

Challenges in forthcoming CMB data sets

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One of the major challenges in the context of the Cosmic Microwave Background (CMB) radiation is to detect a polarization pattern, the so called B-modes of CMB polarization, that are thought to be directly linked to the quantum tensor fluctuations produced in the Universe during the inflationary phase. To date, several challenges have prevented to detect the B-modes partly because of the lower sensitivity of the detectors and because of the contamination of our own Galaxy acting as a foreground contamination in polarization at large scales. At smaller angular scales the data are instead contaminated by the emission of extra-galactic sources like radio quasars and dusty star forming galaxies. In this talk, I will list the computational challenges when it comes to analyze, simulate and reduce realistic amount of data from the forthcoming CMB polarization observations where a huge amount of receivers are going to be employed. I will, particularly, show how improvements thanks to novel machine learning techniques help in correctly accounting for the foreground contamination; particularly, in the context of the future CMB experiments (e.g. SO, LiteBIRD, CMB-S4), where high sensitivities will be achieved at both high (~ 1 arcmin) and low (~ 1 deg) resolutions.

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