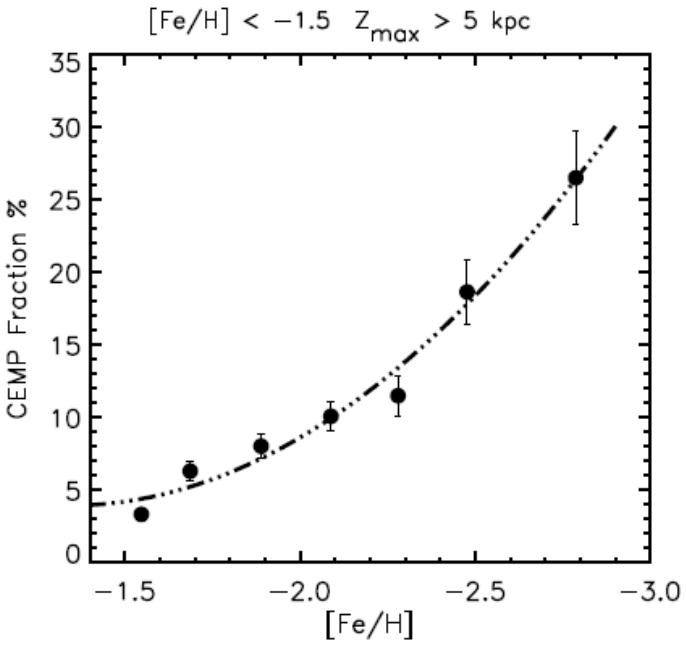
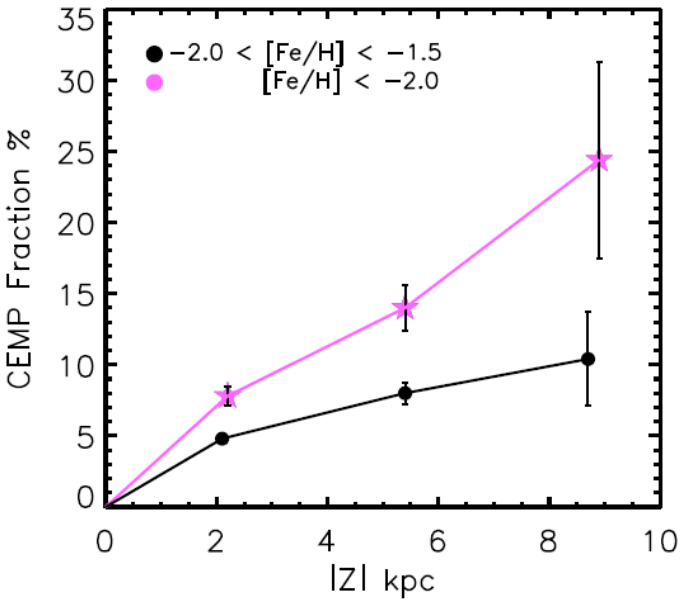
Joint Institute for Nuclear Astrophysics

Carbon-Enhanced Metal-Poor (CEMP) Stars in the Inner and Outer Halo of the Milky Way



*The increasing fraction of CEMP stars in the Galaxy, as a function of declining metallicity, [Fe/H]. The dramatic increase in frequency at low metallicity can be accommodated by models for carbon production that differ between the inner- and outer-halo components of the Milky Way, and open the door for understanding the nature of the **very first element producing objects** in the Universe.*



*The increasing fraction of CEMP stars as a function of height above the Galactic plane, |Z|, for two metallicity regimes. This observed behavior requires that the halo of the Milky Way is a complex, and likely dual system, comprising both an **inner and an outer halo.** Follow-up high-resolution spectroscopy with the world's largest telescopes will help establish the detailed patterns of elemental abundances for these objects.*

The SDSS/SEGUE surveys, in which JINA has played a fundamental role, have obtained spectroscopic metallicity estimates for over 400,000 stars. At low metallicities a significant fraction of these stars exhibit enhanced carbon-to-iron ratios [C/Fe]. These CEMP stars have recorded the production of carbon in the early Galaxy, apparently from several sources. One source is mass transfer from Asymptotic Giant-Branch binary companions. The other sources, likely to be responsible for the carbon incorporated in the outer-halo stars, may well be connected with the **VERY FIRST element production sites in the Universe** – massive rapidly rotating stars and so-called faint supernovae.

Contact Information: Timothy Beers (Michigan State University) 517-884-5616 beers@pa.msu.edu
Researchers: Daniela Carollo (RSAA, Australia), Timothy C. Beers, Young Sun Lee, Catherine R. Kennedy (MSU)
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