



ΓΕΝΙΚΟ ΣΕΜΙΝΑΡΙΟ ΤΜΗΜΑΤΟΣ ΦΥΣΙΚΗΣ

PHYSICS COLLOQUIUM

Thursday, 29 April 2010
17:00-18:00

3rd Floor Seminar Room

"The Quest for B-mode Polarization in the Cosmic Microwave Background Radiation"

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Abstract

The Cosmic Microwave Background Radiation (CMBR) has proven to be an extremely productive arena for the study of Cosmology. In my talk I will describe early CMBR work at the Owens Valley Radio Observatory, which demonstrated that most of the matter in the universe is non-baryonic cold dark matter, and I will then describe observations with the Cosmic Background Imager (CBI) in Chile, which was the first instrument to detect anisotropy in the CMBR on mass scales from galaxy clusters to superclusters, revealing, for the first time, the seeds that gave rise to all the structure we see in the universe today. In addition, the CBI provided sensitive measurements of the E-mode polarization that demonstrated convincingly that the anisotropy in the CMBR was caused by acoustic waves. Following the detection and delineation of the E-mode polarization, the "Holy Grail" of CMBR observations has become the detection of large scale B-mode polarization caused by the interaction of primordial gravitational waves with the CMBR. If detected, such B-mode polarization would show that an inflationary epoch did actually occur in the very early universe. It would reveal the energy scale of inflation and push the clock back to an era $\sim 10^{-35}$ seconds after the Big Bang. However, these B-mode signals are extremely weak and sensitivity of 10^{-8} Kelvin is needed to search for them. This daunting challenge is being met by the QUIET project, which is now operating in Chile, and will be described in detail.