

A.Ruggeri : A formulation of Precession based on mass-energy cyclical transformations-degradations of gravitational origin

The justification of the precessional phenomenon proposed by Einstein used mathematical expressions uncannily close to those I reached through the Ether/ESF (Energized Space Fabric) and the same happens to other justifications which at times are almost identical, but the Ether/ESF is a physical presence and when intuition is applied to discover its characters the rewards are really gratifying.....

Pr. A.E. gave an interpretation of the precessional phenomenon substituting to the eccentric orbit of Kepler a curve that could be interpreted as a cycloid.

I spare the reader the cumbersome mathematical acrobatics , pointing to the fact that the idea of reading the displacement of the perihelion is attractive and appears correct , but precession exists also when the orbit is nearly circular and is not possible to determine well where the perihelion is .

In the other hand the observation is made in conditions of recurrent collimation between Earth, Mercury and the Sun and not as somebody would think observing tangentially the passage at the perihelion every 100 years.

From the empirical observations the term

$$\alpha = \frac{3GM}{c^2} > 0$$

was considered worthy of attention and proposed , since

$$2\pi\alpha$$

is a value close to the orbital advance in metres per each revolution of the perihelion of the planet Mercury as resulting from the practical observations just mentioned .

(on Earth the Astronomers can make a decent observation when Mercury returns in conditions of collimation, which event happens every 100 revolutions of the Earth (or terrestrial years) , corresponding to ~ 414 revolutions of Mercury and a :

$$\Delta L \sim 1.21 \text{ e } 7 \text{ m}$$

was measured, this brought the misguided perception that since:

$$\Delta L' = 414 * 2\pi\alpha = 1.157 \text{ e } 7$$

was short in regard of the measure ΔL of geometric nature the eccentricity of the orbit was a necessary datum to be taken into account in order to obtain the true value of precession i.e. the one coinciding with the measured one ΔL .

Nevertheless such a perception , was not supported by physical intuitions or by a firm theory, but since the observation was made on an orbit having a value of eccentricity $e = 0.206$ an inverse process of verification was enacted which brought to the following formulation coinciding with the empirical data :

$$1) \quad \Delta L = \frac{2\pi\alpha * 414}{(1-e^2)} = \frac{6\pi GM * 414}{c^2(1-e^2)} \approx 1.21 \text{ e } -7$$

therefore dividing ΔL by the orbital length $2\pi r$ the ratio

$$\frac{\Delta L}{2\pi r} \approx 3.31 \text{ e}^{-5}$$

Expressed in arcsec will be giving an advance of orbital position in arcsec :
 $3.31 \text{ e}^{-5} * 60 * 60 * 360 \sim 42.9 \text{ arcsec}$

A value fitting very well with the one measured by the Astronomers .

Under these circumstances the above value of α fits very well the empirical observations .

Nevertheless, results that the formulation is an educated guess in which constants have been used to make up the precession but there is not a theory to support the results!

Starting from the basic assumption that the formula of Precession is valid, what would happen if $e=0$?

We would be sitting with a term "3" as contained in the expression of α that apart from being a prime number, represents absolutely nothing in physical terms.

If the formulation of α is discarded in favor of acceptance of the presence of a phenomenon of precession in the circular orbit associated to a transformation-degradation ruled by a cyclical radial contraction of the mass along the orbit (i.e. a cyclical elastic contraction of the orbital radius) and we assume that in the elliptic orbit, for small values of eccentricity (including the eccentricity of Mercury) we have a value of precession almost equal (almost invariable) to the one of the circular orbit.

In the 1) now substituting π to :

$$a) \frac{3}{1-e^2}$$

which by the way is a value approximating π we obtain for the Precession :

$$2) \Delta L = 2\pi^2 \frac{GM * 414}{c^2} \approx 1.21 \text{ e}^{-7}$$

Behind this result there is a solid theory (the one I developed), as it is to be accepted that assuming a striction or average virtual contraction dr' m/sec of the radius, which takes into account the presence of an elastic Ether/ESF supporting the elastic contractions of the mass in orbit, we have a transformation-degradation of gravitational nature inside the mass affected associated to a vibration of amplitude unknown but whose sum of amplitudes per second of absolute time in the system is $2 dr'$ producing inside the gravitational mass an irreversible transformation called unbundling:

$$dr' = \frac{v_0^3}{2c^2} \text{ m/sec}$$

Is called striction and to it is associated a Precession $2\pi dr'$ m/sec the value of Precession in m over the 100 years time interval is :

$$\Delta L = 365 * 100 * 86400 * 2\pi dr' = 1.2088 e7 \text{ m}/100\text{year}$$

Under these assumptions Precession is a phenomenon common to all the planets orbiting around Large Gravitational Masses and the above formulation results valid for near circular and circular orbits (and what in the planet Mercury looks to be a large value of eccentricity does not affects very much the formulation of precession values).

In this presentation is important to observe that the presumed demonstration containing the eccentricity of the orbit is based on the geometric value e and depends from its variations whereas the Precession is a phenomenon of relativistic character and depends from presence of internal degradation of the gravitational mass into inertial mass and return of it to a degraded gravitational status (depends from a phenomenon of transformation-degradation of mass-energy under the effect of gravity) in a continuous basis along the orbital path due to the effect of the gravity of the Large Gravitational Mass (the Sun in our case) on the gravitational mass of a planet (any planet) and is little affected from the eccentricity (variation of the orbital radius r) especially as it happens that we use an average value of it and approximate the phenomenon to the one along a circular trajectory.

The formulation discarding the eccentricity of the orbit as in a) in favor of the use of π results highly successful in justifying the Precession and has the potential to be always valid for eccentricities not excessive (up the value of the one of Mercury $e= 0.206$ and beyond) leading us to proclaim that there must be an Universal Law of Precession that can be enunciated for masses in circular orbit around a very large one, it comes out when we multiply the Precession in m/sec for the approximately circular orbital period relevant to the particular mass :

$$2\pi dr' T = \frac{2\pi v_0^3}{2c^2} \frac{2\pi r}{v_0} = 2\pi^2 \frac{GM}{c^2} \frac{m}{\text{revolution}}$$

Which being a value made of physical constants is representing an Universal Law which says :

“the Precession over the period of revolution of a planet inside a system like our solar system (having a large mass in the centre) is constant “.

Note : that the constancy of Precession over the orbital path represents a Law of conservation.

For Mercury , taking into account that we calculated 414 revolutions between two successive collimations :

$$\Delta L = 414 * 2\pi^2 \frac{GM}{c^2} = 1.211 e7 \text{ m}/100\text{y}$$

a value fitting well inside the margin of error of the known measurements.

For Earth :

$$\Delta L = 100 * 2\pi^2 \frac{GM}{c^2} = 2.927 \text{ e6 } \text{ m}/100\text{y}$$

In due course we will see why the Precession of Mercury can be fully observed from Earth and Earth Precession does not affect the readings.