PHASE ANALYSIS IN STUDY OF COSMIC MICROWAVE BACKGROUND

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Phase analysis based on the complex values of spherical harmonics of the CMB fluctuation expansion is an extremely important method of observational cosmology. We consider several aspects of phase analysis in the CMB study. They concern the problems of signal restoration (Naselsky et al. 2005), search for non-Gaussianity (Chiang et al. 2003) and study of the foreground contamination of this separated CMB signal (Naseslky et al. 2003, 2004, 2005). Using the GLESP (Gauss-LEgendre Sky Pixelization) package (Doroshkevich et al. 2005) for CMB analysis we produce phase data for spherical harmonics in the form of $a_{\ell m} = |\delta_{\ell m}| \exp(i\Psi_{\ell m})$, where $a_{\ell m}$-s are coefficients of spherical harmonics of the ℓ–multipole in the m–mode, $|\delta_{\ell m}|$ is their amplitude, $\Psi_{\ell m}$ is a phase, and i is the imaginary unit. Considering the minimum in correlation of phases of CMB and foregrounds we can separate the signal corresponding to these properties at low ℓ ($\ell \leq 100$) where the point source influence is minimal. Another important moment is the study of the Gaussianity problem in the CMB observational data. To check statistical properties of the data we produce phase diagrams. These diagrams demonstrate the strong non-Gaussianity for all accessible maps of CMB. The high phase correlations between CMB and foregrounds hint us about problems of signal separation. Similar approaches are developed for the Planck mission.

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