

S E M I N A R



Prof Subhabrata Majumdar

Tata Institute of Fundamental Research, India

Date:

Thursday, 1 August 2024

Time:

12h15-13h15 SAST

Venue:

- **NITheCS Seminar Room**
University of KwaZulu-Natal
Westville Campus
3rd Floor, H-Block,
School of Chemistry and Physics
- **Online**

Refreshments will be served.

WHO SHOULD ATTEND?

This talk is intended to be accessible to postgraduate students. All are welcome!

ENQUIRIES:

Email Neli Mncube:

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Brave New World – Probing our Universe with new secondary CMB anisotropies

ABSTRACT:

Observations of secondary CMB anisotropies have gradually become one of the leading probes of cosmology and large-scale structures. They are, however, mainly restricted to the thermal and kinetic Sunyaev-Zel'dovich (SZ) effects from galaxy clusters. We introduce a novel non-thermal SZ effect as another important cosmology/astrophysics probe and apply it to distortions of the CMB by non-thermal plasma in the ubiquitous lobes of radio galaxies. We also look at CMB distortions from quasar bubbles before reionization. These can be used as new probes of our Universe, and have several implications. Targeted observation of radio galaxies can constrain radio galaxy models, for example, current observations already enable us to obtain limits, previously unavailable, on the low energy cut-off of the electron spectrum. Detecting its radio galaxy CMB fluctuation power spectrum can lead to the tightest constraint on the central black hole mass-to-host halo mass scaling relations. The CMB imprint of a single quasar bubble detected in a high-resolution, ambitious secondary CMB observation in future would carry complementary information to its detection in HI or Lyman- α . There are also implications for cosmology - a knowledge of the mean CMB distortion by a population of radio lobes becomes important if one wants to discover primordial μ -distortions. Finally, time permitting, we also demonstrate a new proposal to estimate the Hubble constant using secondary CMB. All in all, we are poised to enter a brave new world of secondary CMB anisotropies.

Prof Subhabrata Majumdar lectures in the Department of Theoretical Physics at the Tata Institute of Fundamental Research in Mumbai, India.

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