Contribution ID: **24** Type: **Oral Contribution**

Unlocking stellar ages with s-process elements: Calibrating chemical clocks using Kepler data

Friday 13 June 2025 11:30 (20 minutes)

S-process elements (Y, Zr, Ba, Ce), produced via slow neutron-capture processes in stars, are key tracers of stellar and Galactic evolution. When paired with alpha-elements (Mg, Ca, Si, Ti) in abundance ratios, they serve as chemical clocks, providing a powerful tool for estimating stellar ages. In this talk, I present a detailed spectroscopic analysis of 68 Kepler red giant stars, offering high-precision abundances of s-process elements and asteroseismic ages with better than 10% precision from individual mode frequencies.
This sample is used to calibrate chemical clock-age relations, which are fundamental for estimating "chemical ages" of field stars in large spectroscopic surveys. By applying these calibrations to the APOGEE and Gaia-ESO surveys, I derived "chemical ages" for ~270,000 stars, uncovering significant age trends across stellar populations. The results reveal critical insights, such as the age separation of low- and high-alpha sequences, the age-metallicity relation, the flaring of the Galactic disc, and the presence of old metal-rich stars.
This work underlines the importance of s-process elements in reconstructing the chemical and temporal evolution of the Milky Way, highlighting their role in age-dating tools for the Galactic archaeology.

Author: Dr CASALI, Giada (Australian National University)

Presenter: Dr CASALI, Giada (Australian National University)