203(6): Dynamics of Spiral Orbits 1), the Logarithmic Spiral

In plane cylindrical coordinates the spiral orbit is defined by:

$$r = r_0 e^{\alpha\theta} \quad -(1)$$

so

$$\frac{dr}{d\theta} = \alpha r. \quad -(2)$$

The Minkowski line element is:

$$ds^2 = c^2 d\tau^2 = c^2 dt^2 - dr^2 - r^2 d\theta^2 \quad -(3)$$

where

$$d\theta^2 = \frac{1}{\alpha^2 r^2} dr^2 \quad -(4)$$

so

$$ds^2 = c^2 dt^2 - A dr^2 \quad -(5)$$

where

$$\boxed{A = 1 + \frac{1}{\alpha^2}} \quad -(6)$$

So all orbits can be described by the equation (5).

The total energy for all orbits is described by

$$E = \gamma m c^2 \quad -(7)$$

where

$$\gamma = \left(1 - \frac{v^2}{c^2}\right)^{-1/2} \quad -(8)$$

$$v = A^{1/2} \frac{dr}{dt}. \quad -(9)$$

These are equations of modified special

2) Special relativity. The energy equation is:

$$E^2 = A c^2 p^2 + m^2 c^4 \quad -(10)$$

The relativistic kinetic energy is:

$$T = E - mc^2$$
$$= (\gamma - 1) mc^2 \quad -(11)$$
$$\xrightarrow[v \ll c]{} \frac{1}{2} m v^2$$

For a log spiral orbit:

$$v = \left(1 + \frac{1}{\alpha^2}\right)^{1/2} \frac{dr}{dt} \quad -(12)$$

For a precessing elliptical orbit:

$$v = \left(1 + \left(\frac{\alpha}{x \epsilon r \sin(x\theta)}\right)^2\right)^{1/2} \frac{dr}{dt} \quad -(13)$$

For a Newtonian orbit:

$$v = \left(1 + \left(\frac{\alpha}{\epsilon r \sin(x\theta)}\right)^2\right)^{1/2} \frac{dr}{dt} \quad -(14)$$

Conclusion

All orbits can be described by a simple modification of special relativity.

The general orbital equation is:

$$\boxed{\left(\frac{dr}{d\theta}\right)^2 = \frac{r^4}{A}\left(\frac{1}{b^2} - \frac{1}{a^2}\right)} \quad - (15)$$

So

$$\frac{d\theta}{dr} = \frac{A^{1/2}}{r^2}\left(\frac{1}{b^2} - \frac{1}{a^2}\right)^{-1/2} \quad - (16)$$

The general light deflection equation is:

$$\Delta\theta = 2\int_{R_0}^{\infty} \frac{A^{1/2}}{r^2}\left(\frac{1}{b^2} - \frac{1}{a^2}\right)^{-1/2} dt \quad - (17)$$

and all the phenomena now attributed to the incorrect EGR can be understood anew.