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Scalar spectral index in the presence of Primordial Black Holes

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We study the possibility of reheating the universe in its early stages through the evaporation of Primordial Black Holes (PBHs) that are formed due to the collapse of the inhomogeneities that were generated during inflation. By using the current results of the baryon-photon ratio obtained from BBN and CMB observations, we impose constraints on the spectral index of perturbations on those small scales that cannot be estimated through CMB anisotropy and CMB distortions. The masses of the PBHs constrained in this study lie in the range of 10^9 and 10^{11}g, which corresponds to those PBHs whose maximal evaporation took place during the redshifts 10^6 < z < 10^9. It is shown that the upper bound on the scalar spectral index, n_s can be constrained for a given threshold value, ζ_{th}, of the curvature perturbations for PBHs formation. Using Planck results for cosmological parameters we obtained n_s < 1.309 for ζ_{th} = 0.7 and n_s < 1.334 for ζ_{th} = 1.2 respectively. The density fraction that has contributed to the formation of Primordial Black Holes has also been estimated.

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