

CEMP Stars as Probes of First-Star Nucleosynthesis, the IMF, and Galactic Assembly



Contribution ID: 32

Type: **Oral contribution**

CNO abundances in the early Galaxy

Carbon-enhanced metal-poor (CEMP) stars contribute to about 20% of the metal-poor stars below $[\text{Fe}/\text{H}] < -2.0$. The origin of carbon in these stars could be due to AGB mass transfer in a binary system. These class of objects (CEMP-s) also show enhancement of s-process elements, and most of them show radial velocity variations indicating the presence of a companion. However, the class of CEMP stars that do not show s-process enhancements, that are more dominant at much lower metallicities ($[\text{Fe}/\text{H}] < -3.5$), are thought to be true first low mass stars that received contributions from winds of rotating very massive star (spinar) or faint supernovae. C, N, O abundances of these objects are crucial to understand the contributions of C, N, O from these massive stars. Carbon and nitrogen abundances can be derived from the C_2 , CH, CN and NH bands. However, obtaining oxygen abundance is very time-consuming and difficult in CEMP stars due to the weak 6300 [OI] line and crowded C2 and CN lines in cool-CEMP stars that require high resolution, high S/N optical spectra. Hence, we use NIR CO rovibrational bands in the NIR region, to derive oxygen abundances. For a carbon-enhanced star, the CO lines are sensitive to change in oxygen abundances. We also derived C, N, O abundances from optical wavelengths to calibrate the C, N, O abundances from NIR CO lines for a subset of CEMP stars. Here, we report CNO measurements of 10 CEMP stars from high-resolution optical spectra and low-resolution NIR spectra and compare them. This is the first time such comparison of CNO abundance over optical and NIR wavelength done in CEMP stars. We also present a detailed abundance of alpha, Fe-peak, and n-capture elements as well to understand the origin of CNO.

Primary authors: Dr ANTONY, Susmitha Rani (Tata Institute of Fundamental Research Mumbai); Prof. THIRUPATHI, Sivarani (Indian Institute of Astrophysics Bengaluru); Prof. OJHA, Devendra K (Tata Institute of Fundamental Research Mumbai); Mr BANDHYOPADHYAY, Avrajit (Indian Institute of Astrophysics Bengaluru); Dr NINAN, Joe Philip (Pennsylvania State University); Dr SURYA, Arun (UCSD Center for Astrophysics and Space Sciences); Ms UNNI, Athira (Indian Institute of Astrophysics)

Presenter: Dr ANTONY, Susmitha Rani (Tata Institute of Fundamental Research Mumbai)

Session Classification: OBSERVATIONAL APPROACH: CEMP STARS, FIRST STARS, FIRST GALAXIES