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Dark gravitomagnetism with LISA and gravitational waves space detectors

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The LISA interferometer, designed for detecting gravitational waves, lends an opportunity to measure the gravitomagnetic field linked by the device. The expected flux is due to the angular momentum of the sun, but could also have a contribution from the angular momentum of the Milky Way, including the dark halo in which our galaxy is likely to be immersed. According to current models, the total mass of the dark halo is expected to be several times the mass of the visible (baryonic) disk. The method that could be used to spot the total gravitomagnetism at the position of the solar system is based on the anisotropy in the propagation of electromagnetic waves, induced by the presence of the gravito-magnetic field. The asymmetry could be evidenced exploiting the Sagnac effect on pairs of EM pulses propagating in opposite directions along the contour of the interferometer. The peculiar orientation of the plane of LISA leads to a seasonal modulation of the projection of the area onto the galactic plane, thus offering a means to discriminate the signal from the Milky Way from that of the sun. The use of the Sagnac effect is already foreseen within LISA for the control of the configuration of the arms, but it could be extended here for research purposes. We will discuss both the problems of principle and the practical problems to be tackled.

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