

Astrophysics Seminar

Monday, March 30, 2015

Hunting the First Generations of Stars and Galaxies

Anna Frebel

MIT Kavli Institute

Abstract:

The new Australian SkyMapper 1.3m telescope is carrying out a photometric survey of the entire Southern Sky. From using ugriz filter plus an additional narrow filter placed at the Ca K line at 3933A, stellar parameters can be obtained for all stars observed. This allows for an efficient selection of a variety of stellar types, including metal-poor stars. Recent efforts to search for the most metal-poor stars have indeed delivered a new record holder for the most iron-poor star: no iron lines were detected in the high-resolution follow-up Magellan spectrum and only an upper limit of $[Fe/H] < -7.1$ could be determined. Contrary to its iron deficiency, the star has a significant amount of carbon. This abundance pattern can be explained with the star being a second-generation star in the universe which formed from a gas cloud enriched by only one PopIII first star. What was the environment in which these early stellar generations formed? A spectroscopic study of the faintest dwarf galaxy Segue 1 has shed light on this question. Given the chemical abundance patterns of some of its only few stars) with metallicities ranging from $-4 < [Fe/H] < -1$) suggest that this tiny galaxy may be a surviving first galaxy from the early universe. This suggestion is in line with recent age measurements for similar ultra-faint dwarfs which showed these galaxies to be single-age stellar systems that are about as old as the universe itself.

3:15 pm

Refreshments
CAS Room 500

3:30 pm

Seminar
CAS Room 502

Next Week

- *Daniel Eisenstein*
Harvard
- Baryon Acoustic
Oscillations: A Robust and
Precise Route to the
Cosmological Distance
Scale

