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Improved delensing of CMB B-modes with upcoming SO and LSST Year-1 data

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In the era of high-precision Cosmic Microwave Background (CMB) anisotropy measurements, detection of primordial gravitational waves (PGWs) is one of the main goals of current CMB experiments. Detection of a divergence-free (B-mode) component in CMB polarisation will provide direct evidence of inflationary PGWs in the early universe. However, weak gravitational lensing of CMB photons due to intervening mass distribution of the Universe distorts the primordial polarisation patterns, introducing an additional lensing-induced B-mode signal. Removing these lensing-induced B-modes is essential for improving constraints on the amplitude of PGWs. In this work, we test a tomographic delensing method on simulations of the Rubin Observatory LSST galaxy catalogue and Simons Observatory (SO) CMB maps. A significant improvement in delensing efficiency is achieved by using a multi-tracer approach,
where we split the galaxy dataset into tomographic redshift bins. However, uncertainties in photometric redshift measurements pose a problem for optimal weighting of the tracers. In this work, we set up a pipeline to perform a multi-tracer delensing method and studied the impact of photometric redshift errors, using realistic simulations of LSST galaxy catalogue and SO CMB maps.

Presenter(s) : DEKA, Kishan (NCBJ (BP4))

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