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Quaternion Space-time-time Invariance as Gravity DOUGLAS SWEETSER[1], None — The square of any quaternion luckily has the Lorentz invariant interval of special relativity as its first term.

$$(dt, dx_1, dx_2, dx_3)^2 = (dt^2 - dx_1^2 - dx_2^2 - dx_3^2, 2dt\, dx_1, 2dt\, dx_2, 2dt\, dx_3).$$

The other three space-times-time terms are commonly ignored. Ways to vary a quaternion with a continuous function by leave the interval in the square invariant will be discussed. One method uses exponentials, leading to the hyperbolic functions found useful in special relativity. Using the same approach to keep the space-times-time invariant leads to a dynamic interval term. By preserving the space-times-time terms using an exponential function and the geometric source mass, an interval term is found that is similar but experimentally distinct from the Schwarzschild metric applied to space-time 4-vectors:

$$(e^{-z}\, dt, e^{z}\, dR_i/c)^2 = (e^{-2z}\, dt^2 - e^2 z\, dR_i^2/c^2, 2\, dt\, dR_i/c)$$
$$= \left(e^{-\frac{2GM}{c^2 R}}\, dt^2 - e^{\frac{2GM}{c^2 R}}\, dR_i^2/c^2, 2\, dt\, dR_i/c\right)$$
$$\text{if} \quad \mathrm{z} = \frac{\mathrm{GM}}{\mathrm{c^2 R}}, \quad \mathrm{i} = 1, 2, 3.$$

Space-times-time invariance is not a field theory, so gravitons are not necessary and quantization is moot.

[1]The talk is based on a paper written for the Gravity Research Foundation 2015 Awards for Essays on Gravitation.

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None

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