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Optimal lensing estimators for future CMB surveys

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Gravitational lensing of the Cosmic Microwave Background (CMB) will soon be reconstructed with unprecedented precision, driven by deep polarisation maps from upcoming experiments like SPT-3G, the Simons Observatory, and CMB-S4. Reconstructing and subtracting the lensed B modes of polarisation is crucial to uncover the primordial B modes from inflation. In this talk, I will introduce an optimal estimator for the CMB lensing mass map, demonstrating how it surpasses the widely-used quadratic estimator in accuracy and robustness. This optimal estimator is designed to be resilient against modelling assumptions, contamination from unknown anisotropic signals, instrumental noise and non-Gaussianities in the lensing mass distribution. This novel estimator will be crucial for maximising cosmological constraints, particularly for tightening bounds on neutrino masses and on the tensor-to-scalar ratio.

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