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# Kinematic renormalization of energy in the gravity

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The Lagrangian in the theory of gravity in the affine frame (TGAF) [1] is

$$L_\gamma = \delta_{ab}^{\mu\nu} g^{bd} \gamma_{\mu c}^a \gamma_{\nu d}^c, \quad (1)$$

where  $\delta_{ab}^{\mu\nu}$  is the alternator,  $e_a = h_a^\mu \partial_\mu$  is the affine frame in the Riemann space, and  $g_{ab} = e_a \cdot e_b$ ,  $\gamma_{bc}^a$  are coefficients of the torsion-free and metric-compatible affine connection in the affine frame  $e_a$ .

Under  $GL^g$ -transformations  $e'_a = L_a^{a'} e_{a'}$  Lagrangian  $L_\gamma$  is transformed by the rule:

$$L_{\gamma'} = L_\gamma + \nabla_\sigma \Delta V^\sigma, \quad (2)$$

where  $\Delta V^\sigma = \delta_{ab}^{\sigma\nu} g^{bd} \partial_\nu L_{c'}^a L_d^{c'}$ . Transformation (2) is canonical transformation and don't changes the equations of motions – Einstein equations:

$$G_a^\mu \equiv -\nabla_\sigma B_a^{\mu\sigma} - t_a^\mu = \tau_a^\mu, \quad (3)$$

but changes energy-momentum tensor of the gravitational field  $t_a^\mu$  and the superpotential  $B_a^{\mu\sigma}$  of the complete energy-momentum tensor of the gravitational and matter fields  $T_a^\mu = t_a^\mu + \tau_a^\mu$ :

$$t_a'^\mu = t_a^\mu - \frac{1}{\sqrt{-g}} \partial_{h_\mu^a} (\sqrt{-g} \nabla_\sigma \Delta V^\sigma), \quad (4)$$

$$B_a'^{\mu\nu} = B_a^{\mu\nu} + \partial_{\partial_\nu h_\mu^a} \nabla_\sigma \Delta V^\sigma. \quad (5)$$

This changing permits to renormalize the complete energy by changing general reference frames.

## REFERENCES

- [1] S. E. Samokhvalov. General reference frames and definition of energy in theory of gravity (in Ukrainian). *Math. Modelling.*, 2(35), 2016.

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