

SNEWS2.0: A Supernova Early Warning System for the Multi-Messenger Era

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The next supernova in the Milky Way will be a bonanza for astrophysics and fundamental physics. However, since local supernovae are exceedingly rare it will be crucial to capture all possible information in a coordinated multi-messenger effort. The observation of a prompt neutrino burst, expected to occur up to 12 hours before the detection of optical emission, would provide a unique early warning for worldwide optical follow-up. Detection of “pre-supernova” neutrinos during the progenitor’s Si-burning phase may further extend the early warning period to several days. Here we describe an upgrade to the SuperNova Early Warning System (SNEWS), a network of neutrino and dark matter detectors designed to report the detection of neutrinos from a Galactic supernova. SNEWS has operated continuously since 2005, and the SNEWS 2.0 upgrade will add several new capabilities to the existing network: public sub-threshold alerts; pointing to the supernova using inter-experiment triangulation; and searches for pre-supernova neutrinos. We will outline the capabilities and design of SNEWS 2.0, as well as its role in multi-messenger follow-ups.

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