



भारतीय ताराभौतिकी संस्थान  
**INDIAN INSTITUTE OF ASTROPHYSICS**  
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स्नातक अध्ययन मंडल **Board of Graduate Studies.**

STUDENT SEMINAR  
(Part of Comprehensive Examination)

*Speaker:* Mr. Masroor Bashir

**शीर्षक Title:** Testing statistical isotropy and Gaussianity of ACT DR6 convergence data using morphological statistics.

**सार Abstract**

Statistical Isotropy (SI) is a fundamental assumption in modern cosmology. Recent availability of new cosmological datasets has enabled rigorous tests of this assumption. Analyses of Cosmic Microwave Background (CMB) temperature anisotropy maps have revealed several anomalies and potential asymmetries. In our study, we test SI and deviation from Gaussianity using CMB lensing convergence maps provided by the Atacama Cosmology Telescope (ACT) DR6 which covers approximately 23% of the sky. We conduct a comprehensive investigation of the morphological properties of these maps using various statistics, including Minkowski Functionals, contour Minkowski tensor and Betti numbers. We perform a multiscale hierarchical analysis across different scales and resolutions, including global, hemispherical and localized analyses of small patches of the sky. We find statistically significant anomalies for several patches. We discuss the possible physical origins of the anomaly. Interestingly, a few anomalous patches overlap with patches identified in an independent analysis previously carried out using data from Planck. These patches warrant further investigation and cross-correlation with galaxy and large-scale structure surveys.

गुरुवार Thursday 10, अक्टूबर October 2024

Time: 3:30 PM

Venue: प्रेक्षागृह Auditorium

सभी का स्वागत है All are welcome.