



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: Ms. Lupamudra Sarmah

शीर्षक Title: Study of s-process enhanced stars

सार Abstract

A vast majority of the elements heavier than Fe in the universe are produced by neutron (n)-capture processes. The slow (s)-process that proceeds mostly along the stable nuclei on the valley of β stability is known to occur in Asymptotic Giant Branch (AGB) stars. However, many unevolved stars spanning across various metallicities exhibit enhancement in the s-process elements, challenging single stellar evolution. Even though the s-process enhancement is often attributed to mass transfer from a companion AGB (now a CO white dwarf, WD), the pollution factors and mass transfer processes are still not well understood. Some s-process enhanced stars also show elevated Eu levels and peculiar abundances of light elements (e.g., Li, C, N, Na), which do not follow the expected trend of nucleosynthesis yields in AGB stars. Therefore, understanding the stellar parameters and abundance trends in the primary polluted star can provide hints on the nucleosynthesis processes in the companion AGB and stellar mixing after mass transfer. In this work, we have focused on the near solar metallicity regime of the s-process enhanced stars, Barium (Ba) stars, to understand their formation by mass transfer and the evolution of Ba dwarfs and giants. We performed a detailed asteroseismic analysis of a sample of Ba dwarf and giant systems in the TESS (Transiting Exoplanet Survey Satellite) field to derive precise stellar parameters (including evolutionary phases for a subset) and have estimated the companion WD and their progenitor masses, wherever possible. Our results show that the mass distribution of Ba dwarfs, Ba giants (RGB and core-He burning) peak at slightly different masses, but there is a good overlap between them. With the information on companion masses, we further explore the dilution factors after mass transfer using AGB models, revealing discrepancies between observed abundances in Ba stars and AGB yields that imply additional AGB nucleosynthesis processes. In this talk, I will discuss the results from our asteroseismic study of Ba dwarfs and giants and our plan for the spectroscopic study of a sample of binary systems with WDs having a range of orbital parameters and masses to understand the correlation among lighter and heavier elements in the primary stars and its relation with the companion properties.

शुक्रवार Friday 4, अक्टूबर October 2024

Time: 02:30 PM

Venue: प्रेक्षागृह Auditorium

सभी का स्वागत है All are welcome.