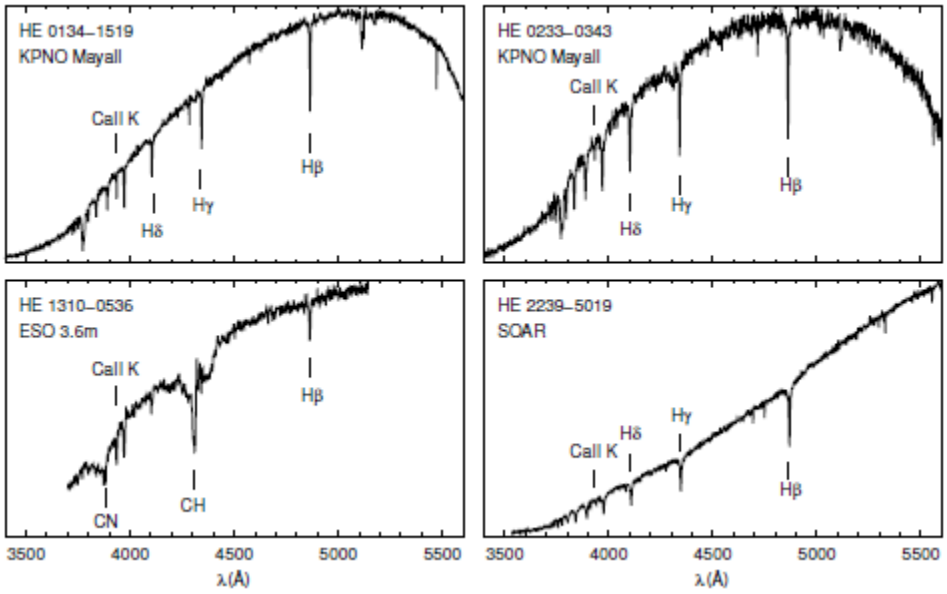
The Origin of Li, C, Sr, and Ba with Four New UMP Stars



Medium-resolution spectra of the four UMP stars, obtained with the SOAR 4.1-m, Mayall 4-m, and ESO 3.6-m telescopes. The locations of the CaII K line, Hβδ, Hγ, and Hδ lines are shown. For HE 1310-0536, the CH and CN molecular carbon bands are clearly visible.

Terese Hansen (PhD candidate at the Univ. of Heidelberg, Germany), and an international team of astronomers, including JINA scientists, have presented an elemental-abundance analysis for four newly discovered ultra metal-poor (UMP) stars from the Hamburg/ESO survey, with [Fe/H] < –4.0.

Based on high-resolution, high signal-to-noise spectra, they derived abundances for 17 elements in the range from Li to Ba. Three of the four stars exhibit moderate to large over-abundances of carbon, but have no enhancements in their neutron-capture elements, placing them among the carbon-enhanced metal-poor (CEMP-no) class of stars. These stars are of central importance, since at present fewer than 10 stars with [Fe/H] < –4.2 have been analyzed.

These authors have detected lithium in the spectra of two of the carbon-enhanced stars, including HE 0233-0343, the lowest metallicity star in the sample, with [Fe/H] = –4.7.

Both stars with Li detections are Li-depleted, with respect to the Li plateau for metal-poor dwarfs found by Spite & Spite (1982, A&A, 115, 357). This suggests that whatever site(s) produced C either do not completely destroy lithium, or that Li has been astrated by early-generation stars, and mixed with primordial Li in the gas that formed the stars observed at present (Piau et al. 2006, ApJ, 653, 300).

Finally, a large spread is found in the abundances of Sr and Ba for these stars, possibly influenced by enrichment from fast-rotating stars in the early Universe.

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