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Detailed abundance analysis of new CEMP stars from HESP-GOMPA survey

The aim of this work is to study the chemical abundances of Milky Way halo stars which belong to the oldest stellar population of the Galaxy and detailed Chemical analysis of these populations can address several intriguing problems in the area of galaxy formation. For our present study, we have carried out high resolution spectroscopic survey using the Hanle Echelle Spectrograph (HESP) at 2m Himalayan Chandra telescope. Till date, we have carried out a detailed abundances analysis of about 60 metal poor stars at resolutions of R=30000 and R=60000 which resulted into the HESP-GOMPA (Galactic survey Of Metal Poor stArs) survey. The current study in high resolution is limited to selected stars from SDSS MARVELS pre-survey with Vmag = 8 - 13, that primarily targets the low latitudes for exoplanet studies.

The results include discovery of more than 10 new EMP and CEMP stars which are useful for further detailed isotopic abundances and key waiting point nuclei to probe the nucleosynthesis sites. We compare the elemental abundances derived for these classes of stars along with other carbon-enhanced metal-poor (CEMP) and EMP stars, in order to understand the nature of their parent supernovae. We find that CEMP-no stars and EMP dwarfs exhibit very similar trends in their lithium abundances at various metallicities. We have also conducted a comparative study of CEMP-no and EMP stars using their heavy element enrichment. We also find indications that CEMP-no stars have larger abundances of Cr and Co at a given metallicity, compared to EMP stars. The spectra were obtained over a span of 6-24 months, and indicate that some of the stars could be members of binary systems. One of the CEMP-s stars in this study ([Fe/H] = -2.3, [C/Fe] = 0.87) shows a very peculiar chemical abundance which could be of significant interest for stellar modelling. It shows a rather unusually high abundance of certain n-capture elements ([Ba/Fe] = 1.62, [Sr/Fe] = 1.18) alongside low abundances for other elements like Y, Zr, Ce, Nd, Sm, Eu and Dy.

Primary authors: Mr AVRAJIT, Bandyopadhyay (Indian Institute of Astrophysics, Bangalore); Dr THIRUPATHI, Sivarani (Indian Institute of Astrophysics, Bangalore)

Presenter: Mr AVRAJIT, Bandyopadhyay (Indian Institute of Astrophysics, Bangalore)

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