

Birefringence at cosmological scales

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The trajectory of light in a flat Robertson-Walker universe is presented taking due account of its spin. The off-set between the trajectories of positive and negative helicity states (birefringence) is of the order of a wave length and depends on the acceleration parameter. In 2008, using techniques of weak quantum measurement, an analogous birefringence in reflection, the Federov-Imbert effect, was observed for the first time. Observation of gravitational birefringence could offer an independent measurement of the acceleration of our universe. Birefringence might also be induced by gravitational waves and allow for new detection techniques of these waves.