Indian Institute of Astrophysics

IIA Colloquium

11:30 am, Tuesday, 2 December 2025
IIA Auditorium

The Role of AGB Stars in the Origin of the Elements

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The chemical evolution of the Universe is governed by the nucleosynthesis contribution from stars, which in turn is determined primarily by the initial stellar mass. The stars that contribute the most to the production of elements include massive stars that explode as core-collapse supernovae, low- and intermediate-mass stars that evolve through the asymptotic giant branch (AGB), and supernovae of Type Ia. Probably the most uncertain aspect of chemical evolution models are the stellar yields that come from theoretical predictions. In this talk I will focus on the contribution from AGB stars, which are important for producing carbon, nitrogen, and elements heavier than iron. Stars up to about 8 solar masses evolve through core hydrogen and helium burning, before ascending the AGB. It is during the AGB phase when mixing episodes can occur between the core and envelope, which enriches the envelope in freshly made elements. Strong outflows or winds remove that envelope into the interstellar medium, which eventually ends the AGB phase. In this talk I present the latest stellar yields from single and binary AGB stars calculated by our group. The binary yields focus on a huge parameter space for solar metallicity stars and include population yields. I will comment on the main uncertainties and our efforts to address them, including using stellar variability to determine the initial masses for the occurrence of the third dredge-up in real AGB stars.

High Tea at auditorium lounge at 11.00 am