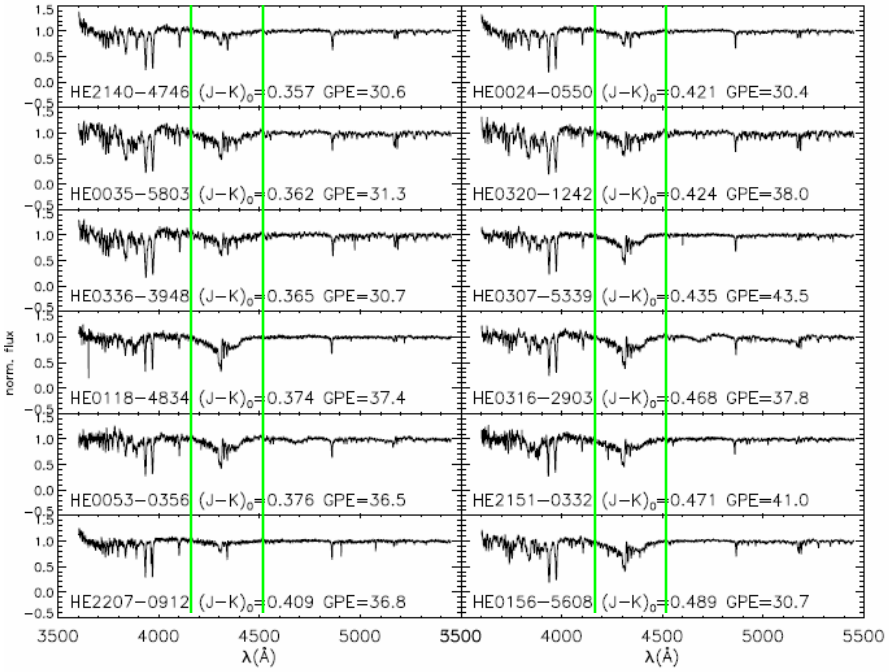
Searches for Unrecognized Carbon-Enhanced Metal-Poor Stars

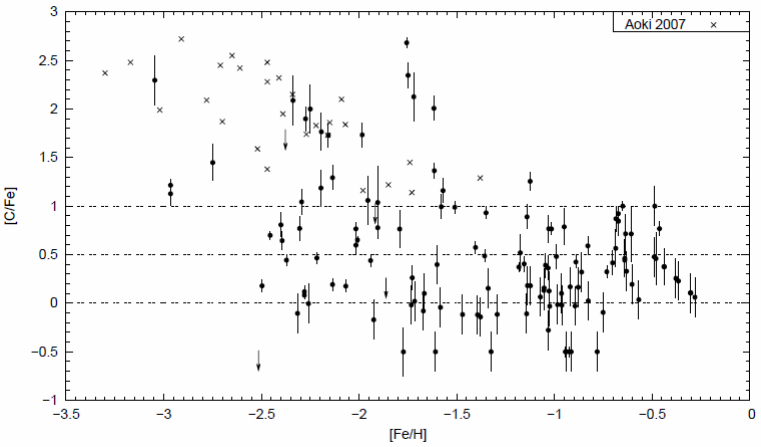


Example medium-resolution spectroscopy of a sample of newly discovered Carbon-Enhanced Metal-Poor stars from the Hamburg/ESO survey. Such stars are important in order to understand the origin of the fundamental elements of life, C, N, and O. The feature between the green lines is a molecular carbon band, which is typically more than 5-10 times stronger than in stars with metallicity near the solar value.

The new detection technique is being used to greatly expand the inventory of such stars that are known, in particular for stars near the peak of the metallicity distribution function of the inner halo at [Fe/H] = -1.6.

Carbon-Enhanced Metal-Poor (CEMP) stars are stars with metallicities less than 10% solar that exhibit carbon abundances at least 3 times higher, relative to iron, than the Sun. Such stars provide valuable probes of the origin of carbon in the Universe, probably by a number of processes. The inventory of these stars is, however, far from complete. Most previous discoveries have come from follow-up observations of metal-poor candidates that turned out to be carbon-enhanced. JINA researchers have now developed a technique to directly detect them from objective prism plates obtained during the Hamburg/ESO survey.

We have now identified many thousands of likely CEMP stars using this new approach, and are in the process of conducting the required medium-resolution spectroscopy needed to verify their status. This will open up the possibility of conducting higher resolution observations of other elements in these stars (which are often associated with s-process elements), using the world's largest telescopes.



Distribution of the [C/Fe] ratio, relative to solar values, as a function of metallicity, [Fe/H], for the first 130 candidate CEMP stars discovered in the new search effort. The crosses indicate values obtained from previous high-resolution follow-up observations. The dashed lines show constant values of [C/Fe] (0.0, +0.5, and +1.0).

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