# 343(3): The Orbit of de Sitter Precession

In note 343(2) it was shown that the rotation responsible for the Thomas precession produces the orbit:

$$r = \frac{\alpha_1}{1 + \epsilon_1 \cos\theta_1} \quad -(1)$$

in the Newtonian limit, where

$$\theta_1 = \theta + \omega_\theta t \quad -(2)$$

Here $\omega_\theta$ is the constant angular velocity of rotation of the plane polar coordinate system $(r, \theta)$. The rotation produces the rotating coordinate system $(r, \theta_1)$.

The orbit of de Sitter precession is therefore:

$$r = \frac{\alpha_1}{1 + \epsilon_1 \cos(x\theta_1)} \quad -(3)$$

where, experimentally:

$$x = 1 - \frac{3MG}{c^2 \alpha_1} \quad -(4)$$

This is because de Sitter precession is caused by rotating the precessing orbit of a planet. In the standard model, this rotation is described by rotating the infinitesimal line element incorrectly known as "the Schwarzschild metric". It is incorrectly claimed in the standard model that "the Schwarzschild metric" produces the orbit:

$$r = \frac{\alpha}{1+\epsilon\cos x\theta} \quad -(5)$$

The only correct fact is that eq. (5) represents the observed orbit if $x$ is defined by eq. (4). This is true if $x$ is very close to unity.

Therefore in the rotating frame $(r, \theta_1)$, eq. (5) becomes eq. (3), and this is de Sitter precession.

Here:
$$\alpha_1 = \frac{L_1^2}{m^2 M G} \quad -(6)$$

where $L_1$ is a constant of motion, and:
$$\epsilon_1 = \left(1 + \frac{2H_1 L_1^2}{m^3 M^2 G^2}\right)^{1/2} \quad -(7)$$

The orbital velocity from eq. (1) is:
$$v_{N1}^2 = \frac{L_1^2}{m^2 r^4}\left(r^2 + \left(\frac{dr}{d\theta_1}\right)^2\right) \quad -(8)$$

and its relativistic equivalent is:
$$v^2 = \frac{v_{N1}^2}{1 - \frac{v_{N1}^2}{c^2}} \quad -(9)$$

where $v$ is the orbital velocity from eq. (3):
$$v^2 = \frac{L^2}{m^2}\left(\frac{1}{r^2} + \frac{x^2\epsilon^2}{\alpha^2}\sin^2(x\theta_1)\right) \quad -(10)$$

) From eqs. (1) and (8):

$$V_{N1}^2 = L_1^2 \left( \frac{1}{r^2} + \frac{\epsilon_1^2}{d_1^2} \sin^2 \theta_1 \right) \quad -(11)$$

Therefore de Sitter precession is described to state of the art experimental accuracy by the Evans Eckardt Theorem:

$$\frac{L^2}{m^2} \left( \frac{1}{r^2} + \frac{x^2 \epsilon^2}{d^2} \sin^2 (x\theta_1) \right) = \frac{L_1^2 \left( \frac{1}{r^2} + \frac{\epsilon_1^2}{d_1^2} \sin^2 \theta_1 \right)}{1 - \left( \frac{L_1}{mrc} \right)^2 \left( \frac{1}{r^2} + \frac{\epsilon_1^2}{d_1^2} \sin^2 \theta_1 \right)} \quad -(12)$$

Eq. (12) can be solved using the method of UFT 342, i.e. r can be expressed in terms of $\theta_1$ from eq. (12). At the end of the calculation, $\theta_1$ can be expressed as:

$$\theta_1 = \theta + \omega_\theta t \quad -(13)$$

so r can be plotted against $\theta$ and $t$ in a three dimensional plot. Finally the velocity of the Thomas precession is given by the following equation:

4)

$$v^2 = \frac{L_1^2 \left( \frac{1}{r^2} + \frac{\epsilon_1^2}{d_1^2} \sin^2\theta_1 \right)}{1 - \left( \frac{L_1}{mrc} \right)^2 \left( \frac{1}{r^2} + \frac{\epsilon_1^2}{d_1^2} \sin^2\theta_1 \right)} \quad -(14)$$

This is the relativistic velocity generated from eq. (11). The next note will evaluate the orbit of the Thomas precession, and develop some properties of the orbit (1).