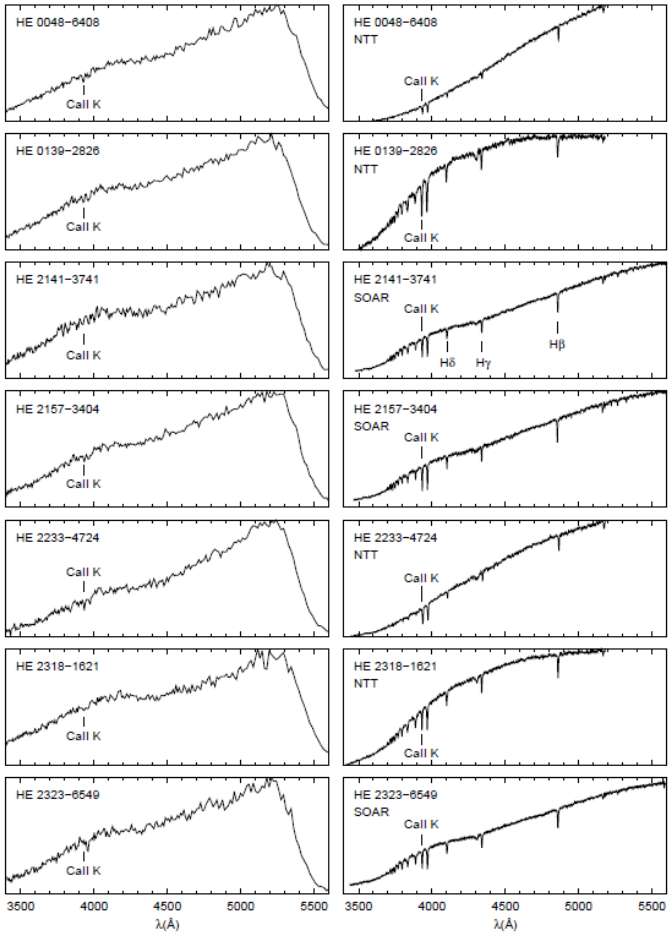
Seven New Stars with [Fe/H] < -3.0 – Six of them CEMP-no

Long-time JINA collaborator Vinicius Placco and his colleagues report the discovery of six new extremely metal-poor stars with [Fe/H] < −3.0, with four having [Fe/H] < −3.5, based on high-resolution spectroscopic follow-up with the Magellan telescope in Chile. Accurate metallicities and elemental-abundance patterns for stars in this metallicity range are of particular importance for studies of the shape of the metallicity distribution function of the Milky Way's halo system, in particular for probing the nature of its low-metallicity tail.

In addition, taking into account suggested evolutionary mixing effects, they report that six of the program stars possess atmospheres that were likely originally enriched in carbon, relative to iron, during their main-sequence phases. These stars do not exhibit over-abundances of their s-process elements, and hence may be additional examples of the so-called CEMP-no class of objects. CEMP stands for carbon-enhanced metal-poor stars, objects that possess a very high ratio of carbon, relative to iron, [C/Fe] > +0.7. CEMP stars represent about 40% of all stars with [Fe/H] < −3.5.

The CEMP-no stars are of particular interest, as they exhibit a characteristic light-element abundance signature (including C, N, O, Mg, Al, and Si) that is likely associated with nucleosynthesis by the very FIRST generation of high-mass stars in the early Universe.



Comparison between the low-resolution objective prism spectra from the Hamburg/ESO survey (left) , and the medium-resolution spectra obtained by SOAR 4.1-m and the ESO New Technology Telescope (right). Prominent spectral features are labeled in the medium-resolution spectra.

Placco and other JINA researchers have been conducting long-term surveys to identify many hundreds of additional examples of CEMP stars, many of which are expected to be CEMP-no, using a variety of telescopes around the world. These are expected to solidify our picture of early Universe nucleosynthesis, and the astrophysical objects responsible for it.

Contact: Vinicius Placco (Gemini Observatory; vmplacco@gemini.edu

Researchers: V.M. Placco (Gemini Obs.), A. Frebel (MIT), T.C. Beers (NOAO), N. Christlieb (Univ, Heidelberg), Y.S. Lee (NMSU), C, Kennedy (Australian National Univ.), S. Rossi, R.M. Santucci (Univ. Sao Paulo)

Publications: Placco et al. (2014), Astrophysical Journal, 781, 40