

Action Replay of Powerful Stellar Explosion (Forwarded)

Source: <http://sci.tech-archive.net/Archive/sci.astro/2008-03/msg00215.html>

- *From:* Andrew Yee <ayee@xxxxxxxxxxxxxxxxxxxxxxxxxxxx>
 - *Date:* Mon, 24 Mar 2008 05:07:47 GMT
-

Jennifer Morcone
Marshall Space Flight Center, Huntsville, Ala.
256-544-7199

Megan Watzke
Chandra X-ray Center, Cambridge, Mass.
617-496-7998

For Release: March 20, 2008

Action Replay of Powerful Stellar Explosion

Astronomers have made the best ever determination of the power of a supernova explosion that was visible from Earth long ago. By observing the remnant of a supernova and a light echo from the initial outburst, they have established the validity of a powerful new method for studying supernovas.

Using data from NASA's Chandra X-ray Observatory, ESA's XMM-Newton Observatory, and the Gemini Observatory, two teams of researchers studied the supernova remnant and the supernova light echo that are located in the Large Magellanic Cloud (LMC), a small galaxy about 160,000 light years from Earth. They concluded that the supernova occurred about 400 years ago (in Earth's time frame), and was unusually bright and energetic.

This result is the first time two methods -- X-ray observations of a supernova remnant and optical observations of the expanding light echoes from the explosion -- have both been used to estimate the energy of a supernova explosion. Up until now, scientists had only made such an estimate using the light seen soon after a star exploded, or using remnants that are several hundred years old, but not from both.

"People didn't have advanced telescopes to study supernovas when they went off hundreds of years ago," said Armin Rest of Harvard University, who led the light echo observations using Gemini. "But we've done the next best thing by looking around the site of the explosion and constructing an action replay of it."

Action Replay of Powerful Stellar Explosion (Forwarded)

In 2004, scientists used Chandra to determine that a supernova remnant, known as SNR 0509–67.5 in the LMC, was a so-called Type Ia supernova, caused by a white dwarf star in a binary system that reaches a critical mass and explodes.

In the new optical study, an estimate of the explosion's energy came from studying an echo of the original light of the explosion. Just as sound bounces off walls of a canyon, so too can light waves create an echo by bouncing off dust clouds in space. The light from these echoes travels a longer path than the light that travels straight toward us, and so can be seen hundreds of years after the supernova itself.

First seen by the Cerro–Tololo Inter–American Observatory in Chile, the light echoes were observed in greater detail by Gemini Observatory in Chile. The optical spectra of the