24.0(12): Description of Perihelia Precession in Terms of the Spin Connection.

Consider the definition of the Cartan torsion:

$$T^a_{\mu\nu} = \partial_\mu q^a_\nu - \partial_\nu q^a_\mu + \omega^a_{\mu b} q^b_\nu - \omega^a_{\nu b} q^b_\mu \quad -(1)$$

By antisymmetry:

$$T^a_{\mu\nu} = 2\left(\partial_\mu q^a_\nu + \omega^a_{\mu b} q^b_\nu\right) \quad -(2)$$

$$\text{so} \quad T^0_{1\nu} = 2\left(\partial_1 q^0_\nu + \omega^0_{1b} q^b_\nu\right) \quad -(3)$$

For the sake of simplicity assume that:

$$b = 0, \quad \nu = 0 \quad -(4)$$

$$\text{so} \quad T^0_{10} = 2\left(\partial_1 q^0_0 + \omega^0_{10} q^0_0\right) \quad -(5)$$

Now define gravitational potential as:

$$\phi = -2 q^0_0 \quad -(6)$$

$$\overline{\phi^{(0)}}$$

$$\text{i.e} \quad \phi^a_\mu = \phi^{(0)} q^a_\mu \quad -(7)$$

in general.

2) It follows that the force is:

$$\boxed{F = -\frac{\partial \phi}{\partial r} - \Omega \phi} \quad -(8)$$

Assume that the gravitational potential is:

$$\phi = -\frac{mMG}{r} \quad -(9)$$

which is the law discovered by Hooke and Newton. Therefore, unlike EGR, the gravitational potential is not changed, but the force is calculated with the spin correction Ω.

For example, if:

$$\boxed{\Omega = \frac{3}{r}\left(\frac{L_0}{mcr}\right)^2} \quad -(10)$$

the force is:

$$F = -\frac{mMG}{r^2} - \frac{3MGL_0^2}{mc^2 r^4} \quad -(11)$$

which is the force law of EGR, QED.

In eq. (10):

$$L_0^2 = \alpha m^2 MG. \quad -(12)$$

For an approximately circular orbit:

3)

$$\alpha = r \quad -(13)$$

and

$$\Omega = \frac{3MG}{c^2 r^2} = \frac{3}{2}\frac{r_0}{r^2} \quad -(14)$$

where

$$r_0 = \frac{2MG}{c^2} \quad -(15)$$

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is called "old Schwarzschild radius." The force is therefore:

$$\boxed{F = -\frac{mMG}{r^2} - \Omega\frac{mMG}{r^2}} \quad -(16)$$

where

$$\Omega = \frac{3MG}{c^2 r^2} \quad -(17)$$

i.e

$$\boxed{F = -\frac{mMG}{r^2}\left(1 + \Omega\right)} \quad -(18)$$

The force law (18) gives the precession:

$$\boxed{\Delta\theta = \frac{6\pi MG}{c^2 r} = 2\Omega r} \quad -(19)$$

This is usually attributed to EGR but using ECE theory it is derived from the Newtonian

4) potential. The total observed precession of a planet is described by a given Ω. For example the experimentally observed equinoctial precession of the earth is: $\Delta\theta = 5029.1''$ per century and added to this are precessions due to planetary perturbations and the precession due to the spin correction Ω. The latter is observed to be $3.85''$ a century.