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Measuring the galactic gravito-magnetism on Earth

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General Relativity tells us that a spinning source of gravity produces, in weak field approximation, both an attractive Newton-like force and a gravito-magnetic interaction. This is of course true for the whole Milky Way and in particular for its dark halo, if it exists. Here I discuss the opportunity of putting upper limits to the intensity of a possible galactic gravito-magnetic field, by terrestrial experiments. When a gravito-magnetic field concatenates with a loop closed in the space of a given observer, it causes a difference in the time of flight of right- and left-handed electromagnetic signals along that loop: this is the generalized version of the Sagnac effect, combining kinematical rotations and general relativity. Terrestrial devices exploiting this effect are for instance ring lasers. A galactic gravito-magnetic field would practically be constant in the whole internal solar system, but a ring fixed on the surface of the earth at a given latitude would daily oscillate its normal with respect to the axis of the Milky Way by an angular amplitude as big as the latitude. This diurnal (stellar day) modulation would be a possible footprint of the galactic gravito-magnetic interaction.

Summary

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