

University of Notre Dame
College of Science
Department of Physics

ASTROPHYSICS SEMINAR

The Super-Chandra Explosion SN2009dc: Where Has All the Energy Gone?

Professor Peter Garnavich
University of Notre Dame

Tuesday, October 5, 2010 12:30 p.m. NSH 184

Type Ia supernovae are thought to be thermonuclear explosions of white dwarfs with masses near the Chandrasekhar limit of 1.4 Solar Masses. But observations near maximum light suggest SN 2009dc synthesized 1.7 Solar Masses of radioactive nickel. This absurd amount of nickel makes SN 2009dc a great candidate for a double-degenerate merger where two white dwarfs coalesce and exceed the Chandra limit at the moment of the explosion. Late-time nebular observations (many obtained with the Large Binocular Telescope) imply a much lower nickel yield and a decay inconsistent with the standard picture of the luminosity powered by radioactive $\text{Ni} \Rightarrow \text{Co} \Rightarrow \text{Fe}$. Where is that energy going, or was it ever there to begin with?