8(5): Precession from Various Metrics

In this note we consider the rotation of various metrics in [order] to deduce the effect of the gravitation of these metrics on the Thomas [precession] and Thomas half. First consider the Minkowski metric in [pl]ane polar coordinates:

$$ds^2 = c^2 dt^2 - dr^2 - r^2 d\phi^2 \quad -(1)$$

[and] spherical polar coordinates:

$$ds^2 = c^2 dt^2 - dr^2 - r^2 d\theta^2 - r^2 \sin^2\theta \, d\phi^2 \quad -(2)$$

[Th]e rotation is defined by:

$$d\phi' = d\phi + \omega dt \quad -(3)$$

[in] both cases. $\quad -(4)$

From eq. (3) in eq. (1):

$$ds^2 = (c^2 - r^2\omega^2) dt^2 - 2\omega r^2 d\phi \, dt - (dr^2 + r^2 d\phi^2)$$

[Th]e velocity of rotation is defined by

$$v = \omega r \quad -(5)$$

so

$$ds^2 = \left(1 - \frac{v^2}{c^2}\right)\left(c^2 dt^2 - 2r^2 \Omega \, d\phi \, dt\right) - (dr^2 + r^2 d\phi^2) \quad -(6)$$

[w]here

$$\Omega = \omega \left(1 - \frac{v^2}{c^2}\right)^{-1} \quad -(7)$$

is known as the Thomas angle (UFT 110). The definition of Ω follows from

$$\omega = \frac{v}{r} \rightarrow \frac{v'}{r'} = \frac{\gamma v}{r/\gamma} = \gamma^2 \frac{v}{r} \quad -(8)$$

[w]here

$$\gamma^2 = \left(1 - \frac{v^2}{c^2}\right)^{-1} \quad -(9).$$

So

$$\omega \rightarrow \Omega = \frac{\omega}{\left(1 - \frac{v^2}{c^2}\right)} \quad -(10)$$

Q.E.D.

It follows that:

$$dt' = \left(1 - \frac{v^2}{c^2}\right)^{1/2} dt \quad -(11)$$

and that the Thomas precession is:

$$\Delta \phi_g = \Omega\, dt' - \omega\, dt \quad -(12)$$
$$= 2\pi(\gamma - 1)$$

In spherical polar coordinates, eqs. (2) and (3) give:

$$ds^2 = (c^2 - r^2 \sin^2\theta\, \omega^2)\, dt^2 - 2r^2 \sin^2\theta\, \omega\, d\phi\, dt - dr^2 - r^2(d\theta^2 + \sin^2\theta\, d\phi^2). \quad -(13)$$

In spherical polar coordinates:

$$v^2 = r^2 \omega^2 \sin^2\theta \quad -(14)$$

$$-(15)$$

So the overall effect is:

$$c^2 dt^2 \rightarrow \left(1 - \frac{v^2}{c^2}\right)\left(c^2 dt^2 - 2r^2 \sin^2\theta\, \Omega\, d\phi\, dt\right).$$

In plane polar coordinates the overall effect is:

$$c^2 dt^2 \rightarrow \left(1 - \frac{v^2}{c^2}\right)\left(c^2 dt^2 - 2\Omega r^2\, d\phi\, dt\right) \quad -(16)$$

In both coordinate systems the Thomas precession is given by eq. (12).

The Thomas precession is true in any coordinate system. Now consider the above calculations for the general, spherical, metric. In plane polar coordinates:

$$ds^2 = m(r,t)\, c^2 dt^2 - \frac{dr^2}{m(r,t)} - r^2 d\phi^2 \quad -(17)$$

and in spherical polars:

$$ds^2 = m(r,t)c^2dt^2 - \frac{dr^2}{m(r,t)} - r^2(d\theta^2 + \sin^2\theta\, d\phi^2) \quad -(18)$$

The effect of the rotation (3) on the metrics (17) and (18) is to modify the Thomas precession to:

$$\Delta\phi = 2\pi\left[\left(m(r,t) - \frac{v^2}{c^2}\right)^{-1/2} - 1\right] \quad -(19)$$

provided that:

$$\Omega := \omega\left(m(r,t) - \frac{v^2}{c^2}\right)^{-1} \quad -(20)$$

The function $m(r,t)$ for various types of metric is given in Table 1.

Metric	$m(r,t)$
1) Schwarzschild	$1 - \frac{2mG}{c^2r}$
2) Kerr Newman and Reissner Nordstrom	$1 - \frac{2mG}{c^2r} + \frac{Q^2}{r^2}$
3) Einstein Rosen Bridge	$1 - \frac{2mG}{c^2r} - \frac{\epsilon^2}{r^2}$
4) Static de Sitter	$1 - \frac{r^2}{\alpha^2}$
5) Reissner Weyl	$1 - \frac{A}{r} - \frac{\kappa B^2}{2r^2}$

Many of these metrics are given in chapter four of UFT301, "Criticisms of the Einstein Field Equation", chapter four, and shown to be incorrect due to neglect of torsion.

The effect of metrics (1) to (5) on the velocity v^2 of the Thomas precession give the effect of gravity in the absolute standard model.

1) Schwarzschild Metric

$$v^2 \rightarrow v^2 + \frac{2mG}{r} \quad -(21)$$

2) Kerr Newman

$$\frac{v^2}{c^2} \rightarrow \frac{v^2}{c^2} + \frac{2mG}{rc^2} - \frac{Q^2}{r^2} \quad -(22)$$

3) Einstein Rosen Bridge

$$\frac{v^2}{c^2} \rightarrow \frac{v^2}{c^2} + \frac{2mG}{rc^2} + \frac{\epsilon^2}{r^2} \quad -(23)$$

4) Static de Sitter

$$\frac{v^2}{c^2} \rightarrow \frac{v^2}{c^2} + \frac{r^2}{\alpha^2} \quad -(24)$$

5) Reissner Weyl

$$\frac{v^2}{c^2} \rightarrow \frac{v^2}{c^2} + \frac{A}{r} + \frac{\kappa B^2}{2r^2} \quad -(25)$$

In none of the cases (21) to (25) are the predictions of the standard model verified. This becomes clear as soon as it is realized that the Thomas half plays a fundamental role in physics.

FLRW Metric

This is described by:

$$ds^2 = c^2 dt^2 - a^2(t)\left(\frac{dr^2}{1-kr^2}\right) - r^2\left(d\theta^2 + \sin^2\theta \, d\phi^2\right) \quad -(26)$$

and for $k = 0$ gives a flat universe, for $k = -1$ an open universe and for $k = 1$ a closed universe. Eqs. (3) and (26) give the effect of these universes on the Thomas half, and again, no such effect is observed.