

PHYSICS DEPARTMENT COLLOQUIUM

“Mining Old Stellar Populations for Clues to Galaxy Construction and Evolution”

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In predictions from Lambda-CDM cosmology, the Milky Way and galaxies like it formed from the hierarchical merging of smaller galaxies. Observations of the colours and motions of stars have uncovered streams that show our Galaxy is still accumulating stellar systems today. However, the Galactic history cannot be disentangled with this data alone. Spatial groupings of stars can dissipate over time, and even velocity phase-space signatures become difficult to detect against a background of stars with a very inhomogeneous distribution of velocities and orbital planes. But, stellar populations arising from different environments can possess varied nucleosynthetic histories, histories that can be inferred from stellar chemical compositions. The relics of early star formation and chemical enrichment in the Galaxy are preserved in observed stellar chemical abundance patterns, providing both clues and constraints to possible formation mechanisms of the elements and the various stellar generations comprising the Milky Way. In this talk I will present recent results of studies of stars in some of the oldest populations of the Local Group: nearby satellite galaxies, both dwarf and ultra-dwarf, as well as those of stars in Galactic globular clusters and the field. The chemical compositions of these objects are powerful probes of stellar evolution, star formation histories, mass functions, and the construction of galaxies.

THURSDAY, FEBRUARY 5, 2009
4:00 PM IN 102 JFB
REFRESHMENTS AT 3:30 PM IN 219 JFB