

TATA INSTITUTE OF FUNDAMENTAL RESEARCH
DEPARTMENT OF ASTRONOMY & ASTROPHYSICS

Speaker : Dr. Soumen Basak
Institut d'Astrophysique de Paris, France

Title : Simulating weak lensing of CMB maps

Day, Date & Time : Tuesday, 24 November, 2009 at 16.00 hrs

Venue : TAP seminar room (A-269)

Abstract

Accurate predictions of cosmic microwave background (CMB) anisotropies and polarization are required for analyzing future CMB data sets, which ultimately require accurately simulated lensed maps. I will present a fast, arbitrarily accurate method to simulate the effect of gravitational lensing of the CMB anisotropies and polarization fields by large-scale structures on arbitrarily spaced grid points over a unit sphere using Non-equispaced fast Fourier transform (NFFT). The angular power spectrum of the simulated lensed CMB map, particularly the B-mode of polarization, agrees extremely well with analytical predictions. The analytical derivation of CMB-lensed spectra is based on non-trivial, partially resummed perturbative expansions of the correlation functions, for which our simulations therefore provide an accurate numerical validation. I will also demonstrate the efficiency and accuracy of the method and exhibit their dependence on the algorithm parameters. Lensed CMB maps simulated in this method are a useful tool for the analysis and interpretation of upcoming CMB experiments, such as PLANCK and ACT.