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Statistical Analysis and Exploitation of Sky Maps in Cosmic Microwave Background Observations

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We focus on the statistical properties of cosmological processes appearing in CMB anisotropies, as well on the associated aspects of Data Analysis. We consider the total intensity of the large fields observed by Planck and the associated constraints of the statistics of perturbations in the Early Universe, as well as the polarization measurements from operating and future probes looking in particular at the curl component (B-Mode), which may be sourced by cosmological Gravitational Waves and Gravitational Lensing. We outline the landscape of observations and the production and analysis of maps. We describe how the different statistics of the observed emissions lead to specialized analysis, reduction, and even exploitation procedures, focusing on the impact of these methodologies on the Early Universe and Cosmic Acceleration

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