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Large Blue Spectral Index From a Conformal Limit of a Rotating Complex Scalar

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One well known method of generating a large blue spectral index for axionic isocurvature perturbations is through a flat direction not having a quartic potential term for the radial partner of the axion field. In this work, we show how one can obtain a large blue spectral index even with a quartic potential term associated with the Peccei-Quinn symmetry breaking radial partner. We use the fact that a large radial direction with a quartic term can naturally induce a conformal limit which generates an isocurvature spectral index of 3 (corresponding to the dimensionless spectrum scaling as wave vector squared). Another way to view this limit is to use the angular momentum of the initial conditions to slow down the radial field. Quantization of the non-static system in which derivative of the radial field and the derivative of the angular field do not commute is treated with great care to compute the vacuum state. The parametric region consistent with dark matter and isocurvature cosmology is discussed.

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No

Primary author: TADEPALLI, SAI CHAITANYA

Co-author: Prof. CHUNG, Daniel (Dept of Physics, University of Wisconsin Madison)

Presenter: TADEPALLI, SAI CHAITANYA

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