

Shape of CMB lensing in early dark energy cosmology

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Recently, the cosmological tensions, H_0 and S_8 in particular, have inspired modification of both the pre and post recombination physics simultaneously. Early dark energy is a promising solution of the H_0 tension known to be compatible with CMB. However, the compatibility of early dark energy, as well as general early resolutions, with CMB is no longer obvious if the late Universe is also modified. Aside from cosmological parameters, the main channel through which late Universe physics affects CMB observable is gravitational lensing. Using a new Gaussian Process function sampling method, we obtained the early Universe (CMB) only constraints on the full shape of the lensing potential, without relying on observation data of the late Universe. It is found that CMB prefers a lensing potential shape that is Λ CDM-like in $80 < L < 400$ but with enhanced amplitude beyond this range. The obtained shape constraints can serve as a CMB-compatibility guideline for both late and early Universe model building that modifies the lensing potential.

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