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Conformal Invariance, Dark Energy, and CMB Non-Gaussianity
EMIL MOTTOLA, Los Alamos National Laboratory, IGNATIOS ANTONIADIS, CERN, PAWEL MAZUR, Univ. of So. Carolina — In addition to scale invariance, a universe dominated by dark energy naturally gives rise to correlation functions with full conformal invariance, due to the isomorphism between the conformal group of three dimensional slices of de Sitter space and the de Sitter isometry group SO(4,1). In the standard homogeneous, isotropic cosmological model the embedding of flat spatial sections in de Sitter space induces a conformal invariant perturbation spectrum and definite prediction for the shape of the non-Gaussian CMB bispectrum. If the density fluctuations are generated instead on the de Sitter horizon, conformal invariance of the S^2 horizon embedding implies a different but also quite definite prediction for the angular correlations of CMB non-Gaussianity on the sky. Each of these forms for the bispectrum is different from the predictions of single field slow roll inflation models, which rely on the breaking of de Sitter invariance. We propose a quantum origin for the CMB fluctuations in the scalar gravitational sector from the conformal anomaly that could give rise to these non-Gaussianities without a slow roll inflaton field. Conformal invariance also leads to the relation nS -1 = nT between the spectral indices of the scalar and tensor power spectrum.

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