भारतीय ताराभौतिकी संस्थान
INDIAN INSTITUTE OF ASTROPHYSICS
कोरमंगला **Koramangala,** बेंगलूरु **Bengaluru – 560034.**

स्नातक अध्ययन मंडल Board of Graduate Studies.

STUDENT SEMINAR
(Part of Comprehensive Examination)

Speaker*:* Ms. Tulip Ray

शीर्षक Title: Dark Matter Halo Dynamics in Yukawa Modified Gravity: From Spherical Collapse to Splashback.

सार Abstract

The nature of the dark sector remains one of the major open questions in cosmology. In particular, dark matter may possess interactions beyond gravity, which could leave imprints on the formation and evolution of cosmic structures. Since dark matter halos emerge through the nonlinear evolution of structure, their dynamics provide a promising avenue to probe and constrain such interactions. We investigate this possibility using a widely studied phenomenological modification of gravity, Yukawa modified gravity, in which dark matter experiences an additional finite-range fifth force. Within a **Λ**CDM background, we study the nonlinear evolution of spherical top-hat overdensities and examine how the modified interaction influences the formation of dark matter halos. By varying the strength and range of the fifth force, we quantify its effects on the turnaround, collapse, and virialization of halos, and determine the initial overdensities required for halos to reach the present epoch at the desired stage of collapse.

We then use the collapse solutions to follow the subsequent evolution of the halo from half-turnaround, incorporating an evolving NFW profile and mass accretion. By tracking the trajectories of infalling matter, we determine the splashback radius and study its dependence on the strength and range of the Yukawa interaction. This allows us to explore splashback as a potential probe of dark-sector interactions on halo scales.

सोमवार Monday 21, सितम्बर September, 2026

समय Time: 11 AM

स्थान Venue: प्रेक्षागृह Auditorium

सभी का स्वागत है All are welcome.