A more appealing Theory of Gravitation

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Abstract

A somewhat more appealing classical theory of gravitation is proposed.

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Key words:

There is a flat 8-dimensional embedding space with metric $\eta \otimes \begin{pmatrix} 1 & -\imath \\ \imath & 1 \end{pmatrix}$, where η is the Minkowski metric. One factor is flat spacetime x, while the other is the gravitational vector field A. For classical gravitation only the symmetric real part of the metric is relevant. So the line element with the dimension of length assigned to it reads

$$\mathrm{d}s^2 = \mathrm{d}x_\mu \mathrm{d}x^\mu + \ell^2 \mathrm{d}A_\nu \mathrm{d}A^\nu \ , \tag{1}$$

where ℓ is the Planck length. The indices are raised and lowered by means of the Minkowski metric or any variant derived from a coordinate transformation in 4 dimensions.

4 embedding equations $A^\nu(x^\mu)$ define a 4-dimensional field manifold. This is stationary, this means the Lagrangian to be integrated over flat spacetime is $const \cdot \sqrt{|\det g|}$, where g is the induced metric on the field manifold. It is to be expressed and varied in terms of the spacetime gradients of the A.

The induced metric couples to the stress-energy tensor, however additively rather than multiplicatively. Nota bene, not g^{00} is to be associated with the Newtonian potential in the appropriate limit, rather A^0 is. T shall denote the usual flat space stress-energy tensor covering all the source terms including their minimal vector coupling to the field A. Combined with the pure field term from above one arrives at the action

$$L = const \cdot \sqrt{\left| \det \left(g + \frac{\ell^3}{m_{pl}} T \right) \right|} \ , \tag{2}$$

where m_{pl} is the Planck mass. As far as the gravitational field is concerned, this action is to be expressed and varied in terms of the A and their spacetime gradients. It is to be integrated over flat spacetime.

References

[1] No references, just a remark: Definitions may mildly be so that all constant factors as well as the only relevant sign are correct.