



ICTS

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SCIENCES

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

## ICTS Seminar

- Title** : Exquisite clutter in the circumgalactic plasmas: crosstalk between macro and microphysics
- Speaker** : Prakriti Palchoudhury (University of Oxford, United Kingdom)
- Date** : Monday, 10 November 2025
- Time** : 3:30 PM (IST)
- Abstract** : Hot, ionised plasmas are organised in the potential wells of dark matter haloes at the largest scales in the Universe, forming the circumgalactic medium (CGM). Macroscopic dynamics like merger of haloes, black-hole feedback and radiative processes of these plasmas reproduce many global CGM properties, broadly consistent with observations. Yet high-resolution multi-wavelength (e.g., X-ray/UV) observations expose tensions that point to missing microphysics. In this talk, I will argue that classical transport theory - built for collisional, weakly magnetised plasmas - often breaks down in the CGM, which is weakly collisional and threaded by dynamically important, albeit energetically weak, magnetic fields. Such magnetic fields enhance the susceptibility to electromagnetic instabilities at microphysical scales (e.g., mirror, firehose and whistler). These, in turn, regulate the effective conductivity/viscosity and alter the macroscopic energy and momentum fluxes which may have profound consequences in the galaxy formation and interpretation of astronomical observations. I will present our novel approach to model micro-macro crosstalk and new physical insights on transport processes that we have recently uncovered. Beyond circumgalactic plasmas, these considerations have interdisciplinary applications - in the hot plasmas near black holes, laboratory plasmas, and inertial confinement fusion.
- Venue** : Online
- Zoom Link: <https://icts-res-in.zoom.us/j/96230786087?pwd=jQP3TBVam4ZhZCvOKuEc6WGUGbQIIy.1>
- Meeting ID: 962 3078 6087
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