Astrophysics Seminars

Tuesday

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12:30 P.M.

Rm 184 NSH

Radical frontiers of stellar evolution

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Core-collapse supernovae mark the catastrophic deaths of massive stars and are among the most powerful explosions in the universe. They shape and enrich their host galaxies; produce a variety of exotic objects including neutron stars, black holes, and some gamma-ray bursts; are a major site of nucleosynthesis and dust; are prodigious emitters of neutrinos; and are likely to be strong Galactic sources of gravitational waves.

Recent observations are dramatically transforming our understanding of the final stages of a massive star's life. Much of this massive star evolution revolution has been propelled by the discovery of major eruptions preluding supernova explosions within one year of core collapse. Such eruptions are not easily explained by our current knowledge of the physical mechanisms that drive mass loss in evolved massive stars, and may have significant ramifications for fields of research that depend on the predictions of stellar feedback.

I will review how radio-through-X-ray investigations of the entire supernova life cycle--from progenitor star, to explosion, to remnant--are helping to “reverse engineer” solutions to key open questions in stellar evolution. I will also explore how unexpected connections between precision supernova tomography and future time domain surveys (including LSST) can provide firm observational tests for state-of-the-art simulations attempting to predict and interpret the multi-messenger signals from the next Galactic supernova.

PHYSICS