



Contribution ID: 121

Type: **Talk in a parallel session**

Measuring a novel form of gravitomagnetism with hierarchical triple systems

Monday, 8 July 2024 17:00 (30 minutes)

In hierarchical triple systems, the inner binary can be considered as a rotating matter ring with respect to the distant, outer companion. As such, the orbital angular momentum of the former induces an own gravitomagnetic field which may be orders of magnitude larger than that due to the individual spin angular momenta of the binary's components. The resulting gravitomagnetic orbital precessions may reach a considerable fraction of the Schwarzschild-like, gravitoelectric ones. Potential scenarios able, in principle, to allow for a measurement of such an effect are the so-called circumbinary exoplanets and triple systems like PSR J0337+1715 made of a tight pulsar-white dwarf pair orbited by a further, distant white dwarf. A major source of systematic bias is given by the competing classical precessions due to the quadrupolar term of the multipolar expansion of the Newtonian potential of a massive ring modeling the largest contribution to the overall gravitational field experienced by the distant companion.

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Session Classification: Experimental gravitation