

A consistent, physical, and analytic model for CMB observables of reionisation

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The Epoch of Reionisation imprints its history and morphology on the Cosmic Microwave Background temperature and polarisation anisotropies through two effects: The kinetic Sunyaev Zel'dovich (kSZ) effect and Thomson scattering. I present an analytical approach to derive consistently the angular power spectra of the three main resulting imprints that are the spatial fluctuations of the Thomson optical depth, the patchy kSZ effect, and the scattering and screening B-modes, as well as their cross-spectra. The approach differs from existing (unphysical) models, as it is calibrated on high-resolution hydrodynamical simulations. I will show how each observable constrains different parameters describing the reionisation history or morphology (in the limit of their detectability), to illustrate the potential of their joint analysis to get a global picture of reionisation. This analytical but physical model will be a powerful tool in the analysis of upcoming CMB data, either alone or in combination with independent datasets such as measurements of the high-redshift 21cm power spectrum.

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