117(3): The Basic Experimental Result of Gravity Probe B.

The basic experimental result is that the rotation of the earth affects gyroscopes in a satellite. In ECE theory this is an effect analogous to the energy of interaction of a magnetic flux density $\underline{B}$ with a magnetic dipole moment $\underline{m}$:

$$E_n = - \underline{m} \cdot \underline{B} \quad -(1)$$

The torque generated by such an interaction is:

$$\underline{Tq} = - \underline{m} \times \underline{B} \quad -(2)$$

The ECE explanation of gravity probe B is therefore that the gravitomagnetic field $\underline{h}$ of the earth interacts with the gravitomagnetic dipole of the gyroscope in the satellite. The gravitomagnetic field $\underline{h}$ is the gravitational attraction between two rotating bodies. This sets up an angular frequency (radians per second):

$$\omega = \frac{|\underline{h}|}{c} \quad -(3)$$

resulting in a precession angle change. The field $\underline{h}$ is defined by:

$$\underline{\nabla} \times \underline{h} = \frac{4\pi G}{c} \underline{J}_m \quad -(4)$$

$$\underline{\nabla} \cdot \underline{h} = 0 \quad -(5)$$

$$\frac{\partial \underline{h}}{\partial t} = \underline{0} \quad -(6)$$

2) In analogy with the theory of magnetostatics:

$$\underline{\nabla} \cdot \underline{J}_m = 0 \quad -(7)$$

where

$$J^\mu = (c\rho_m, \underline{J}_m) \quad -(8)$$

is the mass current four vector. The mass density ρ_m has units of kilograms per cubic metre. Eqs. (4) to (6) describe the extra effects due to rotation. In the presence of a gravitational field $\underline{g}$:

$$\underline{\nabla} \times \underline{h} - \frac{1}{c}\frac{\partial \underline{g}}{\partial t} = \frac{4\pi G}{c}\underline{J}_m \quad -(9)$$

$$\underline{\nabla} \cdot \underline{h} = 0 \quad -(10)$$

$$\underline{\nabla} \times \underline{g} + \frac{1}{c}\frac{\partial \underline{h}}{\partial t} = \underline{0} \quad -(11)$$

$$\underline{\nabla} \cdot \underline{g} = 4\pi G \rho_m \quad -(12)$$

Even more generally, the right hand sides of eqs. (10) and (11) are not necessarily zero. Gravitational polarization and magnetization effects are not accounted for in eqs. (9) to (12), whose electromagnetic analogues are:

$$\underline{\nabla} \times \underline{B} - \frac{1}{c^2}\frac{\partial \underline{E}}{\partial t} = \mu_0 \underline{J} \quad -(13)$$

$$\underline{\nabla} \cdot \underline{B} = 0 \quad -(14)$$

$$\underline{\nabla} \times \underline{E} + \frac{\partial \underline{B}}{\partial t} = \underline{0} \quad -(15)$$

$$\underline{\nabla} \cdot \underline{E} = \rho / \epsilon_0 \quad -(16)$$

3)

Standard Explanation

This relies on the Kerr metric:

$$c^2 d\tau^2 = \left(1 - \frac{r_s r}{\rho^2}\right) c^2 dt^2 - \frac{\rho^2}{\Lambda^2} dr^2 - \rho^2 d\theta^2 - \left(r^2 + \alpha^2 + \frac{r_s r \alpha^2}{\rho^2} \sin^2\theta\right) \sin^2\theta \, d\phi^2 + \frac{2 r_s r \alpha c \sin^2\theta}{\rho^2} d\phi \, dt \quad (17)$$

where: $r_s = \frac{2GM}{c^2}$, $\alpha = \frac{J}{Mc}$,

$\rho^2 = r^2 + \alpha^2 \cos^2\theta$, $\Lambda^2 = r^2 - r_s r + \alpha^2$.

which can be simplified to:

$$c^2 d\tau^2 = \left(g_{tt} - \frac{g_{t\phi}}{g_{\phi\phi}}\right) dt^2 + g_{rr} dr^2 + g_{\theta\theta} d\theta^2 + g_{\phi\phi}\left(d\phi + \frac{g_{t\phi}}{g_{\phi\phi}} dt\right)^2 \quad (18)$$

giving an ~~angle~~ angular frequency: — (19)

$$\Omega = -\frac{g_{t\phi}}{g_{\phi\phi}} = \frac{r_s \alpha r c}{\rho^2 (r^2 + \alpha^2) + r_s \alpha^2 r \sin^2\theta}$$

which simplifies to:

$$\Omega = \frac{r_s d c}{r^3 + d^2 r + r_s d^2} \quad \text{radians per second}$$

This is comparable to the ECE angular frequency (3).

Maxima must now be used to test the Kerr metric for mathematical correctness, and also similar metrics such as Kerr-Newman, Reissner-Nordstrom and so on. If these metrics violate the dual identity of ECE they must be discarded. It is already known in fact that all metrics that are solutions of the Einstein field equation violate the dual identity. The standard explanation of gravity probe B is therefore incorrect.