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**Constraints on Tensor-to-scalar Ratio for Planck Mission** KING

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— One of the main goals of modern CMB missions is to measure the tensor-to-scalar ratio  $r$  accurately to constrain inflation models. Due to the ignorance of the reionization history  $X_e(z)$ , this analysis is usually done by assuming an instantaneous reionization  $X_e(z)$  occurring at  $z \sim 10$ . Moreover, due to strong mixing of B-mode and E-mode polarizations in cut-sky measurements, applying the simple  $f_{sky}$  modification on full-sky forecast would not give satisfactory results. In this work, we make a forecast of the constraints on  $r$  for the Planck mission taking into account the general reionization scenario and cut-sky. We also study the degeneracy caused by  $r$  and  $X_e(z)$  on B-mode polarization. Our results show that by applying N-point interpolation analysis on reionization history, it can correct the bias induced by instantaneous reionization assumption and the best fit of  $r$  is constrained within 5% error level by including both temperature and polarization correlation in likelihood, if the true value of  $r$  is 0.1.

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