

Component separation for cosmic microwave background radiation

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Abstract

Cosmic microwave background (CMB) radiation data obtained by different experiments contains, besides the desired signal, a superposition of microwave sky contributions mainly due to, on the one hand, synchrotron radiation, free-free emission and re-emission of dust clouds in our galaxy; and, on the other hand, extragalactic sources. We present an analytical method, using a wavelet decomposition on the sphere, to recover the CMB signal from microwave maps. Being applied to both temperature and polarization data, it is shown as a significant powerful tool when it is used in particularly polluted regions of the sky. The applied wavelet has the advantages of requiring little computing time in its calculations being adapted to the *HEALPix* pixelization scheme (which is the format that the community uses to report the CMB data) and offering the possibility of multi-resolution analysis. The decomposition is implemented as part of a template fitting method, minimizing the variance of the resulting map. The method was tested with simulations of WMAP data and results have been positive, with improvements up to 12% in the variance of the resulting full sky map and about 3% in low contaminate regions. Finally, we also present some preliminary results with WMAP data in the form of an angular cross power spectrum C_{ℓ}^{TE} , consistent with the spectrum offered by WMAP team.

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