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# Biases in CMB lensing and delensing for next-generation CMB experiments

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Exploiting the weak gravitational lensing signal of the CMB has become one of the primary targets of current and upcoming CMB observatories, since it allows to tighten constraints on the physics of structure formation in a more direct way than by CMB power spectrum measurements. In this context, future CMB experiments target a sub-percent measurement of the CMB lensing power spectrum, aiming for example at a detection of the absolute mass scale of neutrinos. Furthermore, the lensing deflection appears as a crucial foreground in the quest to detect primordial gravitational waves with future high-sensitivity CMB polarization measurements. I will discuss robustness of common estimators for auto- and cross-correlation CMB lensing spectra to the modeling of the non-linear matter distribution and post-Born CMB lensing in our Universe. I will demonstrate that a good understanding of these higher-order effects are crucial to reach the targets of the next-generation CMB experiments, e.g. an unbiased estimate of the total mass of neutrinos on the level of 100 meV. I will also present results on the impact of galactic foregrounds on the CMB lensing estimation, as well as the removal of the lensing deflection effect from measured CMB B-mode maps, the so-called delensing. I will show that taking both, foreground removal with multi-frequency observations and delensing, into account at the same time with realistic simulations, it is possible to reach the proposed target of a detection of a tensor-to-scalar ratio larger than $r \sim 10^{-3}$ of CMB-S4.

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