

Gravitational Thomas Precession Effect as a New Cosmological Probe

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Thomas Precession has been extensively studied as a special relativistic effect. In this paper, we study Thomas like precession of spinning tops in the presence of gravitational fields. To establish this effect we evaluate a system whose spin is defined by a spin-four vector near a strong source of gravitational waves. It can be shown that for a system like hydrogen atom in a strong gravitational potential, the energy of gravitational Thomas precession is a significant effect. This effect causes an additional splitting of energy levels near certain sources and this has been studied via quantum mechanical perturbation theory. We further propose this effect can be observed in events involving Primordial Black Holes, Blackholes present in the center of galaxies etc. In this paper we examine the signatures of distribution of primordial blackholes using aforementioned gravitational Thomas Precession. This effect could possibly be a new window to probe the early universe.

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