tensor potential* $W_{\mu\nu}$ *of traceless part of the torsion lead to 2 sm displacement of quark-lepton system as whole in magnetic field of collider in accordance with a significant sample of events related to* $b\bar{b}$ *production and decay in which at least one of the muon candidates is produced outside of the beam pipe of radius 1.5 cm. A traceless part of the torsion in CGTG is not vanish in Newtonian limit of non-zero mass. Torsion gravity potential* $W_{\mu\nu}$ *give conservation of a special conformal current and may be produced in the condition of a spontaneous breaking of gauge symmetry the gravitation mass* M_X *defect 1-3* $TeV\cdot c^{-2}$ *or* $10^{-13}\, M_X$. *This effect may be possible so at known effects on top pair asymmetries at the Tevatron and LHC and take place as the known energy dissipation at the upper limit of Galaxy gamma-ray spectrum in a two bubbles outer the Galaxy plane.*

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1. INTRODUCTION

On a study of multi-muon events produced at the Fermilab Tevatron collider a significant sample of events in which at least one of the muon candidates is produced outside of the beam pipe of radius 1.5 cm. The production cross section and kinematics of events in which both muon candidates are produced inside the beam pipe are successfully modeled by known QCD processes which include heavy flavor production. In contrast, we are presently unable to fully account for the number and properties of the remaining events, in which at least one muon candidate is produced outside of the beam pipe [1]. Despite the impressive success of the Standard Model (SM), a common point of view is that the SM cannot play the role of fundamental theory because it does not include quantum gravity. Quantum Gravity and it generalizations are non-renormalizable. Therefore, a desired fundamental theory is expected to provide the solution to the quantum gravity and maybe even explain the low energy observables. Traces of such fundamental theories could be identified by some additional characteristics of space–time, different from the SM fields. Space–time torsion is one of the candidates which could play this role. The effect of the torsion field on low energy observables such as the muon anomaly, Lorentz and CPT violation, Kaon physics and neutrino mass have been studied in the literature [2]. Also, phenomenological studies on the torsion effect at colliders have been performed in [3]. Those the local gauge approach to gravitational interactions unlike gauge the Yang – Mills fields the connected with groups internal symmetry, connect with space – time symmetry. A choice of the gauge group corresponding gravitation, gauge variables of a gravitational field, the procedure of localization on the basis of which the field of gravitation is entered as a gauge field, a choice of a Lagrangian of a gravitational field – all these questions have no now standard decision. The main problem of gravitational interaction with torsion with gauge fields in all approaches became a problem of a gauge invariance: interaction a gauge vector field, for example, a vector – potential of an electromagnetic field, with torsion leads to obvious breaking to a gauge invariance. The some investigators consider that the gauge vector field with torsion does not interacted at all. The decision of a problem of a gauge invariance has been reached [4] by introduction in structure of a trace of a torsion as effective Weil's field [5] a vectors - potential of an gauge electromagnetic field due to compensating an action by the gradient transformation of internal symmetry of the conformal transformation of connection. Thus the scalar field considered as a field of Higgs's type because of its negativity hamiltonian in a Riemann – Cartan space – time, it is eliminated as a dynamic variable on the tetrades scaling mechanism [5-6], that allows to resolve a problem of two times of P. Dirac and leads to scale of masses (at fixing of a conformal calibrations) in primary massless conformal theory. It leads to the conformal calibration of curvature [4]. It has allowed on the basis of localization conformal group (about scaling symmetry elementary particles and resonanses see [7]) in space of an affine connection to construct the conformal gauge theory of gravitation (CGTG) in the works [4,8,9], providing inclusion of gravitational interactions with torsion to the Standard Model (SM) of electroweak interaction.

Spinor – torsion interaction enter the SM of electro-weak interactions as interaction of fermions with a new axial vector field q_v, such an interactions is character ized by the new parameter – coupling constant

$f_T = \frac{8}{3Q_{ESW}}$,

Where CGTG universal constant Q_{ESW} is defined below.

CGTG following to [10] gives the value of the torsion pseudo trace – spinor universal coupling $f_T = 4.388 \cdot 10^{-17} = 4.4 \cdot 10^{-12}\, G_F$, and limits on torsion mass from known experiments [8] - $m_T = 0.4700 \cdot 10^{-7}$ eV or $m_T = 0.445 \cdot 10^{-15}$ muon mass. So the value of the constant of effective 4-fermions interaction $f_T/m_T = 0.988$, that indeed may leads to multy-muon events production.

2. The Basic Designations and Reductions

RG – Einstein's general relativity,

CGTG – Conformal Gauge Theory of Gravitation,

TEM – energy – momentum tensor,

EWI – electro – weak interaction in the Standard Model,

R_4 – Minkovski space – time,

M_4 – space – time as four – dimension real differential manifold,

U_4 – Riemann – Cartan space – time,

Y_4 – Weyl – Cartan space – time,

L_4 – general metric – affine space – time,

$\Gamma^{\mu}{}_{\nu\rho}$ – An affine connection coefficients,

$\overline{\Gamma}^{\mu}{}_{\nu\rho} = \frac{1}{2}\left(\Gamma^{\mu}{}_{\nu\rho} + \Gamma^{\mu}{}_{\rho\nu}\right)$. The average affinne connection,

$Q^{\mu}{}_{\nu\rho} = \Gamma^{\mu}{}_{[\nu\rho]} \equiv \frac{1}{2}\left(\Gamma^{\mu}{}_{\nu\rho} - \Gamma^{\mu}{}_{\rho\nu}\right)$, – The torsion tensor,

$\Gamma^{\mu}{}_{\nu\rho} = \left\{{}_{\nu}{}^{\mu}{}_{\rho}\right\} + B^{\mu}{}_{\nu\rho}$,

$\left\{{}_{\nu}{}^{\mu}{}_{\rho}\right\} = \frac{1}{2} g^{\mu\lambda}\left(\partial_{\nu} g_{\rho\lambda} + \partial_{\rho} g_{\lambda\nu} - \partial_{\lambda} g_{\nu\rho}\right)$ Is the usual Christoffel symbol,

$g_{\mu\nu}$ – the metric tensor,

$B^{\mu}{}_{\nu\alpha}$ – is a so-called *deviation tensor,*

$$B^{\mu}{}_{\nu\rho} = Q^{\mu}{}_{\nu\rho} - Q_{\nu}{}^{\mu}{}_{\rho} - Q_{\rho}{}^{\mu}{}_{\nu} + \frac{1}{2}\left(N^{\mu}{}_{\nu\rho} - N_{\nu}{}^{\mu}{}_{\rho} - N_{\rho}{}^{\mu}{}_{\nu}\right),$$

$$Q^{\mu}{}_{\nu\rho} = 2\delta^{\mu}{}_{[\nu}V_{\rho]} + S^{\mu}{}_{\nu\rho} + \varepsilon^{\mu}{}_{\nu\rho\lambda}q^{\lambda} \tag{1}$$

$V_{\rho} = -\frac{1}{3}Q^{\mu}{}_{\rho\mu}$ – The torsion vector, it is not dynamic field in CGTG,

$S_{\alpha\beta\gamma}$ – traceless part of the torsion $S^{\mu}{}_{\nu\mu} = 0, \varepsilon_{\mu\nu\rho\lambda}S^{\nu\rho\lambda} = 0,$

$q_{\lambda} = \frac{1}{6}\varepsilon_{\lambda\nu\mu\rho}Q^{\nu\mu\rho}$ – Pseudo vector of the torsion,

We use for traceless part of the torsion

$$S_{\mu\nu}{}^{\lambda} = \overline{D}_{\mu}W_{\nu}{}^{\lambda} - \overline{D}_{\nu}W_{\mu}{}^{\lambda},$$

$W_{\mu\nu}$ – tensor field of traceless part of the torsion of spin 2,

$\overline{D}_{\mu}$ – The covariant derivative in the symmetrical average affinne connection of Y_4,

Ortonormal reper $\vec{e}_i$, its protections to vectors of a coordinates basis gives the tetrade $h_{\mu}{}^{a}$, $g_{\mu\nu} = \eta_{ik}h^{i}{}_{\mu}h^{k}{}_{\nu}$, $\eta_{ik} = diag(1, -1, -1, -1)$, $\delta^{\mu}{}_{\nu}$ – Kroneker's simbol, $\varepsilon_{\mu\nu\rho\sigma}$ – the antysymmetrical tensor, $\alpha, \beta = 0, 1, 2, 3$ – space – time coordinates; $a, b, c,\ldots = 0, 1, 2, 3$ – the terade indexes, the metric signature $(+, -, -, -)$, $g = det g_{\mu\nu}$, D_{μ}^{Γ} – the covariant derivative in the connection Γ. Numerical tetrade components are designated from above by «^».

$A^{ik}{}_{\mu}$ – the Lorents connection (Lorents gauge field),

($F^{ik}{}_{\mu\nu}$ – the intensity corresponding it conterminous with of the curvature tensor of space – time U_4.)

The conformal calibration of the curvature

$$R(\Gamma) + b_1 N^2 + b_2 V^2 + b_3 N \cdot V + b_4 q^2 + b_5 S_{\mu\nu\lambda}S^{\mu\nu\lambda} = 0, \tag{2}$$

Where

$R(\Gamma) = R - 12\partial_{\alpha}V^{\alpha} - 6\partial_{\alpha}N^{\alpha} + 6N^2 + 24V^2 + 24N \cdot V + 6q^2 - 2S_{\mu\nu\lambda}S^{\mu\nu\lambda}$ – the curvature scalar, $b_1,\ldots, b_5$ – factors of additives, square-law on a trace V_{α} and a pseudo-trace of torsion q_{α}, a trace of Weil's non-metricity N_{α}, traceless parts of torsion $S_{\mu\nu\lambda}$, R – a scalar of the Riemann curvature.

3. THE ACTION OF CONFORMAL GAUGE THEORY OF GRAVITATION

As known in the conformal gauge theory of gravitation (CGTG) [4,8,9,10] the decision of a question of an origin conserving lepton currents $j_{\lambda}^{(e)}$ is obviously possible only at the account of gravitational interaction on the basis of unification of weak, electromagnetic and gravitational interactions, also consists in an identification lepton currents $_{\lambda}^{(e)}$, $j_{\lambda}^{(\mu)}$, $j_{\lambda}^{(\tau)}$ with conserving dilaton currents differing on structure of a trace of torsion, generating scale transformations as effective Weil's field [5].

The number of families of heavy leptons should be certain by dynamic symmetry on number of various structures of a trace of the torsion, providing full elimination of Higgs's scalar as a dynamic variable on the mechanism offered in [5], but it is possibility only. Really there are in CGTG two definitions of Higgs's scalar dynamics: at once – providing not full elimination of the Higgs's scalar action; and secondly – we may to take for Higgs's scalar the representation of two-Higgs-doublet models[1]. Differently families of heavy leptons will differ on allocated to electron, muon and tauon directions of a trace of torsion in space with torsion by means of Higgs mechanism, it is similar to allocation "electromagnetic" directions in internal charging space in the Standard Model of unification of weak and electromagnetic interactions (for example [11,12]). In this case conformity with the experience as scalar Higgs field of the Standard Model of electroweak interaction (EWI) direct supervision is not revealed will be provided. The introduction of gravity in form of 4 – fermion interaction in flat space with masses forming on a Higgs mechanism according to [13] lead to spontaneous braking of gauge symmetry connected with a space anysotropy. Some uncertain number of families of the leptons forming as in model EWI *SU (2)* a doublet of the left leptons (for an electron and it neutrino, and further it is similar for heavy leptons) will appear in initial statement of a problem

$$L = \begin{pmatrix} \nu_{eL} \\ e_L \end{pmatrix} \tag{3}$$

And singlet *R* the right lepton

$$R = \frac{1}{2}(1+\gamma_5)e = e_R. \tag{4}$$

All leptons initially are massless. A group *SU (2)* answers the internal symmetry EWI generating charged currents, and does not contain the generator of a neutral weak current [11]. Inclusion of a neutral weak current in conformity with structure of leptons demands expansion of group *SU (2)* up to a gauge group *SU(2)×U(1)* EWI. EWI gauge symmetry *SU (2)×U(1)* is answered with introduction of a triplet vector mesons $\boldsymbol{A}_{\lambda}$,, connected with a subgroup *SU (2)* and the fourth vector meson B_{λ}, connected with a subgroup *U (1)* . *SU (2)* invariance forbids introduction of a mass member of leptons (see below). For introduction of masses vector bosons so that only three [1]two-Higgs-doublet as known will contribute to the dark matter density, one of them is not interactions with some physics fields and so, it is providing full elimination of this scalar as a dynamic variable from four bosons became massive and as a result it has turned out a massless electromagnetic field, the doublet complex Higgs scalars is entered

$$\phi = \begin{pmatrix} \phi^{+} \\ \phi^{0} \end{pmatrix}. \tag{5}$$

Inclusion of weak interaction in such formulation in CGTG demands a special way of introduction of interaction gauge fields with a gravitational field in space of affine connection as the minimal interaction defined by replacement of derivative gauge fields on covariant derivatives, obviously breaks a gauge invariance. The common decision of a problem gauge invariance at introduction of interaction gauge fields with fields of torsion is absent, that is substantially interfaced to absence gauge invariance of the spin angular moment gauge the fields, a torsion being by a source. If to consider gauge fields EWI not interacting with torsion nothing not will give it for the decision of a problem of an origin of heavy leptons. On the other hand for decision of gauge invariance problems in [4] it was offered to invariance to enter an gauge electromagnetic field into structure of a trace of torsion as the effective Weil's field adequating to a subgroup *U (1)* of conformal group. Subgroup *U (1)* of a local conformal group answers scale symmetry, concerning which Maxwell's equations (Maxwell's equations are invariant also rather conformal transformations). And scale invariance provides conservation dilaton currents which have been not connected with electric or weak charges. A role an gauge electromagnetic field here double, but in connection with a dilaton current as effective Weil's field the electromagnetic field (EMF) is not specific, whereas in the interaction with electric current EMF defines the law of conservation of an electric current.

$$S = \int d^4x\sqrt{-g}\left(L_{Grav} + \frac{\kappa}{\eta^2}\phi^{+}\phi\left(R(\Gamma) + \alpha N^2 + \beta N\cdot V + \gamma V^2\right) + L_{\phi} + L_I + L_H{}^{I} + L_M \right), \tag{6}$$

$$\kappa = \frac{c^4}{16\pi G}.$$

The action S is considered in the Weyl – Cartan space Y_4, where the metrics $g_{\mu\nu}$, torsion $Q^{\lambda}_{\ \mu\nu}$ and a Weyl's nonmetricity vector N_{μ} (see the Appendix A) are considered as independent variables, *G*

– a Newton's constant of gravitation, c – speed of light, $R(\Gamma)$ – a scalar of the curvature of the space, the second member in the Lagrangian corresponds to Einstein's member in general relativity which is not conformal – invariant and consequently at $R(\Gamma)$ a factor serves $\phi^+\phi$ – square–law expression of two–component scalar Higgs's field (5) at once written down in the unitary calibration due to $SU(2)$ rotations

$$\phi = \begin{pmatrix} \phi^+(x) \\ \phi^0(x) \end{pmatrix} = \begin{pmatrix} 0 \\ \upsilon(x) \end{pmatrix}, \tag{7}$$

Transforming at conformal transformations of the metrics

$$g'_{\mu\nu} = e^{2\lambda(x)} g_{\mu\nu} \tag{8}$$

As

$$\phi' = e^{\lambda(x)}\phi,$$

η a normalizing multiplier, α, β, γ – dimensionless factors of square – law additives on a trace of torsion, Weyl's vector and their product, $L\varphi$ – the Lagrangian of scalar Higgs fields. Its kind will be certain on a following step.

Number of families of leptons vaguely, but structure (3–4) at all identical: $SU(2)$ doublet of the left leptons and $SU(2)$ singlet (4). For each family of leptons it is entered hiral not invariant interaction (it differently to not define)

$$L_H{}^I = -\sum_l G_l \left(\bar{L}_l \phi R_l + \bar{R}_l \phi^+ L_l \right), \tag{9}$$

Where G_l - a new coupling constant which will define as a result masses of electron and heavy leptons. (9) Breaks preservation of parity [11, 12]. L_H^I locally invariant both rather $SU(2)$, and rather $U(1)$ [11, 12].

$$L_I = -\frac{1}{4}\left(\bar{D}_\mu \vec{b}_\nu - \bar{D}_\nu \vec{b}_\mu + g\vec{b}_\mu \vec{b}_\nu \right)^2 + \sum_l \left[i\bar{L}_l \gamma^\mu \left(\nabla_\mu - ig\frac{\vec{\tau}}{2}\vec{b}_\mu \right) L_l + i\bar{R}_l \gamma_\mu \nabla^\mu R_l \right] \tag{10}$$

L_I – the Lagrangian, invariant rather $SU(2)$ – transformations,

b^a_μ $(a = 1, 2, 3)$ – a triplet vector bosons – Yang – Mills's fields [11,12],

τ^a – spin (2×2) matrixes Pauli,

g – The coupling constant connected with $SU(2)$,

$\bar{D}_\mu$ – A covariant derivative, taken in average connectivity of space (definition see the Appendix A (23A)),

∇_μ – The total covariant derivative in the space Y_4.

Such form of derivatives is chosen under the receipt [4] assuming absence of interaction of gauge fields with the torsion and according to a choice of a gauge group $C\times SU(2)\times U(1)$ for initial action.

$$L_{Grav} = Q^2 \left[aR(\Gamma)_{[\mu\nu\rho]}{}^\lambda R(\Gamma)^{[\mu\nu\rho]}{}_\lambda + bR(\Gamma)_{[\lambda\nu\rho]}{}^\lambda R(\Gamma)^{[\lambda\nu\rho]}{}_\lambda - \frac{f^{-2}}{64} R(\Gamma)_{\lambda\nu\rho}{}^\lambda R(\Gamma)^{\lambda\nu\rho}{}_\lambda \right] \tag{11}$$

– gravitational Lagrangian CGTG, formed squared – law invariants of curvature of the Weyl – Cartan space, Q – a constant coupling CGTG its dimension – an electric charge, f – a constant of communication of a Weyl's vector N_μ (A.4) and a neutral boson

$$N_\mu = fB_\mu, \tag{12}$$

$$b = -\frac{3}{(d-2)} a = -\frac{3}{2} a \tag{13}$$

d = 4 dimension of space – time, and a – numerical factor [4]. As it is known, in the Weyl – Cartan space connection $\Gamma^{\lambda}_{\mu\nu}$ will not be transformed at a conformal transformation of the metric (8) and consequently the curvature tensor $R\ (\Gamma)^{\lambda}_{\mu\nu\rho}$ also is invariant so its square – law convolutions are invariant as in Y_4, so and in U_4. The last member in (11) is added in the gravitational action for the definition of a free action of a Weyl nonmetricity vector as according to (A.7) and (A.11)

$$R(\Gamma)_{\lambda\mu\nu}{}^{\lambda} = 4(\partial_{\nu} N_{\mu} - \partial_{\mu} N_{\nu}) = +4(\overline{D}_{\mu} N_{\nu} - \overline{D}_{\nu} N_{\mu}). \tag{14}$$

Painting last member in (11), we have

$$-\frac{f^{-2}}{4} \Omega_{\mu\nu} \Omega^{\mu\nu}, \tag{15}$$

где (A.7) $\Omega_{\mu o} = \partial_{\nu} N_{\mu} - \partial_{\mu} N_{\nu}$.

The action (15) in U_4 it is cancelled and consequently earlier [4] was not considered. On the other hand (15) it is possible to paint in Maxwell a kind. Advantage of the gravitational Lagrangian (11) that settlement factors a and b according to (13) provide full decomposition for the sum of actions of not resulted parts of a torsion tensor $Q^{\lambda}_{\mu\nu}$ and a Weyl's nonmetricity vector (15):

$$L_{Grav} = -\frac{Q^2}{4} a_0 f_{\nu\mu} f^{\nu\mu} + L_q + L_s - \frac{f^{-2}}{4} \Omega_{\mu\nu} \Omega^{\mu\nu}, \tag{16}$$

where a_0 – numerical factor ($a_0 = 0$), $f_{\mu\nu} = \partial_{\mu} V_{\nu} - \partial_{\theta} V_{\mu}$ intensity of a field of a trace of torsion V_{μ}, L_s – action of traceless part of the torsion $S_{\mu\nu}{}^{\lambda} = \overline{D}_{\mu} W_{\nu}{}^{\lambda} - \overline{D}_{\nu} W_{\mu}{}^{\lambda}$, in the representation by a symmetric tensor, connected with a new kind of gravitation – the torsion gravitation [4,9]. Action for a torsion gravitation is not free; it is polynomial the fourth degree on derivatives and actually does not contain the second derivatives of potentials as only alternations of the second derivatives of a kind

$$2\overline{D}_{[\alpha} \overline{D}_{\beta]} W_{\mu\nu} = -\overline{R}_{\alpha\beta\mu}{}^{\lambda} W_{\lambda\nu} - \overline{R}_{\alpha\beta\nu}{}^{\lambda} W_{\lambda\mu}. \tag{17}$$

Known identity (17) where the designation of the curvature tensor in average connectivity of the Weyl – Cartan space is entered here, shows, that is possible Riemann curvature via the torsion gravitation will enter into the action CGTG

$$L_q = -\frac{1}{8} \overline{D}_{\mu} q_{\nu} \overline{D}^{\mu} q^{\nu} - \frac{1}{8} \overline{D}_{\mu} q_{\nu} \overline{D}^{\nu} q^{\mu} - \frac{1}{2} (\overline{D}_{\alpha} q^{\alpha})^2. \tag{18}$$

Lagrangian (16) thus, completely satisfies to “nonreducing theories criterion” to W. Pauli demanding a final wording of the theory in terms of indecomposable fields, in this case – nonreducing parts of the torsion tensor V_{μ}, $S_{\lambda\mu}$, q_{μ} and the Weyl vector N_{μ}. The formulation of the gravitational lagragian in terms of covariant derivatives in the average connectivity considers some hashing field of the torsion and the nonmetricity, but it is connected with known uncertainty of splitting of connectivity on the metrics and torsion. At a conclusion (16) the identity

$$R(\Gamma)_{[\mu\nu\rho]}{}^{\lambda} = 2\nabla_{[\mu} Q_{\nu\rho]}{}^{\lambda} - 4Q_{[\mu\nu}{}^{\alpha} Q_{\rho]\alpha}{}^{\lambda}, \tag{19}$$

which is used undersigns for terms of average connectivity [9]

$$R(\Gamma)_{[\mu\nu\rho]}{}^{\lambda} = 2\overline{D}_{[\mu} Q_{\nu\rho]}{}^{\lambda} + 2Q_{[\mu\nu}{}^{\alpha} Q_{\rho]\alpha}{}^{\lambda}. \tag{20}$$

By redefinition of torsion it is possible to achieve similarity to the expression (19) certain in terms full by a covariant derivative of the Weyl – Cartan space, but it is not essential. Thus, the gravitational Lagrangian it is obvious a conformal invariant both in the Weyl – Cartan space, and in the Riemann – Cartan space where the trace of torsion will be transformed only, and all other components of torsion will not be transformed. It is necessary to add, what last member of action (6) defines the possible contribution of other interactions – quarks, hadrons. Interaction of gauge fields is entered similarly EWI, and with other fields – by a rule of the minimal interaction, by replacement of derivatives on general covariant one.

4. The Action of Electroweak Interaction in CGTG

As a result of all operations in initial action (6) besides a triplet Yang – Mills bosons from the gravitational Lagrangian free action (15) Weyl's nonmetricity vector N_μ adequating to the subgroup *U (1)* of dilatations of the conformal group is allocated. According to the approach stated in the introduction, for the decision of a problem it is necessary for the gauge invariance to connect a Weyl's nonmetricity vector with the neutral vector boson B_μ and to consider in the further interaction of the Weyl's vector with fields of the weak interaction how it has been entered in the Standard Model [11, 12] for the neutral boson B_μ. In the rest N_μ remains in Y_4 in former quality. On the other hand through communication with Weil's nonmetricity the neutral boson will cooperate with a dilaton current of leptons $j_\mu^{(l)}$. (l). the regrouping of members of the Lagrangian CGTG leads to the lagrangian a form of the Standard Model

$$L_{EWI} = -\frac{1}{4}B_{\mu\nu}B^{\mu\nu} - \frac{1}{4}F_{\mu\nu}{}^{i}F^{i\mu\nu} + L'_\varphi + L^I_H + \\ + \sum_l \left\{ \overline{R}_l i\gamma^\mu\left(\nabla_\mu + ig'B_\mu\right)R_l + \overline{L}_l i\gamma^\mu\left[\nabla_\mu + \frac{i}{2}\left(g'B_\mu - g\tau^i A^i_\mu\right)\right]L_l \right\}, \tag{21}$$

Where

$$A^i_\mu \equiv \left(\vec{b}_\mu\right)^i,$$
$$B_{\mu\nu} = \partial_\mu B_\nu - \partial_\nu B_\mu,$$
$$F^i_{\mu\nu} = \partial_\mu A^i_\nu - \partial_\nu A^i_\mu + g\varepsilon^{ijk}A^j_\mu A^k_\nu,$$
$$L'_\varphi = \frac{1}{\eta^2}\phi^+\phi\left(R(\Gamma) + \alpha N^2 + \beta N\cdot V + \gamma V^2\right) + L_\varphi,$$

Where

$$L_\varphi = \left[\partial_\mu\phi^+ + i\left(\frac{g'}{2}\right)B_\mu\phi^+ + i\left(\frac{g}{2}\right)\tau^i A^i_\mu\phi^+\right]\cdot\left[\partial^\mu\phi - i\left(\frac{g'}{2}\right)B^\mu\phi - i\left(\frac{g}{2}\right)\tau^i A^{i\mu}\phi\right] - V\left(\phi^+\phi\right),$$

(22)

$$L^I_H = -\sum_l G_l\left[\overline{R}_l\phi^+L_l + \overline{L}_l\phi R_l\right]$$

So, as a result of consecutive carrying out of the offered approach really, after an establishment of communication N_μ and B_μ and introductions of a constant *g'* which can differ from *SU (2)* constants [11,12] g, in the operation CGTG the part completely equivalent to the action of the Standard Model of electroweak interactions is allocated. It is necessary to paint only covariant derivatives of spinors on by Fock – Ivanenko [14]

$$\gamma^\mu\nabla_\mu\Psi = \gamma^\mu\partial_\mu\Psi + \gamma^a\Delta_a(\beta,\delta)\gamma^\beta\gamma^\delta\Psi + \gamma^\mu\gamma_0 q_\mu\Psi, \tag{23}$$

$\Delta_a(\beta,\delta)$ factors of Ricci rotation, and a scalar of a curvature $R(\Gamma)$ it is defined according to (24B):

$$R(\Gamma) = R - 12\partial_\alpha V^\alpha - 6\partial_\alpha N^\alpha + 6N^2 + 24V^2 + 24N\cdot V + 6q^2 - 2S_{\mu\nu\lambda}S^{\mu\nu\lambda}. \tag{24}$$

In covariant derivatives on spinors (23) the account N_μ is no necessary as it is already made in view of B_μ so additional to the Standard Model interaction of leptons occurs with the torsion pseudotrace q_μ, connected with pseudo-vector mesons, and, certainly, is not necessary with N_μ. Except for that spinors in Y_4 in addition to (23) cooperate with N_μ and q_μ, so in the equations of movement following replacement [18]

$$i\gamma_\mu \partial^\mu \Psi \to i\gamma_\mu \left(\partial^\mu + 4N^\mu - 6V^\mu\right)\Psi. \tag{25}$$

Accordingly (25) the gauge dilaton symmetry to transformation $N_\mu \to N_\mu + \partial_\mu \sigma$ is made will provide conservation of a spinor lepton dilaton current $j^{(l)}{}_D$, as in case of electrons

$$\bar{R}_l i\gamma_\mu \partial^\mu R_l + \bar{L}_l i\gamma_\mu \partial^\mu L_l = i\bar{e}\gamma_\mu \partial^\mu e + i\bar{\nu}_e \gamma_\mu \partial^\mu \left(\frac{1-\gamma_5}{2}\right)\nu_e, \tag{26}$$

That formally according to [15] at the account (25, 26), and also scale dimension of spinors [15], we have

$$j^{(e)}_{D\mu} = i\left(\bar{e}\gamma_\mu e + \bar{\nu}_e \frac{(1-\gamma_5)}{2}\nu_e\right). \tag{27}$$

It the sum of a stream of an energy – an impulse of electron and it neutrino. Drawing a member breaking a parity

$$L^I_H = -\sum_l G_l \left[\bar{R}_l \phi^+ L_l + \bar{L}_l \phi R_l\right] = -G_e \upsilon(x)\bar{e}e + ... \tag{28}$$

As in EWI leads to a mass member at fixing calibration $\upsilon\,(x) = \upsilon$:

$$m_e = G_e\,\upsilon,\ m_\mu = G_\mu\,\upsilon,\ m_\tau = G_\tau\,\upsilon. \tag{29}$$

It is necessary to note, that through interaction B_μ with Higgs scalar ϕ interaction a nonmetricity B_μ with spinless Higgs scalar ϕ in (22) is entered. In view of all purchases the further operations with the Lagrangian (21) same as in the Standard Mode EWI: are defined two neutral fields

$$\begin{aligned} Z_\mu &= \frac{\left(-gA^3_\mu + g'B_\mu\right)}{\sqrt{g^2 + g'^2}}, \\ A_\mu &= \frac{\left(g'A^3_\mu + gB_\mu\right)}{\sqrt{g^2 + g'^2}}, \end{aligned} \tag{30}$$

and also charged bosons

$$W^\pm{}_\mu = \frac{\left(A^1_\mu \pm iA^2_\mu\right)}{\sqrt{2}}. \tag{31}$$

Members of interaction of leptons with charged W^+ and W^- bosons are drawn as

$$\frac{g}{2}\bar{L}_e \gamma^\mu \left(\tau^1 A^1_\mu + \tau^2 A^2_\mu\right)L_e = \left(\frac{g}{\sqrt{2}}\right)\left[\bar{\nu}_L \gamma^\mu e_L W^+{}_\mu + e_L \gamma^\mu \nu_L W^-{}_\mu\right] \tag{32}$$

Collecting all members of interaction, we have [11]

$$\begin{aligned} L^V_I = &-\frac{g}{2\sqrt{2}}\bar{\nu}_e \gamma^\mu (1+\gamma_5) e W^+{}_\mu + э.с. + \frac{gg'}{\sqrt{g^2 + g'^2}}\bar{e}\gamma_\mu e A^\mu + \frac{1}{2}\left[-tg\Theta_W \left(2\bar{e}_R \gamma^\mu e_R + \right.\right. \\ &\left.\left. + \bar{\nu}_e \gamma^\mu \nu_e + \bar{e}_L \gamma^\mu e_L\right) - ctg\Theta_W \left(\bar{e}_L \gamma^\mu e_L - \bar{\nu}_e \gamma^\mu \nu_e\right)\right] Z_\mu + \left\{e \leftrightarrow \mu, \nu_e \leftrightarrow \nu_\mu\right\} + ... \end{aligned} \tag{33}$$

Where the value $\Theta_W = arctg\left(\frac{g'}{g}\right)$ – the Weinberg's corner.

From here it is visible, that an electron charge and a constant of a weak interaction of Fermi G_F are expressed through parameters g and g' as follows

$$e = \frac{gg''}{\sqrt{g^2 + g'^2}} = g\sin\Theta_W, \tag{34}$$

$$\frac{G_F}{\sqrt{2}} = \frac{g^2}{8{m_W}^2}. \tag{35}$$

it is necessary to notice, that the mass m_W is not certain yet, and only in the assumption of gauge fixing υ *(x)* = υ as in (29), by the form a mass member for vector fields [11]

$$\frac{\upsilon^2}{4}\left[g^2\left(A_\mu^1\right)^2 + g^2\left(A_\mu^2\right)^2 + \left(g'B_\mu - gA_\mu^3\right)^2\right] \tag{36}$$

$$m_Z = \frac{1}{\sqrt{2}\sqrt{g^2 + g'^2}}\cdot\upsilon, \tag{37}$$

Whence $m_W = \frac{1}{\sqrt{2}g}\upsilon$, if to not consider the additional contribution from on *R(Γ)* (24). The interaction of leptons with the torsion pseudotrace receives a form:

$$L_{Ie}^q = \bar{e}\gamma_\mu\gamma_5 e q^\mu + \bar{\nu}_e\gamma_\mu\frac{(1-\gamma_5)}{2}\nu_e q^\mu + \dots \tag{38}$$

Similarly - for other leptons. Diagonal members of kinetic action vector boson [11]

$$\left(B_{\mu\nu}\right)^2 = \frac{1}{g^2 + g'^2}\left[g'^2\left(Z_{\mu\nu}\right)^2 + g^2\left(A_{\mu\nu}\right)^2 + 2gg'Z_{\mu\nu}A^{\mu\nu}\right], \tag{39}$$

$$\left(A_{\mu\nu}^i\right)^2 = 2\left(\partial_\mu W^+{}_\nu - \partial_\nu W^+{}_\mu\right)\left(\partial^\mu W^{-\nu} - \partial^\nu W^{-\mu}\right) +$$
$$+\frac{1}{g^2 + g'^2}\left[g^2\left(Z_{\mu\nu}\right)^2 + g'^2\left(A_{\mu\nu}\right)^2 - 2gg'Z_{\mu\nu}A^{\mu\nu}\right]$$

From here their free actions [11]

$$L_0 = -\frac{1}{4}\left(\left(B_{\mu\nu}\right)^2 + \left(A_{\mu\nu}\right)^2\right) = -\frac{1}{4}\left[\left(Z_{\mu\nu}\right)^2 + \left(A_{\mu\nu}\right)^2 + 2\left(\partial_\mu W^+{}_\nu - \partial_\nu W^+{}_\mu\right)\left(\partial^\mu W^{-\nu} - \partial^\nu W^{-\mu}\right)\right] \tag{40}$$

Other kinetic members are resulted in [11].

In a Newtonian limit CGTG these cross members are reduced to the additive square – law invariants of a trace of the torsion, a nonmetricity vector and their products. By virtue of freezing of a trace of the torsion in a trace of a tensor spin in CGTG, the formulation of cross members through additives in terms the spin gives natural treatment to these hyromagnetic effects. On the other hand this additive to action in sector of electroweak interactions CGTG causes the additive to the mass of neutral Z – boson of the Standard Model. To be convinced of it it is possible direct calculation of tensor a spin of $W^{\pm}$ bosons and their convolutions by a variation on fields by all kinetic parts of the action (for example, under the formula (7.69) books [11] on 206 p.):

$$S^\mu_{.\alpha\nu}\left(W^+\right) = 2W^+{}_{[\alpha}\frac{\delta}{\delta\bar{D}_\mu W^{+\nu]}}L = 2W^+{}_{[\alpha}W^{-[\mu}{}_{,\nu]]} - 4\frac{igg'}{\sqrt{g^2+g'^2}}W^+{}_{[\alpha}A^{[\mu}W^-{}_{\nu]]} + 4\frac{ig^2}{\sqrt{g^2+g'^2}}W^+{}_{[\alpha}Z^{[\mu}W^-{}_{\nu]]}$$
$$-\frac{igg'}{\sqrt{g^2+g'^2}}\left[W^+{}_\alpha\left(\delta^\mu_\nu A\cdot W^- - W^{-\mu}A_\nu\right) - W^+{}_\nu\left(\delta^\mu_\alpha A\cdot W^- - W^{-\mu}A_\alpha\right)\right] +$$
$$+\frac{ig^2}{\sqrt{g^2+g'^2}}\left[W^+{}_\alpha\left(\delta^\mu_\nu Z\cdot W^- - W^{-\mu}Z_\nu\right) - W^+{}_\nu\left(\delta^\mu_\alpha Z\cdot W^- - W^{-\mu}Z_\alpha\right)\right],$$

$\bar{D}_\mu W^+{}_\nu$ – A covariant derivative in symmetric average connectivity (in a Newtonian limit this derivative is certain in the flat metrics),

$$2W^{-[\mu}{}_{,\nu]} = \overline{D}_\nu W^{-\mu} - \overline{D}^\mu W^-{}_\nu .$$

In the second line the contribution of cross members of interaction of derivatives on A boson, which preliminary, in flat space by means of integration in parts to within full a divergence are represented in obviously gauge-invariant form

$$A_\mu \overline{D}_\nu \left(W^{+[\mu} W^{-\nu]}\right) \tag{40a}$$

of interaction of a vector – potential of an electromagnetic field with a conserving current (and it is similar for neutral Z boson).

$$S^\mu_{.\alpha\nu}\left(W^-\right) = 2W^-{}_{[\alpha} \frac{\delta}{\delta \overline{D}_\mu W^{-\nu]}} L = 2W^-{}_{[\alpha} W^{+[\mu}{}_{,\nu]]} - 4\frac{igg'}{\sqrt{g^2+g'^2}} W^+{}_{[\alpha} A^{[\mu} W^-{}_{,\nu]]} + 4\frac{igg'}{\sqrt{g^2+g'^2}} W^-{}_{[\alpha} A^{[\mu} W^+{}_{,\nu]]}$$

$$+\frac{igg'}{\sqrt{g^2+g'^2}}\left[W^-{}_\alpha\left(\delta^\mu_\nu A\cdot W^+ - W^{+\mu}A_\nu\right) - W^-{}_\nu\left(\delta^\mu_\alpha A\cdot W^+ - W^{+\mu}A_\alpha\right)\right] -$$

$$-\frac{ig^2}{\sqrt{g^2+g'^2}}\left[W^-{}_\alpha\left(\delta^\mu_\nu Z\cdot W^+ - W^{+\mu}Z_\nu\right) - W^-{}_\nu\left(\delta^\mu_\alpha Z\cdot W^+ - W^{+\mu}Z_\alpha\right)\right],$$

$$S_\mu\left(W^+\right) = 2W^+{}_{[\alpha} \frac{\delta}{\delta D_\mu W^{+\alpha]}} L = W^+{}_\alpha \overline{\partial}_\mu W^{-a} - W^+{}_\alpha \overline{\partial}^\alpha W^-{}_\mu + \frac{igg'}{\sqrt{g^2+g'^2}}\left(A\cdot W^+ W^-{}_\mu - A_\mu W^-\cdot W^+\right) -$$

$$-\frac{igg'}{\sqrt{g^2+g'^2}}\left(\left(\delta^\alpha_\alpha - 2\right)\left(g'A - Z\right)\cdot W^- W^+{}_\mu + \left(g'A_\mu - Z_\mu\right)W^-\cdot W^+\right) - \frac{igg'}{\sqrt{g^2+g'^2}}\left(Z\cdot W^+ W^-{}_\mu - Z_\mu W^-\cdot W^+\right),$$

$$S_\mu\left(W^-\right) = 2W^-{}_{[\alpha} \frac{\delta}{\delta \overline{D}_\mu W^{-\alpha]}} L = W^-{}_\alpha \overline{D}_\mu W^{+\alpha} - W^-{}_\alpha \overline{D}^\alpha W^+{}_\mu - \frac{igg'}{\sqrt{g^2+g'^2}}\left(A\cdot W^- W^+{}_\mu - A_\mu W^-\cdot W^+\right)$$

$$-\frac{igg'}{\sqrt{g^2+g'^2}}\left(\left(\delta^\alpha_\alpha - 2\right)A\cdot W^- W^+{}_\mu - A_\mu W^-\cdot W^+\right) + \frac{ig^2}{\sqrt{g^2+g'^2}}\left(\left(\delta^\alpha_\alpha - 2\right)Z\cdot W^- W^+{}_\mu - Z_\mu W^-\cdot W^+\right) -$$

$$+2\frac{igg'}{\sqrt{g^2+g'^2}}\left(Z\cdot W^- W^+{}_\mu - Z_\mu W^+\cdot W^-\right),$$

Calculation a spin of neutral bosons leads to a parity for the sum of their spin traces:

$$\left[S_\mu(A) + S_\mu(Z)\right]\cdot\left(g'A^\mu - gZ^\mu\right) = 2\left(A_{[\mu}\overline{D}^\lambda A_{\lambda]} + Z_{[\mu}\overline{D}^\lambda Z_{\lambda]}\right)\left(g'A^\mu - gZ^\mu\right) -$$

$$-\frac{g^2}{g^2+g'^2}\left\{g'^2\left(A^2 W^+\cdot W^- - A\cdot W^- A\cdot W^+\right) + g^2\left(Z^2 W^+\cdot W^- - ZW^- ZW^+\right) - gg'\left(2A\cdot Z - A\cdot W^- Z\cdot W^+\right)\right\}.$$

After a regrouping initial action is led to a following form:

$$L = -\frac{1}{4}\left(Z_{\mu\nu}{}^2 + A_{\mu\nu}{}^2 + 2W^+{}_{\mu\nu}W^{-\mu\nu}\right) +$$

$$+\left(g'A_\mu - gZ_\mu\right)\left(S^\mu\left(W^+\right) + S^\mu\left(W^-\right) + S^\mu(A) + S^\mu(Z)\right) -$$

$$-2\left(A_{[\mu}\overline{D}^\lambda A_{\lambda]} + Z_{[\mu}\overline{D}^\lambda Z_{\lambda]}\right)\left(g'A^\mu - gZ^\mu\right) -$$

$$-\frac{2\mathrm{ig}}{\sqrt{\mathrm{g}^2+g'^2}}\left(g'A_\mu - gZ_\mu\right)\vec{\partial}_\nu\left(W^{+[\mu}W^{-\nu]}\right) -$$

$$-\frac{g^2}{2}\left[\left(W^-{}_\mu W^{+\mu}\right)^2 - \left(W^{-\mu}\right)^2\left(W^{+\mu}\right)^2\right]$$

In the first line – a free bosons action. In the second line kinetic members of initial action are led completely to a kind of interaction neutral bosons with a full spin all bosons, charged and neutral, as additives of traces of torsion and nonmetricity: the trace of torsion in CGTG is determined in terms of neutral bosons, and, on the other hand, freezing (identically) in a trace full a boson spin.

As a result of such identical regrouping of initial action almost all nonlinearity of the fourth degree on fields are transferred in structure of the specified additives on traces of torsion. From their number there was only a part on massive charged bosons. Cross members in the third line from above represent nonlinearity smaller - the third order on fields (the first order on a derivative). Such representation of a kinetic part of action in obvious an gauge invariant kind removes many questions on the Standard Model.

Thus, here it is shown, what square-law additives on a trace of torsion and a nonmetricity vector to action CGTG in sector of electroweak interactions not only define defect of the mass Z – bozon, but also kinetic cross members of base action of the Standard Model, defining the abnormal magnetic moment of $W^{\pm}$ bosons include together with (40a) all. In CGTG calibration of gauge fields is made in common in the form of the generalized calibration of curvature. The generalized symmetry can be kept and at breaking of symmetry of a separate kind (as in [16]). The given effects allow to define the abnormal magnetic moment at a minimality of introduction of interaction with an electromagnetic field in CGTG. Therefore as the first hyromagnetic effect of display of a pseudotrace of torsion q_μ consideration of its contribution to the a normal magnetic moment of leptons proceeding from structure dilaton lepton currents is of interest.

5. Higgs Mechanism. Diagonalizing of Masses Z – Boson and the Photon Problem

Till now the conformal invariance of the action CGTG has not been broken, and masses W^+, W^- и Z – are certain very conditionally by the form (36) at fixing calibration unique components *v(x)*, remained from the Higgs field. Exception makes an massless electromagnetic field *A*, that is defined by properties of the Standard Model EWI. But also it in the given statement is not final because of presence *N* and *V* in R*(Γ)*. Role *V* in Y_4 is passive enough, but in U_4 *V* is connected with group of dilatations *U (1)* and on logic of the approach should be connected with *B* – boson in U_4, so and with an electromagnetic potential *A*. From inevitability of transition in U_4 where $N = 0$, we shall enter into structure of a trace of torsion of field *Z* and *A* to within compensating scale transformation (in Y_4 a trace of torsion $V = trQ$ it will not be transformed):

$$V_\mu = g\frac{\left(xA_\mu + yZ_\mu\right)}{\sqrt{g^2+g'^2}}\left[\frac{32\pi G m_W{}^2}{\hbar^2 c^2}\right]^{1/2} \tag{41}$$

also we shall redefine also *f*

$$N_\mu = B_\mu f\left[\frac{32\pi G m_W{}^2}{\hbar^2 c^2}\right]^{1/2}, \tag{42}$$

Where

$$B_\mu = \frac{gA_\mu + g'Z_\mu}{\sqrt{g^2+g'^2}}$$

x and *y* in (41) – dimensionless unknown factors. Collecting all mass members vector bosons, we have (believing $\eta = \upsilon$)

$$\begin{aligned} L_\upsilon &= -\partial_\mu\upsilon\partial^\mu\upsilon + \frac{g\sqrt{g^2+g'^2}}{2\sqrt{2}}\left(W^+{}_\mu Z^\mu + W^-{}_\mu Z^\mu\right)\upsilon^2 + V(\upsilon) - \\ &-\left(\frac{g^2}{2}W^+{}_\mu W^{-\mu} + \frac{\left(g^2+g'^2\right)}{4}Z_\mu Z^\mu\right)\upsilon^2 + \frac{\upsilon^2}{\eta^2}\left[R(\Gamma) + \alpha N^2 + \beta N\cdot V + \gamma V^2\right], \end{aligned} \tag{43}$$

Where

$$R(\Gamma) = R - 12\partial_\alpha V^\alpha - 6\partial_\alpha N^\alpha + 6N^2 + 24V^2 + 24N\cdot V + 6q^2 - 2S_{\mu\nu\lambda}S^{\mu\nu\lambda}. \tag{44}$$

And invariant conformallly members with uncertain numerical factors α, β, γ are added.

Thus, the central problem will be a spectral masses diagonalizing problem in (43), consisting in the requirement of absence of additives of a kind AZ and A^2 in (43) under condition of conformity to the mass m_Z of Z – boson. The same problem can be considered and in standard statement of spontaneous braking of symmetry as in the Standard Model EWI but then there will be no elimination of Higgs's scalar. The problem is reduced to substitution (41, 42) in (43) and to the decision of system of three equations concerning unknown value x and y:

$$\begin{cases} (6+\alpha)f^2tg^2\Theta_W + (24+\beta)yftg\Theta_W + \dfrac{24y^2}{2} = \dfrac{\left(m_Z{}^2 - m_Z^{theor\,2}\right)}{4m_W{}^2\cos^2\Theta_W}, \\ (6+\alpha)f^2 + (24+\beta)xf + \dfrac{24x^2}{2} = 0, \\ (6+\alpha)f^2tg^2\Theta_W + \left(12+\dfrac{\beta}{2}\right)f\left(xtg\Theta_W + y\right) + 24xy = 0. \end{cases} \tag{45}$$

In (45) m_Z^{theor} – theoretical value (37) [11] in the Standard Models EWI only no more than for some percent smaller, than experimental m_Z. The system (45) is redefined and consequently at various and has only three not trivial decisions – at $\alpha = 18, \beta = 24$:

$$V_\mu^{(\pm)} = -\left(A_\mu\cos\Theta_W + Z_\mu\sin\Theta_W\right)f\sqrt{\frac{32\pi Gm_W{}^2}{\hbar^2c^2}} \pm Z_\mu\left[\frac{2\pi G\left(m_Z{}^2 - m_Z^{theor\,2}\right)}{3\hbar^2c^2}\right] \tag{46}$$

and one at $\alpha = -6, \beta = -24$

$$V_\mu^Z = \pm Z_\mu\sqrt{\frac{\left(m_Z{}^2 - m_Z^{theor\,2}\right)2\pi G}{3\hbar^2c^2}}. \tag{47}$$

6. Discussion of Results

Two decisions (46) and one decision (47) of the masses diagonalizing problem (43) on Z_μ and A_μ also set three allocated directions of a trace of torsion V_μ in space Y_4 . These three various directions it is possible to compare with three types of dilaton currents of leptons $j_\mu^{(l)}$, three constants of communication and, accordingly, three various masses (29):

$$m_l = G_l\upsilon. \tag{48}$$

By such comparison settlement number of families of leptons – three – defines all known leptons: electrons, muons and tauons. The decision (46) and (47) can be presented in independent of a constant f a kind if to put

$$\beta + 24 = \frac{48}{f}, \alpha + 6 = \frac{24}{f^2}. \tag{49}$$

Then the decision (46) remains to the same, and decisions (46) will be the same kind with replacement f on *1*. Transition from Y_4 to U_4 *when* $f \to 0$ the second a condition (49) will not change the received decisions. To that it is shown, what the received structure of a trace of torsion of a kind (46-47) exists and in the Riemann – Cartan space – time. A photon and Z – boson enter in (46) into mixes, but at the some f in structure V_μ^+ of there is one photon, i.e. the structure (46, 47) supposes following representation

$$V_\mu^Z = Z_\mu\sqrt{\frac{\left(m_Z{}^2 - m_Z^{theor\,2}\right)2\pi G}{3\hbar^2c^2}}, \tag{50a}$$

$$V_\mu^A = -A_\mu ctg\Theta_W\sqrt{\frac{\left(m_Z{}^2 - m_Z^{theor\,2}\right)2\pi G}{3\hbar^2c^2}}, \tag{50b}$$

$$V_{\mu}^{AZ} = -\left(A_{\mu}\cos\Theta_W + 2Z_{\mu}\sin\Theta_W\right)\sqrt{\frac{32\pi G m_W^{\ 2}}{\hbar^2 c^2}}. \tag{50c}$$

The direction V_μ^A is connected only with electromagnetic potential A_μ: where Q – a constant CGTG [4]. The direction V_μ^Z and V_μ^{AZ} also contains a massive field Z_μ. It is followed that in the same way we may made $m_W = 0$ as it take place in some GUT theories. So in [50a, b] don't be m_Z^{theor}. From (50c) Q – the coupling constant CGTG is easily calculated

$Q = 0,711 \cdot 10^{18}\, e$ (e – an electron charge), (51)

$$Q_{EWI} = \frac{c^2}{e} ctg\left(\Theta_W\right)\sqrt{\frac{G_F}{4\pi G\sqrt{2}}} = 0.711 \cdot 10^{18} e,$$

G_F – Fermy coupling constant, G – Newton's gravitation constant, c – speed of light.

The amplitude of a trace of torsion in this case at $A_\mu \sim m_Z c^2/e$, $V_A \sim A_\mu/Q \sim 1.02 \cdot 10^{-2}\ sm^{-1}$ characterizes scale of length of $V_A^{-1} \sim 102\ sm$ that corresponds to quantum of energy of the order $10^{-7}\ eV$. Calculation of value Q, proceeding from analogy CGTG to plasma under the formula

$$\frac{Q}{e} \approx 10^{40}\sqrt{\frac{\rho_\infty}{\rho}}, \tag{52}$$

где $\rho_\infty = 4 \cdot 10^{-4}\ sm^{-3}$ density of particles in the vacuum, ρ – the density of particles in plasma, leads to value (51) when ρ characterizes the density of particles in a kernel on on distances $10^{-12}\ sm$. It is necessary at the same time to notice once again, that all can be received these results and by spontaneous breaking of symmetry in the Standard Model [11] but then allocation of three leptons directions in relation to a case $V_\mu = -\ N_\mu$, when $\Delta m_Z = 0$ and besides then Higgs's scalar it is not eliminated will be not absolutely clear. In the offered approach elimination of Higgs's scalar leads to occurrence of addition Δm_Z to the mass of Z – boson according to data of the experiment, that is quite, corresponds to the general theoretical representations. Directions (46)

$$V_{\mu}^{Z} = -N_{\mu} \pm Z_{\mu} + O\left(\Delta m_Z\right). \tag{53}$$

In view of little though also importance of the contribution Z_μ, define a parity between V_μ and N_μ, appearing in nonmetricity representation in terms of the torsion (21b), that also correlates with speciality of these directions.

7. Concluding Remarks

CGTG following to [10] gives the value of the torsion pseudotrace – spinor (protons, quarks) universal coupling $f_T = 4.388 \cdot 10^{-17} = 4.4 \cdot 10^{-12}\ G_F$ (G_F – Fermi coupling constant), and with limits from known experiments [8] - torsion mass $m_T = 0.4700 \cdot 10^{-7}$ eV or $m_T = 0.445 \cdot 10^{-15}$ muon mass. In the low energy limit, the total action leads to an effective four – fermion interaction term with following form:

$$L_{int} = -\frac{f_a f_b}{m_T^{\ 2}}(\bar{\psi}_a\gamma_5\gamma^\mu\psi_a)(\bar{\psi}_b\gamma_5\gamma_\mu\psi_b),$$

Where $f_a = f_b = f_T$ for proton – proton and quark – quark interactions. So the value of the constant of effective 4- fermions interaction $f_T^2/m_T^2 = 0.988^2$, that is the same value as the torsion coupling constant [3] and that indeed may leads to multy-muon events production.

The major part of torsion gravity in Newtonian limit $D_{[0}\ W^0_{\ l]} = 0$ motion equations

$$\frac{d^2 x_l}{dt^2} + f_l + u^\alpha \overline{D}_{[\alpha} W^\lambda_{l]} u_\lambda = 0 \tag{54}$$

f_l - forces of the torsion trace and external forces, u_l – 4- particles speed, x_l – coordinate, for 1-dimension case are equivalent to the string equations

$$\frac{d^2x_2}{dt^2}+f_2+u^0\overline{D}_0W_{23}u_3=0,$$
$$u^0\approx 1,u_3=\frac{dx_3}{dt},W_{23}=W_{32}\equiv Y,W_{22}=W_{33}\equiv X. \tag{55}$$

CGTG gravitation action is

$$\int J^2(X,Y)dtdz=\int JdXdY,$$
$$J(X,Y)=\partial_0X\partial_zY-\partial_0Y\partial_zX \tag{56}$$

Have an actually form of the continual integral on fields and according to [16] have a form of a antisymmetric field (B) structure of a fermion string

$$S=\int\varepsilon_{ab}B_{cd}(y)\partial_a y^c\partial_b y^d d^2\xi$$

Where $B_{cd}=\varepsilon_{cd}\varepsilon_{ab}\partial^a y^c\partial^b y^d\equiv J(x,y)\varepsilon_{cd}$.

In the oscillator model a force f $_2$ it was considered as is proportional to length x_1 in analogy with an electromagnetic vector-potential of a constant magnetic field. It leads (with dates [19]) to the value of the displacement of the string in whole on 2 sm – the same as at the Tevatron.

The equation (55) have form

$$\frac{d^2x_2}{dt^2}+\frac{f_2}{M}+\partial_zZ'\frac{1}{\mu_\Gamma{}^s}\frac{dz}{dt}=0. \tag{57}$$

$\mu_\Gamma{}^s$ – an author's spin gravymobility, which is defined on Einstein's formula in terms of the neutrons diffusion $1.1\cdot10^{-3}$ SGS, and is equal to 4.86 10^{-14} sec on 300K. On the ortonormal condition $\partial_zZ'\partial_zx_2=-1$ $x_2(z(t), t)$ describes a string form according to (4):

$$\frac{\partial x_2}{\partial z}\left[\frac{d^2x_2}{dt^2}+\frac{f_2}{M}\right]=\frac{1}{\mu_\Gamma}\frac{dz}{dt}. \tag{58}$$

For a plane wave $Y=\alpha(x-vt)$, v = 1+c.The parameter α may to defined from the condition of compensation vacuum energy displacement in the model of gravitating fermy - gas [8] by the energy of the interaction between torsion trace and traceless pert of torsion –

$$\varepsilon_{XF}=2\int M_x\phi\rho(0)d^3x:\varepsilon_{XF}-\int d^3x\delta L=0,\rho(0)=\frac{p_F{}^3}{6\pi^2}.$$

$$\int d^3x\delta L=f(d)Q^2c^2\alpha^2\int\phi d^3x.$$

On $c\approx10^{-12}$ (it follows from the distinguish between an inertion and an gravitation masses) it leads to fulfilled of this correspondences when $\alpha=10^{22},M_X=10^{16}$.

Let oscillator

$$\frac{f_2}{M}=\kappa Hy(x(t),t).$$

Here H – the strength of magnetic field and a value *κH = 0.05 (СГС)* – on *H=10000 CGS* on an acceleration of the mass in experiment [19] *0.05 CGS.*

String equations have form

$$\eta\frac{dx}{dt}=\left(\frac{f_y}{\lambda}-\frac{M}{\lambda}\frac{\partial^2 Y}{\partial t^2}\right)\frac{\partial Y}{\partial x} \tag{59}$$

η – viscosity, $M\lambda^{-1}$ – string mass density on unit of length. (59) is equivalent to (58) if take the string mass density as equal to the proton mass on Bohr's radius $\lambda = 0.05\ nm$ и $\eta = 0.01\ SGS$ – as in the water. The solution of a string equation (59) has an exponential form with the displacement on y on 2 sm and with displacement on a x – phase is equal to the gravitation screening radius [8] ax = $1.3\cdot 10^{-22}$ *sm* for $M_x = 3\cdot 10^{15}\ m_p$, or $a_x = 0.5\cdot 10^{-18}$ *sm* for $M_x = 1\cdot 10^{14}\ m_p$ – the proton Compton wave length at LHC on 20 TeV.

Appendix A

ELEMENTS OF THE TENSOR ANALYSIS IN GENERAL METRIC – AFFINE SPACE

The general affine – metric space is characterized by connection defining parallel carry of tensors

$$\Gamma^{\mu}{}_{\nu\rho}=\left\{{}_{\nu}{}^{\mu}{}_{\rho}\right\}+B^{\mu}{}_{\nu\rho}, \tag{A.1}$$

Where $\left\{{}_{\nu}{}^{\mu}{}_{\rho}\right\}=\frac{1}{2}g^{\mu\lambda}\left(\partial_{\nu}g_{\rho\lambda}+\partial_{\rho}g_{\lambda\nu}-\partial_{\lambda}g_{\nu\rho}\right)$ – is the usual Christoffel symbol, $g_{\mu\nu}$ – the metric tensor, $B^{\mu}{}_{\nu\alpha}$ – is a so-called *deviation tensor*,

$$\begin{aligned}B^{\mu}{}_{\nu\rho}&=Q^{\mu}{}_{\nu\rho}-Q_{\nu}{}^{\mu}{}_{\rho}-Q_{\rho}{}^{\mu}{}_{\nu}+\frac{1}{2}\left(N^{\mu}{}_{\nu\rho}-N_{\nu}{}^{\mu}{}_{\rho}-N_{\rho}{}^{\mu}{}_{\nu}\right),\\ Q^{\mu}{}_{\nu\rho}&=2\delta^{\mu}{}_{[\nu}V_{\rho]}+S^{\mu}{}_{\nu\rho}+\varepsilon^{\mu}{}_{\nu\rho\lambda}q^{\lambda}\end{aligned} \tag{A.2}$$

The torsion tensor $Q^{\mu}{}_{\nu\rho}=\Gamma^{\mu}{}_{[\nu\rho]}\equiv\frac{1}{2}\left(\Gamma^{\mu}{}_{\nu\rho}-\Gamma^{\mu}{}_{\rho\nu}\right),$

$V_{\rho}=-\frac{1}{3}Q^{\mu}{}_{\rho\mu}$ – The torsion vector, it is not dynamic field in CGTG,

$S_{\alpha\beta\gamma}$ – traceless part of the torsion $S^{\mu}{}_{\nu\mu}=0, \varepsilon_{\mu\nu\rho\lambda}S^{\nu\rho\lambda}=0,$

$q_{\lambda}=\frac{1}{6}\varepsilon_{\lambda\nu\mu\rho}Q^{\nu\mu\rho}$ – Pseudo vector of the torsion,

We use for traceless part of the torsion

$S_{\mu\nu}{}^{\lambda}=\bar{D}_{\mu}W_{\nu}{}^{\lambda}-\bar{D}_{\nu}W_{\mu}{}^{\lambda},$

(A.3)

$W_{\mu\nu}$ – tensor field of traceless part of the torsion of spin 2,

$N_{\lambda\mu\nu}=\bar{N}_{\lambda\mu\nu}+2N_{\lambda}g_{\mu\nu}$ – Nonmetricity tensor,

(4A)

$\nabla_{\rho}g_{\mu\nu}=N_{\rho\mu\nu},$

$N_{\lambda}\equiv\frac{1}{8}N_{\lambda\rho}{}^{\rho}$ – The trace of nonmetricity tensor: Weyl's vector,

(A.5)

$\bar{N}_{\lambda\mu\nu}$ – Traceless part of the nonmetricity tensor $\left(\bar{N}_{\lambda\rho}{}^{\rho}=0\right).$

It is used a designation of convolution $\bar{N}_{\mu}\equiv\frac{1}{2}\bar{N}^{\rho}{}_{\rho\mu}.$

Traces [17]

$$B_{\mu\rho}{}^{\rho}=2\left(N_{\mu}-\overline{N}_{\mu}-V_{\mu}\right),$$
$$B_{\rho\mu}{}^{\rho}=2\left(V_{\mu}-2N_{\mu}\right), \qquad \text{(A.6)}$$
$$B_{\rho}{}^{\rho}{}_{\mu}=-4N_{\mu}.$$

Tensor

$$\Omega_{\mu\nu}=\frac{1}{4}\left(\partial_{\mu}\Gamma^{\lambda}{}_{\lambda\nu}-\partial_{\nu}\Gamma^{\lambda}{}_{\lambda\mu}\right)=\partial_{\nu}N_{\mu}-\partial_{\mu}N_{\nu}. \qquad \text{(A.7)}$$

The curvature tensor

$$-R^{\alpha}{}_{\beta\mu\nu}(\Gamma)=\partial_{\mu}\Gamma^{\alpha}{}_{\beta\nu}-\partial_{\nu}\Gamma^{\alpha}{}_{\beta\mu}+\Gamma^{\alpha}{}_{\lambda\mu}\Gamma^{\lambda}{}_{\beta\nu}-\Gamma^{\alpha}{}_{\lambda\nu}\Gamma^{\lambda}{}_{\beta\mu}. \qquad \text{(A.8)}$$

Ricci tensor

$$-R_{\beta\nu}(\Gamma)=-R^{\alpha}{}_{\beta\alpha\nu}(\Gamma)=\partial_{\alpha}\Gamma^{\alpha}{}_{\beta\nu}-\partial_{\nu}\Gamma^{\alpha}{}_{\beta\alpha}+\Gamma^{\alpha}{}_{\lambda\alpha}\Gamma^{\lambda}{}_{\beta\nu}-\Gamma^{\alpha}{}_{\lambda\nu}\Gamma^{\lambda}{}_{\beta\alpha}. \qquad \text{(A.9)}$$

Curvature scalar

$$-R(\Gamma)=-R^{\alpha}{}_{\alpha}(\Gamma)=\partial_{\alpha}\Gamma^{\alpha\lambda}{}_{\lambda}-\partial_{\lambda}\Gamma^{\alpha}{}_{\lambda\alpha}+\Gamma^{\alpha}{}_{\lambda\alpha}\Gamma^{\lambda\beta}{}_{\beta}-\Gamma^{\alpha}{}_{\lambda\beta}\Gamma^{\lambda\beta}{}_{\alpha}. \qquad \text{(A.10)}$$

Tensor (A.7)

$$-\Omega_{\mu\nu}=\frac{1}{4}R^{\lambda}{}_{\lambda\mu\nu}(\Gamma). \qquad \text{(A.11)}$$

Properties of nonmetricity:

Длина вектора A_{μ}

$$l^{2}=g_{\mu\nu}A^{\mu}A^{\nu}. \qquad \text{(A.12)}$$

Supposed that the vector A_{μ} is displaced parallely from point with coordinates x^{μ} to the point x^{μ} $+dx^{\mu}\nabla_{\lambda}A_{\mu}=0.$

Applying covariant differentiation to the eq. (A.12) one finds [17]:

$$d\left(l^{2}\right)=N_{\lambda\mu\nu}A^{\mu}A^{\nu}dx^{\lambda} \qquad \text{(A.13)}$$

– A change of the length under parallel displacement.

Constructing the parallel displacement of l^2 along an infinitesimal coordinate quadrilateral, one obtains for the change in the length

$$d\left(l^{2}\right)=F_{\alpha\beta\mu\nu}A^{\alpha}A^{\beta}dx^{\mu}\delta x^{\nu}, \qquad \text{(A.14)}$$

Where $F_{\alpha\beta\mu\nu}=2\nabla_{[\nu}N_{\mu]\alpha\beta}+2g^{\rho\sigma}\left(N_{[\mu|\alpha\rho}N_{\beta|\nu]\sigma}+N_{[\mu|\alpha\rho}N_{\sigma|\nu]\beta}\right).$ (A.15)

In case Y_4, where [17] $\overline{N}_{\lambda\mu\nu}=0$

$$F_{\alpha\beta\mu\nu}=2g_{\alpha\beta}\partial_{[\nu}N_{\mu]}=g_{\alpha\beta}\Omega_{\mu\nu}, \qquad \text{(A.16)}$$

$\Omega_{\mu\nu}$ defined by (A.7), (A.11).

$$\Delta\left(l^{2}\right)=2l^{2}\Omega_{\mu\nu}dx^{\mu}\delta x^{\nu} \qquad \text{(A.17)}$$

– a change of the length in the Weyl – Cartan Y_4 . Hence in Y_4 a light cone $l^2=0$ is conserved: $\Delta l^2=0$ (such as in (A.5).

The straightest lines ore autoparallels [17] in $L4$

$$0=\frac{du^{\alpha}}{ds}+\left(\left\{{}_{\mu}{}^{\alpha}{}_{\rho}\right\}+B^{\alpha}{}_{(\mu\rho)}\right)u^{\mu}u^{\rho}, \tag{A.18}$$

$$B^{\mu}{}_{\nu\rho}=2\left(g_{\nu\rho}V^{\mu}-\delta^{\mu}_{\rho}V_{\nu}\right)+N^{\mu}g_{\nu\rho}-N_{\nu}\delta^{\mu}_{\rho}-N_{\rho}\delta^{\mu}_{\nu}+$$
$$+S^{\mu}{}_{\nu\rho}-S_{\nu}{}^{\mu}{}_{\rho}-S_{\rho}{}^{\mu}{}_{\nu}+\frac{1}{2}\left(\overline{N}^{\mu}{}_{\nu\rho}-\overline{N}_{\nu}{}^{\mu}{}_{\rho}-\overline{N}_{\rho}{}^{\mu}{}_{\nu}\right)+\varepsilon^{\mu}{}_{\nu\rho\lambda}q^{\lambda}$$

The shortest lines ore extremals of the extremal length with respect to the metric of the manifold [17] in W_4

$$\delta\int ds=\delta\int\sqrt{g_{\mu\nu}\frac{dx^{\mu}}{ds}\frac{dx^{\nu}}{ds}}=0, \tag{A.19}$$

$$0=\frac{du^{\alpha}}{ds}+\left\{{}_{\mu}{}^{\alpha}{}_{\rho}\right\}u^{\mu}u^{\rho}-2u^{\alpha}u^{\rho}N_{\rho}+N^{\alpha}-u^{\alpha}u^{\rho}\left(\overline{N}_{\rho\mu}{}^{\alpha}-\frac{1}{2}\overline{N}^{\alpha}{}_{\mu\rho}\right). \tag{A.20}$$

The representation of the trsaceless part of nonmetricity tensor in terms of torsion exactly to scale transformations

$$\overline{N}^{\rho}{}_{\mu\nu}=S_{\mu}{}^{\rho}{}_{\nu}+S_{\nu}{}^{\rho}{}_{\mu}. \tag{A.21}$$

From (A.20) one find

$$B^{\mu}{}_{\nu\rho}=Q^{\mu}{}_{\nu\rho}+g_{\nu\rho}V^{\mu}-S_{\nu}{}^{\mu}{}_{\rho}-S_{\rho}{}^{\mu}{}_{\nu}+N^{\mu}g_{\nu\rho}-\frac{1}{2}N_{(\nu}\delta^{\mu}_{\rho)}+\frac{1}{2}\left(\overline{N}^{\mu}{}_{\nu\rho}-\overline{N}_{\nu}{}^{\mu}{}_{\rho}-\overline{N}_{\rho}{}^{\mu}{}_{\nu}\right)=$$
$$=Q^{\mu}{}_{\nu\rho}+g_{\nu\rho}V^{\mu}-S_{\nu}{}^{\mu}{}_{\rho}-S_{\rho}{}^{\mu}{}_{\nu}+\frac{1}{2}\left(S_{\nu}{}^{\mu}{}_{\rho}+S_{\rho}{}^{\mu}{}_{\nu}-S^{\mu}{}_{\nu\rho}-S_{\rho\nu}{}^{\mu}-S^{\mu}{}_{\rho\nu}-S_{\nu\rho}{}^{\mu}\right)+N^{\mu}g_{\nu\rho}-$$
$$-\frac{1}{2}N_{(\nu}\delta^{\mu}_{\rho)}=Q^{\mu}{}_{\nu\rho}+g_{\nu\rho}V^{\mu}-S_{\nu}{}^{\mu}{}_{\rho}-S_{\rho}{}^{\mu}{}_{\nu}+\frac{1}{2}\cdot 2\left(S_{\rho}{}^{\mu}{}_{\nu}+S_{\nu}{}^{\mu}{}_{\rho}\right)+N^{\mu}g_{\nu\rho}-\frac{1}{2}N_{(\nu}\delta^{\mu}_{\rho)}=$$
$$Q^{\mu}{}_{\nu\rho}+g_{\nu\rho}V^{\mu}.+N^{\mu}g_{o\rho}-\frac{1}{2}N_{(\nu}\delta^{\mu}_{\rho)}. \tag{A.22}$$

From here (22.A) it is visible, that the equation of auto parallels (18.A) in this case from a traceless part of a nonmetricity tensor does not depend as well as in [6] where it is shown, that with spinors interacts the Weyl nonmetricity vector only.

Average connection

$$\overline{\Gamma}^{\mu}{}_{\nu\rho}=\frac{1}{2}\left(\Gamma^{\mu}{}_{\nu\rho}+\Gamma^{\mu}{}_{\rho\nu}\right).$$

From (A.22)

$$\overline{\Gamma}^{\mu}{}_{\nu\rho}=\left\{{}_{\nu}{}^{\mu}{}_{\rho}\right\}+g_{\nu\rho}V^{\mu} \tag{A.23}$$

Curvature scalar in Y_4 (10.A)

$$R(\Gamma)=R-12\partial_{\alpha}V^{\alpha}-6\partial_{\alpha}N^{\alpha}+6N^{2}+24V^{2}+24N\cdot V+6q^{2}-2S_{\mu\nu\lambda}S^{\mu\nu\lambda}, \tag{A.24}$$

R – A Riemann curvature scalar.

Appendix B

ALGEBRA OF A CONFORMAL GROUP

The Minkovski space, except for group of translations and lorents's rotations, is invariant also rather wider the *15* – parametrical group Li [15] containing also stretchings ($x \to x_{\mu}/\ \rho)$ and inversions ($x_{\mu} \to cx_{\mu}/x^{2}$). The condition $ds'^{2} = ds^{2}$ at such transformations is replaced more than general condition

$$\sigma(x)ds'^2 = ds^2, \tag{B.1}$$

So the invariance takes place only for the equations on a light cone. Most the general infinitesimal transformation $x_\mu \to x_\mu + \delta x_\mu$ satisfying to the equation (B.1) appears [15]

$$\delta x_\mu = \varepsilon_\mu + \omega_{\mu\nu}x^\nu + \varepsilon x_\mu + c_\mu x^2 + 2x_\mu c\cdot x, \tag{B.2}$$

Where ε_μ, $\omega_{\mu\nu} = -\omega_{\nu\mu}$ and ε – parameters of translations, Lorents rotations and stretchings, and c_μ – the parameter, connected with special conformal transformation. In [15] it is resulted final special conformal transformation

$$x'_\mu = \left(\frac{x_\mu}{x^2} + c_\mu\right)^{-1} = \frac{x_\mu + c_\mu x^2}{1 + 2c\cdot x + x^2c^2}, \tag{B.3}$$

that is $\quad \delta x_\mu = c_\mu x^2 - 2c\cdot x x_\mu.$ (B.4)

From the formula (B.3) follows

$$x'^2 = \frac{x^2}{1 + 2c\cdot x + x^2c^2}, \tag{B.5}$$

whence it is visible, what a light cone $x^2 = 0$ remains invariant, but the reference in zero of a denominator does possible transition from time – similar to spatially – similar intervals (and on the contrary). Thus, the conformal invariant theory unessentially causality. Representations the generators connected with conformal transformations, changing only one an argument,

$$\varphi'(x) = \exp(iN_c)\varphi(x),\ \varphi'(x') = \varphi(x).$$

For an infinitesimal transformation (B.4)

$$N_\mu \to i\left(2x_\mu x_\nu - g_{\mu\nu}x^2\right)\partial^\nu. \tag{B.6}$$

Using similar representations for generators of group of Poincare and operation of a stretching

$$P_\mu \to i\partial_\mu,\ M_{\mu\nu} \to i\left(x_\mu\partial_\nu - x_\nu\partial_\mu\right),\ D \to ix\cdot\partial,$$

We have

$$\begin{aligned}&\left[P_\mu, D\right] = iP_\mu, \left[M_{\mu\nu}, D\right] = 0, \left[D, D\right] = 0,\\ &\left[P_\mu, N_\mu\right] = 2i\left(g_{\mu\nu}D + M_{\mu\nu}\right), \left[N_\mu, N_\mu\right] = 0,\\ &\left[M_{\mu\nu}, N_\lambda\right] = i\left(g_{\mu\nu}N_\nu - g_{\nu\lambda}N_\mu\right), \left[D, N_\mu\right] = iN_\mu\end{aligned} \tag{B.7}$$

And it is had also known parities of algebra of Poincare. From algebra (B.7) in [15] expression for a conformal current $N_{\mu\nu}$:

$$N_{\mu\nu} = \left(2x_\mu x_\nu - g_{\mu\nu}x^2\right)\Theta^\lambda_\nu, \tag{B.8}$$

Where $\Theta^\lambda{}_\nu$ – an energy – impulse tensor in the Belinfante’s form. From (8A) follows:

$$\partial^\nu N_{\mu\nu} = 2x_\mu\Theta^\nu_\nu \equiv 2x_\mu\partial^\nu j^D{}_\nu, \tag{B.9}$$

Where $\Theta^\nu{}_\nu$ – a trace of an energy – momentum tensor, $j^D{}_\nu$ – a dilaton current.

From here is visible to communication a conformal and scale invariance. When a scale invariance takes place, i. e. $\partial^\nu j^D{}_\nu = 0$, a conformal invariance also takes place [15] $\partial^\nu N_{\mu\nu} = 0$.

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