

GEOMETRIC APPROACH TO PLANCK SCALE FIELD

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ABSTRACT. In this short paper i present a try to explain how gravity works on Planck scale and beyond it. Where i use field equation that connects tensor field with metric and energy. I present only all mathematical model that is needed for field to work. Solution to field equation is both a scalar field F and tensor fields: metric tensor, field tensor and energy tensor. I present no solutions to this equation in this paper.

1. FIELD EQUATION

I can write field equation as, where F is field, g is metric tensor and T is energy tensor:

$$\begin{aligned} \partial_{\alpha_1} \partial_{\beta_1} \dots \partial_{\alpha_n} \partial_{\beta_n} F^{\alpha_1 \beta_1 \dots \alpha_n \beta_n} - \partial_{\alpha_1} \partial_{\beta_1} \dots \partial_{\alpha_n} \partial_{\beta_n} g^{\alpha_1 \beta_1} \dots g^{\alpha_n \beta_n} \\ = g^{\alpha_1 \beta_1} \dots g^{\alpha_n \beta_n} T_{\alpha_1 \beta_1 \dots \alpha_n \beta_n} \end{aligned} \quad (1.1)$$

Energy has to be conserved so change of energy tensor is zero:

$$\partial^{\alpha_1} \partial^{\beta_1} \dots \partial^{\alpha_n} \partial^{\beta_n} T_{\alpha_1 \beta_1 \dots \alpha_n \beta_n} = 0 \quad (1.2)$$

Space-time interval is no longer a line but a hyper-dimensional volume that connects two regions of field, i can write it formally as:

$$ds^{2n} = g_{\alpha_1 \beta_1} \dots g_{\alpha_n \beta_n} dx^{\alpha_1} dx^{\beta_1} \dots dx^{\alpha_n} dx^{\beta_n} \quad (1.3)$$

It can be understood as shortest volume that connects two volumes of space-time. I can connect some part of that hyper-surface with another part by using metric tensor but not one but n ones. Proper time is now not a distance in space-time but a shortest hyper-volume connecting two parts of field that are hyper-volumes themself:

$$\tau^n = \frac{1}{c^n} \sqrt{\int_{P(\mathbf{x}) \in R^n} g_{\alpha_1 \beta_1} \dots g_{\alpha_n \beta_n} dx^{\alpha_1} dx^{\beta_1} \dots dx^{\alpha_n} dx^{\beta_n}} \quad (1.4)$$

So history of object is no longer a line but hyper-volume, i assume space-time interval is in space units that's why i divided it by speed of light. Where $P(\mathbf{x}) \in R^n$ is path of field that belongs to some closed n-dimensional region.