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ASTRONOMY

Physics, astronomy come together to date supernovae

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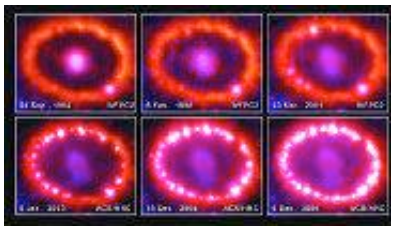
BY KENNETH HICKS

Last week, Tom Statler's Science page column described how radioactivity is used to date stars. Here is another example of how nuclear physics and astronomy are applied to the most spectacular event: the supernova.

This image, taken by the Hubble Space Telescope, is of a supernova that exploded in 1987. Supernova SN1987a was about 150,000 light-years away, in the Large Magellanic Cloud.



NASA

Supernova SN1987a

The necklace of light around its center, about 1 light-year in diameter, appeared about five years ago. Current theory holds that the star coughed its outer gas layers into space thousands of years ago and that the blast is catching up.

Even more interesting is the recent observation of short-lived radioactive elements that it produced. An isotope of cobalt emits gamma-rays as it decays. Using telescopes, scientists can detect the amount of radioactive cobalt produced by a supernova.

The amount of radioactive elements produced determines how long the supernova will shine. The detection of gamma rays also hints at the mass of the remnant (either a neutron star or a black hole). The diffuse glow in the center of the photo likely stems from radioactive isotopes of cobalt and titanium.

Titanium's radioactivity is visible only for a supernova's first few hundred years, and its glow can be used to date other supernova. Data from SN1987a might help date the supernova Cassiopeia A's explosion. (Some think it was recorded in 1680.)

Using studies of gamma rays from radioactive elements, theorists are unraveling the physics of supernova explosions.

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