

# Physics Department Colloquium

## **“Cosmic Explosions: Across Electromagnetic Spectrum & Beyond”**

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The most energetic cosmic explosions are supernovae and gamma-ray bursts and they are observed across a wide range of electromagnetic spectrum (from radio to high energy gamma rays). Despite the advances of instrumentation and major theoretical progress the physics of these explosions is still not fully understood and their origins remain a mystery. Recently, a very new window has opened for studies of Universe; gravitational radiation observatories such as US LIGO and European VIRGO are actively searching nearby galaxies for bursts of gravitational waves. Compact objects: white dwarfs, neutron stars and black holes, in different combinations are the most likely candidates to explain supernovae, gamma-ray bursts and are expected to be the most promising sources of gravitational waves. These compact objects are formed as the end products of evolution of intermediate- and high-mass stars. I will review the available observations of compact objects, and point out some very striking implications these observations have for the understanding of gamma-ray bursts. I will also demonstrate how these observations may potentially give a new perspective on the detection chances of gravitational waves. In the end I will discuss star formation in the very early Universe and the nature of the most distant explosion that was detected just a few months ago.

**Thursday, January 15, 2009**

**4:00 PM in 102 JFB**

**Refreshments served, 3:30 in 219 JFB**