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Rees-Sciama signatures from evolving dark matter halos in the cosmic microwave background LIANG DAI, LIN YANG, MARC KAMIONKOWSKI, JOSEPH SILK, Johns Hopkins Univ — Photons in the cosmic microwave background (CMB) radiation receive an extra blueshift in their energies as they traverse slowly-growing dark matter halos. This Rees-Sciama effect arises from the time-dependent gravitational potentials generated by the subsequent accretion of dark matter flows onto collapsed halo cores. Studies of the Rees-Sciama contributions to the stochastic anisotropies in the CMB from large scale linear or quasi-linear perturbations have been previously conducted, but in this work we focus on non-perturbative, collapsed halos. We calculate the magnitude of this effect for a spherical symmetric halo model of self-similarity, and demonstrate a projected profile of this signature on the sky as a function of the impact parameter of the line of sight. Its typical angular size is larger than that of the halo's virialized core, which provides a possible avenue to separate Rees-Sciama signatures from scattering signatures of Sunyaev-Zeldovich effects. We argue that this effect can be potentially utilized not only to probe the dynamics of dark matter halos, but also to measure cosmological parameters such as $H(z)$ and $\Omega_\Lambda(z)$.

Liang Dai
Johns Hopkins Univ

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