MONTANA STATE UNIVERSITY | College of LETTERS & SCIENCE

Physics Colloquium

Friday, November 4th
4:10 – 5:00 PM
Barnard Hall 103

SDSS/APOGEE H-band Spectroscopy of Magnetic Chemically Peculiar Stars

S. Drew Chojnowski – Montana State University

Abstract:

Magnetic chemically peculiar (MCP) A- and B-type stars represent ~15% of the A/B star population in our Galaxy, and they pose a number of challenges for stellar astrophysics. Perhaps the most important mystery is the origin of apparently permanent and certainly extreme magnetic fields (up to 35 kilo-Gauss) in stars that are expected to lack surface convection zones. Any theory to explain the existence of the fields must also explain MCP stars' anomalous surface abundances, whereby light elements like helium are usually depleted with respect to the Sun, while heavy elements like europium can exhibit surface abundances one million times that of the Sun. Further, there have been claims in the literature of detections of fully radioactive/synthetic elements (Pm, Am, Es) in the atmospheres of a few of the most extreme MCP stars, leading to speculation about in situ production of the elements via surface nuclear reactions. The most slowly rotating and strongly magnetic MCP stars are of particular interest in the study of MCP stars owing to our ability to resolve magnetically (Zeeman) split absorption lines using high-resolution spectrographs. In these cases, the magnetic splitting provides unambiguous measures of the surface magnetic field strengths as well as a a sanity check on the elements and ions present on the star's surface.

Although it was far from the original goal, the Apache Point Observatory Galactic Evolution Experiment (APOGEE) has over the past decade uncovered a large new sample (~2000 stars) of MCP stars in our Galaxy, and now represents the largest homogeneous, high-resolution, multi-epoch survey of MCP stars to date. In this talk, I will provide an overview of the APOGEE survey along with a summary of some key findings from the MCP star sample, the most recent of which is the discovery of a rival for Przybylski's Star, which is often regarded as the most peculiar star known regardless of mass, temperature, and evolutionary state.

Host: David Nidever

**** Refreshments served in the Barnard second floor atrium at 3:30 P.M.***