

U07a      **Optimal delensing method for improving constraints on primordial gravitational waves for LiteBIRD**

Hanchun Jiang (The University of Tokyo), Toshiya Namikawa (Kavli IPMU/DAMTP/KICC)

Detecting the primordial B-mode polarization of the cosmic microwave background (CMB) induced by inflationary gravitational waves is a key observational target for ongoing and future CMB experiments. However, gravitational lensing by large-scale structure generates B-mode contamination at the level of  $r \simeq 0.01$  at the recombination bump and could dominate the primordial signal at the targeted sensitivity of next-generation experiments such as LiteBIRD ( $\sigma(r) < 0.001$ ). To address this, we present a new delensing approach that employs pixel-weighted subtraction of lensing templates constructed from multi-tracer combinations of CMB and large-scale structure data. The weighting scheme optimally accounts for inhomogeneous noise and lensing cosmic variance across the sky while avoiding computationally prohibitive covariance modeling. This technique enhances the capability to constrain  $r$  from wide-sky surveys, and lays a key groundwork for science goals of LiteBIRD and future CMB missions targeting the inflationary epoch.