

ICTS Astrophysics & Relativity Seminar

Title : Dynamical Stability and Long-Term Evolution of Planetary Systems

Speaker : Hareesh Gautham Bhaskar (Indiana University, Bloomington)

Date : Thursday, 02 July 2026

Time : 3:30 PM (IST)

Abstract :

Planetary systems display a wide range of architectures, including compact multi-planet systems, eccentric planets, mutually inclined orbits, and close-in planets with distant companions. This diversity raises fundamental questions about their long-term evolution: what determines whether planetary systems remain stable, how do instabilities reshape their architectures, and what can observed exoplanetary systems reveal about their dynamical histories?

In this talk, I will present my past research addressing these questions using analytical methods and numerical simulations from celestial mechanics. I will discuss the stability of mutually inclined planetary systems, showing how orbital inclination affects long-term stability boundaries. I will then describe how planet--planet scattering in unstable systems can lead to collisions and ejections, contributing to the population of free-floating planets. Finally, I will present work on the anti-aligned orbit of the warm Neptune TOI-1710 A b, where dynamical modeling provides insight into the system's past evolution and predicts an additional intermediate giant planet. I will also briefly highlight related work applying similar dynamical tools to the outer Solar System, the early evolution of the Moon, planets in stellar binaries, high-eccentricity migration, and black-hole triples.

Venue : Feynman Lecture Hall

Zoom Meeting: <https://icts-res-in.zoom.us/j/93040885078?pwd=WYRLs0SQoP5LSsbjmbcU6VZABIkjwy.1>

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