Contribution ID: **29**   Type: **Talk**

Observation of r-process abundance patterns in stars

Monday 6 May 2019 12:00 (30 minutes)

Stars conserve in their atmospheres, to a large extent, the chemical composition of the gas cloud from which they formed. The chemical compositions of old, metal-poor stars in the halo of our galaxy can hence be used for reconstructing the chemical enrichment history of the Milky Way, and studying the nucleosynthesis processes that contributed to the enrichment. For example, a unique abundance signature of the rapid neutron-capture process (r-process) has been observed in metal-poor stars strongly enriched in r-process elements, providing constraints on r-process models and the physical conditions of the site of this process.

In my talk I will review the recent progress that has been made in identifying large samples of metal-poor stars by means of wide-angle sky surveys, determinations of their chemical compositions with optical high-resolution spectra and state-of-the art stellar model atmospheres, and future prospects in the era of 4-10m telescopes equipped with highly multiplexed spectrographs, as well as the next generation of large ground-based telescopes currently under construction.

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Track Classification: STARS