U20a   Impact of Reionization History on Constraining Primordial Gravitational Waves with Cosmic Microwave Background B-modes

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Primordial gravitational waves (PGWs) predicted by cosmic inflation are not yet confirmed by observations. Detecting B-modes from PGWs is one of the main goals of ongoing and future cosmic microwave background (CMB) experiments. The prediction of the B-mode power spectrum from PGWs depends on not only the tensor-to-scalar ratio (r) but also the reionization history. In this talk, we show the impact of the uncertainty of the reionization history on constraining r. We employ various reionization models, including the exponential model, the double reionization model, and random models, to calculate the corresponding CMB B-mode signals. We show that an incorrect model of reionization history can lead to a non-negligible bias on r. Specifically, with more random reionization histories and smaller r values, constraining PGWs becomes more challenging. This highlights the importance of accurately characterizing reionization history to constrain r.