Contribution ID : **47** Type : **Contributed talk**

Searching for Carbon-Enhanced Metal-Poor Stars in DESI

Wednesday, 28 October 2026 13:05 (10)

Carbon-enhanced metal-poor (CEMP) stars are some of the oldest and most chemically primitive stars in the Milky Way. They are defined by excess carbon and low metallicity, and further classified by neutron-capture enrichment. The origin of this unique enrichment varies between CEMP subclasses. Neutron-capture-enriched CEMP stars reflect previous extrinsic enrichment events, whereas CEMP stars with no neutron-capture enrichment (CEMP-no) are believed to be intrinsically enriched, reflecting progenitor conditions. These varying enrichment histories provide key insights into nucleosynthetic processes and the nature of the first stars. A challenge that remains for their study is the lack of large-scale, homogeneous data. The scale problem may be addressed through major stellar surveys such as the Dark Energy Spectroscopic Instrument (DESI) Milky Way Survey Program. While DESI observes deeper into the Galactic halo and at lower magnitudes than other stellar surveys, its resolution and signal-to-noise ratio make it difficult to classify CEMP stars using provided chemical abundances. Using DESI DR1 spectra, we constructed a method for flagging stars as CEMP using the CH-G band and the strontium line at 4077Å. This rough scheme separates CEMP-no stars from remaining CEMP subclasses. It correctly classifies ≥80% of stars in common between DESI and high-resolution literature samples, and ≥95% of stars in common between DESI and other surveys. We found a total of 3,154 CEMP stars with a metallicity as low as -4.0 dex. High-resolution follow-up will be performed on the most viable candidates.

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If you are selected for a poster, would you be interested in giving a short flash talk on your work?

Yes

What is your career level?

Undergraduate

Which keyword describes the area of focus of this talk?

Stars & stellar clusters

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Session Classification : Galaxies, Gas/dust, Solar system & Stars