ESSAY 120 : GRAVITOMAGNETIC PRECESSION

The gravitational field equations of ECE2 theory have the same structure precisely as the electromagnetic field equations, so concepts of electromagnetism can be used for gravitation, for example the gravitomagnetic field and the gravitomagnetic dipole moment of UFT344. A torque is produced by the vector cross product of these two quantities in precise analogy with the torque produced by the magnetic flux density and magnetic dipole moment in electrodynamics, producing a Larmor precession frequency. This precessional motion is animated in the award winning animation by Chris Pelkie and myself from the Cornell Theory Center.

A gravitomagnetic Larmor precession is produced by the torque between the gravitomagnetic field of the sun and the earth's gravitomagnetic dipole moment. It can be expressed in terms of an effective gravitomagnetic Lande factor, and is responsible for the precession of the perihelion, previously attributed to the obsolete Einstein theory. The same mechanism precisely produces the Lense Thirring precession, clearly observed in a fast spinning pulsar. In the Lense Thirring precession, the gravitomagnetic Lande factor is unity, but in the precession of planets or any object in orbit, the Lande factor can become different from one. For the earth's precession for example it is about three.

The ECE2 gravitational equations are the first precisely correct description of the Lense Thirring effect, which is observed in the orbit of a mass m around a spinning mass M. The de Sitter or geodedic precession on the other hand is observed with a static M and a spinning frame of reference, and was observed in Gravity Probe B. The Thomas precession is observed by spinning the infinitesimal line element of ECE2 theory.

The original derivation of these effects by de Sitter, Lense and Thirring was based on the then new Einstein field equation of November 1915, immediately rejected by Schwarzschild in Dec. 1915, but perpetrated dogmatically. The Lense Thirring effect was derived in the years 1918 to 1921 by linearizing the Einstein field equation in a rough approximation. On the other hand the underlying geometry of ECE2 theory is exact, and is based on a non zero torsion and a non zero curvature. In any valid geometry these two objects must be non zero. If torsion vanishes so does curvature, and there is no geometry. These facts of geometry were not known until the early twenties. The equations obtained by linearizing the Einstein field equation happen to look like the ECE2 field equations, but there the similarity ends. The original Einstein field equation is incorrect because it neglects torsion completely. So curvature also vanishes, meaning that there is no gravitation. By now these facts are well known and the Einstein field equation is obsolete.

The Lense Thirring effect is due to a spinning mass such as the sun or the earth. The sun for example spins around an axis once every 27 days. This axis is tilted by a few degrees to the earth's axis of spin, so the angular momenta of the sun and the earth are not parallel. This means that a torque is created by the cross product of these two angular momenta as explained in UFT344. The sun's gravitomagnetic field is worked out in the dipole approximation using the geometry of a spinning sphere. This procedure is the same as that adopted by Lense and Thirring in 1918 to 1921, but is now based on a precisely correct set of ECE gravitational equations. The gravitomagnetic dipole moment of the earth is half its angular momentum, due to its rotation about its own axis. This relation between gravitomagnetic dipole moment and angular momentum is derived in precise analogy with the relation between magnetic dipole moment and angular momentum in electrodynamics, mediated by the gyromagnetic ratio. The charge on the electron, -e, is replaced by the mass m of the orbiting orbit.

The gravitomagnetic Larmor precession is proportional to the gravitomagnetic field of the sun through a proportionality constant, the gravitomagnetic Lande factor. The

Larmor precession is the observed precession of the perihelion. Each planet has its own gravitomagnetic Lande factor. Every object of mass m in orbit about a spinning mass M has its own gravitomagnetic Lande factor. So the precession of the perihelion becomes a Lense Thirring effect.