

Gravitomagnetism in the Lewis cylindrical metrics

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ABSTRACT

The Lewis solutions describe the gravitational field produced by infinitely long rotating cylinders, and are useful models for global gravitational effects, in particular the gravitomagnetic ones. When the metric parameters are real (Weyl class), the exterior metrics of rotating and static cylinders (Levi-Civita solution) are locally indistinguishable, but known to globally differ. The significance of this difference, both in terms of concrete physical effects and of the mathematical invariant where the rotation imprints itself, remains however an open problem. In this talk we will address these issues. In particular, we establish their distinction in what pertains to gravitomagnetism, and put forth a (thought) physical apparatus to reveal it. We also dissect the mysterious “force” parallel to the cylinder’s axis, previously found in the literature.