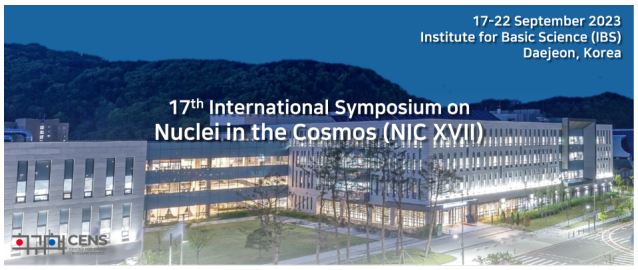

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The s-process in AGB stars

Monday, 18 September 2023 10:45 (30 minutes)

About half of the solar abundance of elements heavier than iron are made by the slow neutron capture process (s-process) occurring in low and intermediate-mass asymptotic giant branch (AGB) stars. Elements are mixed from the core to the surface and then expelled into the interstellar medium through strong stellar winds. In comparison to the rapid neutron capture process, modelling the s-process has presented fewer difficulties owing to the fact that most of the nuclei involved are near the valley of stability, and we observe stars enriched in heavy elements produced by the s-process. However, many important uncertainties still remain including the mechanism leading to the formation of ^{13}C pockets and the details around mixing in AGB stars. There is an increasing wealth of observational data that is being used to constrain s-process modelling in AGB stars. In recent years the main improvements to these observations have come from accurate distance estimates owing to Gaia. In this talk I will review the current status of theoretical models of the s-process in AGB stars. I will also provide an update on observations, highlighting results from Galactic AGB stars, which may provide a constraint on the minimum stellar mass required for a star to produce s-process elements. I will also briefly touch on the intermediate neutron capture process (or i-process) and show evidence that this process occurred in the early Galaxy. I will show that a potential site is AGB stars experiencing proton ingestion episodes during convective He-shell burning but other sites exist, and are still debated.

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