Abstract Submitted
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A scalar gravity model with an action and link to group theory

DOUGLAS SWEETSER, None — The simplest relativistic extension of Newton's theory of gravity is explored using this action:

$$S = \int \sqrt{-g} dx^4 \left(-\sqrt{T_{\mu\nu} T^{\mu\nu}}\ \Phi + \frac{1}{2} (\nabla^\mu \Phi)(\nabla_\mu \Phi) \right)$$

This leads to the one field equation:

$$-\sqrt{T_{\mu\nu} T^{\mu\nu}} = \frac{c^2}{G} \left(\frac{1}{c^2} \frac{d^2}{dt^2} - \nabla^2 \right) \Phi$$

The field equation has the same form as the Maxwell equations in the Lorenz gauge, justifying the similarity between Newton's law of gravity and Coulomb's law. Unlike EM but like GR, the field equation is non-linear due to the contraction of the stress-energy tensor. A deep lesson from general relativity is that any model for gravity must change the geometry of spacetime. How could this one field equation curve space-time geometry? I propose it changes the size of elements of the quaternion group Q_8 in the following way:

$$(\pm 1, \pm i, \pm j, \pm k) \rightarrow (\pm 1/\Phi, \pm i\ \Phi, \pm j\ \Phi, \pm k\ \Phi)$$

If one now calculates distances using the static, non-rotating, uncharged field solution to the field equation, $\Phi = 1 + GM/c^2 R$, the resulting interval is the same as the Schwarzschild metric to first order in the source mass.

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None

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