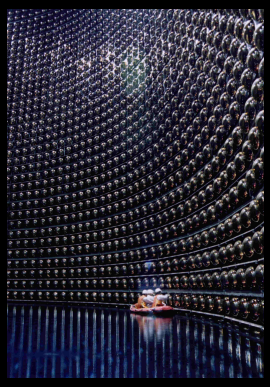
# Are you ready for the next SUPERNOVA?

## SNEWS: SuperNova Early Warning System



http://snews.bnl.gov

SNEWS may be your chance to make a significant contribution to science! Be the first to pinpoint a rare Galactic supernova and make early observations!

A supernova caused by the collapse of the core of a massive star is one of the brightest events in the universe. The light from such an explosion is not seen until the resulting shock wave breaks out of the star's surface. However, the huge blast of neutrinos created by the core collapse escapes from the star immediately, preceding the light by hours or even days. SNEWS is an alert network to provide advance warning of a supernova in our own galaxy. SNEWS receives input from the neutrino detectors around the world, and will use this information to alert observers that light from a nearby supernova will be arriving at Earth within the next few hours, allowing for rapid observations of a rare and spectacular event.

Neutrinos are fundamental particles related to electrons. Unlike electrons, neutrinos are electrically neutral and only interact weakly with matter. While this inherent slipperiness is what allows them to escape from the exploding star so rapidly, it also makes them very hard to detect, requiring massive detectors located deep underground to shelter the subtle neutrino signal from the constant rain of cosmic rays at the surface of the Earth. Three of these detectors send possible supernova neutrino alerts to the SNEWS network: Super-Kamiokande in Japan; the Large Volume Detector (LVD) in Italy; and the AMANDA/IceCube detector at the South Pole. The burst of neutrinos from a supernova somewhere in the Milky Way would create many neutrino interactions in these detectors. Supernovae in other galaxies are too far away to be seen in neutrinos, but one in our galaxy would be both a spectacular event and a great chance to study such an event up close. One such supernova should occur in our galaxy every few decades, although none in the Milky Way have been observed optically since Kepler in 1604.

Each participating neutrino detector sends potential supernova neutrino bursts to the SNEWS computer (hosted by Brookhaven National Lab). A real core collapse supernova will be seen in multiple detectors at the same time, while any instrumental noise or other false alarms in a single detector will not be propagated. This scheme allows rapid and automated distribution of the early warning to observers, including amateurs, who can use the advance warning to prepare to observe the impending light show from the earliest possible time.

In the event of a supernova, neutrino detectors may yield only limited information about where the supernova is. In the best case, there may be a few degrees of pointing; in the worst case there could be no pointing information at all. Therefore amateurs, with their wide viewing capabilities, may well be the first to find the supernova and point more powerful telescopes to the event. Very early data taken by amateurs themselves may be of prime importance, too. Because Milky Way supernovae are so rare (a few per century), it will be especially crucial to see the very early turn-on of the light. The time between the neutrino burst warning and the first visible light could be minutes, hours or days, depending on the nature of the stellar envelope and the amount of obscuration.

**So time is of the essence! If you receive a SNEWS alert, get out there and look!**

*Sky and Telescope* magazine provides an AstroAlert service for notification of amateurs. It provides a report form and will serve as a clearinghouse for amateur observations, so that information about the direction of a supernova can be disseminated as soon as possible to other observers, including professionals. You can sign up, and get more information at http://www.skyandtelescope.com/resources/proamcollab/AstroAlert.html

You may also sign up to be notified directly by SNEWS: please go to snews.bnl.gov for information on how to sign up. However, we recommend that amateur observers sign up for AstroAlert, and report observations via the *Sky and Telescope* feedback system (the *Sky and Telescope* folks are experts on observational astronomy; we are primarily neutrino physicists and won't know what to do with your material!) For more information, see Sky and Telescope's articles linked to on the AstroAlert page.

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