DESY Seminar

22 March 2005, 17:00, DESY Hörsaal

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Measuring the Polarization of the Cosmic Microwave Background with CAPMAP and QUIET

The Cosmic Microwave Background (CMB) is radiation which was released 400000 years after the Big Bang and contains a wealth of cosmological information. Its spectrum has been measured with extraordinary precision and its spatial anisotropy has been very well characterized, with WMAP providing the most comprehensive results. There are two distinct patterns to the polarization of the CMB, conventionally termed E- and B-modes. Characterization of the E-mode power spectrum is important for testing the understanding of the origin of the CMB as well as for breaking degeneracies in cosmological parameter determinations. The B-modes are expected to be at least an order of magnitude smaller and can be produced by gravity waves from the inflationary epoch as well as from lensing of E-modes. The amplitude of the gravity waves as seen in the CMB is linked to the energy scale of inflation which may also be the GUT scale. Measurements of the lensing contribution can provide interesting limits on neutrino masses. The CMB polarization measurements thus have exciting prospects for opening new windows to fundamental physics. CAPMAP is an experiment measuring the E-mode CMB Polarization in the angular range from 4' to 40' (l-range from 200 to 2500) with multiple 90 GHz and a few 40 GHz correlation receivers on the 7m Crawford Hill telescope in New Jersey. Data has been taken for the past 2 years starting with 4 receivers and increasing that by now to 16. The techniques of polarization measurements and the implementation for CAPMAP will be described. The latest results from CAPMAP will be presented as well as the overall status and future of CMB polarization measurements. The plans and potential for the successor of CAPMAP will also be shown: the experiment QUIET, a large polarimeter array, using miniaturized correlation polarimeters. QUIET will increase the sensitivity of current experiments to unprecedented precision, using in its first season 91 receivers at 90 GHz with a later upgrade to 1000 receivers.

- Tea and cookies will be served at 16:45 in the lobby.
- After the seminar there is a chance for private discussions with the speaker over wine and pretzels also in the lobby.