

PHYSICS AND ASTRONOMY SEMINAR **SPRING 2009**

SPECTROPOLARIMETRIC SIGNATURES IN CLUMPY
SUPERNOVA EJECTA

KAREN T. HOLE
Department of Astronomy
University of Wisconsin

Despite their enormous importance to a variety of subjects in astronomy, significant questions remain in our understanding of supernova explosions. One promising observational method of gaining new information about these events is spectropolarimetry, which can give us information about the explosion geometry of unresolved objects. Indeed, polarization has been detected at early times for all types of supernovae, indicating that all such systems result from or quickly develop some form of asymmetry. My research focuses on the detection of strong line polarization in some supernovae, which is suggestive of chemical inhomogeneities ("clumps") in the layers above the photosphere and may reflect hydrodynamical instabilities during the explosion. I have developed a fast, flexible, approximate semi-analytic code for modeling polarized line radiative transfer within 3-D inhomogeneous and rapidly expanding atmospheres, as well as a method to connect the results of the simulations to robust observational parameters such as the maximum degree of polarization and polarized flux throughout the line. I will discuss how polarization may arise in supernovae, what the observed polarization may tell us about the explosion processes, and present the first results of my simulations in predicting spectropolarimetric signatures of clumpy ejecta.

Friday, January 23, 2009, 4:00 pm
Brown Hall 261

Refreshments served at 3:45 pm