Chemistry of Stars
Connecting Dwarf Galaxies and the Galactic Halo

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Introduction

Galaxies are expected to build up through the assembly of smaller systems, yet comparisons of the stars in dwarf galaxies and the Galactic halo have shown few similarities. Only the most metal-poor stars are similar in both systems, particularly made clear through high resolution spectral analyses to determine the detailed chemistry of stars in dwarf galaxies.

Unusual Chemistries In the Cluster Formation Gas

The heavy neutron-capture abundances in some globular clusters are unusual, e.g., unexpected star-to-star variations in r-process elements (i.e., La and Eu, Roederer 2011). These variations are not correlated with the well known light element dispersions, indicating it was present in the gas throughout the duration of star formation, and are not presently predicted.

Origins in Poorly Mixed Dwarf Galaxies?

The unusual chemistries found in some globular clusters and halo stars may be due to origins in dwarf galaxies where the chemistry is poorly mixed. Stars in Carina show the largest range in Mg (Lemasle et al. 2012; also Ba, Venn et al. 2012). Models suggest small dwarfs could have chemically inhomogeneous ([Fe/H] > 1) gas for ~2 Gyr (e.g., Revaz & Jablonka 2012), which is much longer than the timescales for star formation in the globular clusters.

Star Formation During Accretion?

Young clusters of stars like Pal 1 (5 Gyr) in the Galactic halo are unique in location and chemistry. For example, Pal 1 shows high [Eu/alpha] like the Sgr clusters Ter 7 and Pal 12. Pal 1 is not associated with the Sgr globular clusters dynamically, chemically (+ = Pal 12, x = Ter 7), or spatially (blue are MW clusters with [Fe/H] < -1). Could star formation be induced during the accretion of dwarf galaxies?

Conclusions

The Galactic halo is expected to host remnants from disrupted satellites, and seems to, therefore we may expect a variety of unusual chemical properties when examined in detail. One of the most powerful methods is high resolution spectroscopy of individual stars, and even though high throughput spectrographs have been available on large aperture telescopes for over a decade, the (outer) halo is still revealing its secrets.

The new Gemini/GHOS will have a significant impact, especially in the era of follow-up observations to imaging and low resolution spectroscopic surveys.

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References: please ask me.