

mercoledì 6 febbraio alle ore 14.30 in Sala Lauree si terrà il
seminario del vincitore procedura concorsuale per RTDA SC 02/C1 SSD FIS/05, Dr. Giuseppe
D'Alessandro

Titolo

Development of instrumentation for the study of Cosmic Microwave Background

Abstract

Cosmic Microwave Background (CMB) experimentalists are living a fervent period: ground-based, suborbital and satellite experiments are pushing down the limit for B-Modes of polarized CMB radiation to levels where several inflation models should produce measurable signals. Moreover, large catalogs of galaxy clusters are obtained using the Sunyaev-Zeldovich effect, and the search for low-level spectral distortions in the Planck spectrum of the CMB is attracting the interest of experimentalists. The future of precision CMB measurements relies on the control of systematic effects, more than on the improvement of the survey sensitivity. In this talk, I'll describe two experimental methods to control systematic effects, with an important impact on the field.

For the measurements of CMB polarization and B-modes, a key component is the polarization modulator. I'll describe the development of a cryogenic polarization modulator for the QUBIC experiment. For the same experiment, I'll show the design and first cool down for the large cryostat as well.

Two kinds of measurements of spectral distortions are being implemented: isotropic (due to processes happening in the early universe and in the reionization phase) and anisotropic (due to localized later times effects, like the Sunyaev-Zeldovich effect). In both cases, the use of a Differential Fourier Transform Spectrometer is the key to obtain accurate measurements. I'll describe the development of the DFTS of the OLIMPO experiment, from design to performance during the 2018 flight of OLIMPO. The successful operation of the

"1 OLIMPO DFTS laid the basis for an isotropic spectroscopic experiment: the COSmic Monopole Observer (COSMO). This is a ground base experiment, to be deployed in the Italian-French base of Dome-C in Antarctica. Again I'll show how the use of a differential instrument provides the required common-mode rejection to measure low-level distortions related to elusive cosmological signals.