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Detection of early dark energy through the CMB rotation spectrum

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The latest distance ladder measurements have inferred a value of the Hubble factor inconsistent at $\sim 4\%$ with the value that best fits the data from the PLANCK experiment. To ease the tension, an anomalous expansion of the universe due to early dark energy has been posited. A Pseudo Nambu-Goldstone boson, which begins oscillations at matter-radiation equality, is consistent with cosmological data. The coupling with the photon would generate cosmological birefringence that rotates the CMB polarization non-uniformly across the sky. The resulting rotation spectrum may be detected by a next generation of experiments. Its form could strongly distinguish different models.

Presenter: CAPPARELLI (RM1), Ludovico (Roma Sapienza)

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