15(6): Calculation of the Spin Connection from Frame Rotation in m Theory.

In m theory, the relevant equations of motion are:

$$\gamma^3 \frac{dv}{dt} = -\frac{1}{m(r)^{1/2}} \frac{MG}{r}\left(\frac{1}{r} + \Omega_r\right) \quad -(1)$$

and

$$\frac{dL}{dt} = 0 \quad -(2)$$

where

$$L = |\underline{r} \times \underline{p}| = \frac{\gamma m r^2}{m(r)} \dot{\phi} \quad -(3)$$

The m(r) function of ECE theory is:

$$m(r) = 2 - \exp\left(2\exp\left(-\frac{r}{R}\right)\right) \quad -(4)$$

$$\xrightarrow[R\to\infty]{} 1$$

(UFT190), and

$$\gamma = \left(m(r) - \frac{v^2}{c^2}\right)^{-1/2} \quad -(5)$$

The infinitesimal line element of m theory is:

$$ds^2 = c^2 d\tau^2 = m(r)c^2 dt^2 - \frac{dr^2}{m(r)} - r^2 d\phi^2 \quad -(6)$$

and as shown in previous UFT papers, eq. (6) produces:

$$\frac{dr}{d\phi} = r^2\left(\frac{1}{b^2} - m(r)\left(\frac{1}{a^2} + \frac{1}{r^2}\right)\right)^{1/2} \quad -(7)$$

where

$$a = \frac{L}{mc}, \quad b = \frac{Lc}{E} \quad -(8)$$

Here E is the conserved total energy:

2)

$$E = \gamma m c^2 \quad -(9)$$

and L is the conserved angular momentum (3). It was shown in UFT108 that a striking orbit is produced by the empirical:

$$n(r) = 1 - \frac{2mG}{c^2 r} - \frac{\alpha}{r^2} \quad -(10)$$

where α is an adjustable parameter.

Now use the frame rotation:

$$\phi' = \phi + \omega_1 t \quad -(11)$$

and

$$\dot{\phi}' = \dot{\phi} + \omega_1 + t\frac{d\omega_1}{dt} \quad -(12)$$

to calculate the spin connection Ω_r.

The frame rotation changes:

$$\gamma^3 = \left(n(r) - \frac{1}{c^2}\left(\dot{r}^2 + r^2\dot{\phi}^2\right)\right)^{-3/2} \quad -(13)$$

to

$$\gamma'^3 = \left(n(r) - \frac{1}{c^2}\left(\dot{r}^2 + r^2\dot{\phi}'^2\right)\right)^{-3/2} \quad -(14)$$

It follows that:

$$\frac{1}{\gamma'^2} - \frac{1}{\gamma^2} = A := \frac{r^2}{c^2}\left(\omega_1 + t\frac{d\omega_1}{dt}\right)\left(\omega_1 + t\frac{d\omega_1}{dt} + 2\omega\right) \quad -(15)$$

and that:

$$\gamma^3\left(\ddot{r} - r\dot{\phi}^2\right) = -\frac{1}{n(r)^{1/2}}\frac{mG}{r^2}\left(1+\gamma^2 A\right)^{3/2} + \frac{\gamma^3 c^2 A}{r}$$

$$:= -\frac{1}{n(r)^{1/2}}\left(\frac{mG}{r^2} - \frac{mG}{r}\Omega_r\right) \quad -(16)$$

Therefore:

$$\Omega_r = \frac{1}{r\,n(r)^{1/2}} - \frac{(1+\gamma^2 A)^{3/2}}{r\,n(r)^{1/2}} - \frac{\gamma^3 c^2 A}{mG} \quad -(17)$$

Eq. (17) reduces to the spin connection calculated in UFT414 for:

$$n(r) \rightarrow 1 \quad -(18)$$

<u>Q.E.D.</u>

So the orbit can be calculated from eqs. (1) and (2) with a suitable choice of $n(r)$, notably $n(r)$ from Eq. (4). Knowing $n(r)$, the spin connection can be calculated from eq. (17) in terms of ω_1 and $d\omega_1/dt$. It would be interesting to calculate the orbit from eq. (7) using:

$$E = \gamma m c^2, \quad L = \frac{\gamma m r^2}{n(r)}\dot{\phi} \quad -(19)$$

It would also be interesting to use the empirical function (10)