On the gravitomagnetic phenomena induced by orbital motions

L.Iorio (1), H. Lichtenegger (2)

(1) Viale Unità di Italia 68, I-70125 Bari, Italy (lorenzo.iorio@libero.it), (2) Institut für Weltraumforschung, Österreichische Akademie der Wissenschaften, A-8042 Graz, Austria (herbert.lichtenegger@oeaw.ac.at)

In the framework of the linearized weak-field and slow-motion approximation of general relativity, the ensemble of the so-called gravitomagnetic effects are induced by the off-diagonal components of the space-time metric tensor which are proportional to the components of the matter current density of the source.

It is possible to speak of two types of mass currents in gravity. The first type is induced by the rotation of the matter source around its center of mass: it generates the intrinsic gravitomagnetic field which is closely related to the angular momentum (spin) of the rotating body. The other type is due to the translational motion of the source: it is responsible of the extrinsic gravitomagnetic field.

In this talk we deal with the second type of gravitomagnetic phenomena. The precession of a spin fixed in the center of a rotating matter ring is analyzed and applied to the Earth-Sun and Jupiter-Galilean satellites systems. The observability of such effects is also discussed.