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Observational signatures of anisotropic inflationary models

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We study observational signatures of two classes of anisotropic inflationary models in which an inflaton field couples to (i) a vector kinetic term $F_{¥mu¥nu}F^{¥mu¥nu}$ and (ii) a two-form kinetic term $H_{¥mu¥nu¥lambda}H^{¥mu¥nu¥lambda}$. We compute the corrections from the anisotropic sources to the power spectrum of gravitational waves as well as the two-point cross correlation between scalar and tensor perturbations. The presence of statistical anisotropies generally leads to a suppressed tensor-to-scalar ratio r and a smaller scalar spectral index n_s. For the potentials of chaotic and natural inflation, we place observational constraints on the model parameters and the anisotropic parameter g_* by using the recent Planck bounds of n_s and r. Since the signs of g_* are different depending on the vector and two-form field models, the precise measurements of the anisotropic scalar power spectrum can allow us to discriminate between the two models further. The non-linear estimator f_{NL} of scalar non-Gaussianities in the two-form field model is generally smaller than that in the vector model for the same level of anisotropies, so that the former is easier to be compatible with the Planck bounds of non-Gaussianities than the latter.

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