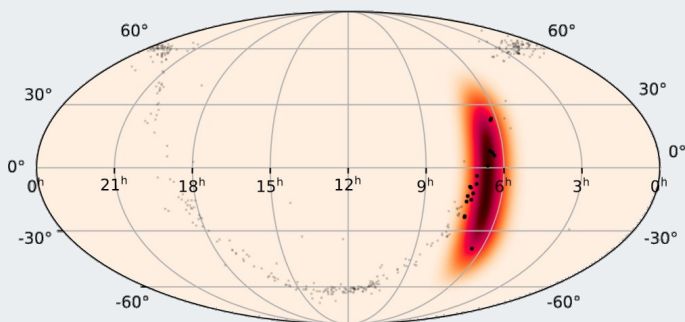


SNEWS Essentials Guide: from Alert to Action

What is SNEWS?

The SuperNova Early Warning System (SNEWS) is a **worldwide network of neutrino facilities** that monitor and localize neutrino bursts. A SNEWS alert is sent to astronomers seconds after the detection of a neutrino burst.

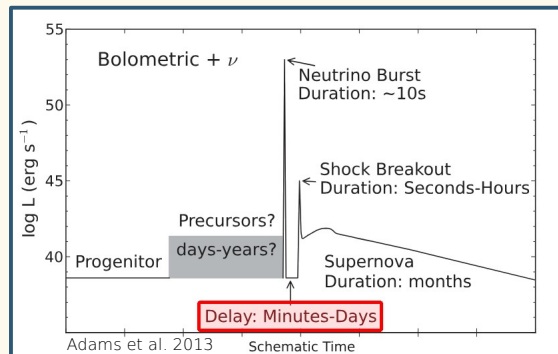


The current SNEWS neutrino detection facility locations are portrayed by red dots above.

SNEWS triangulates the direction to the source by comparing the precise timing of each facility's detection. The image above maps the neutrino burst localization (shaded) and the known galactic red supergiants (dots).

Why Neutrinos?

Massive evolved stars undergo core-collapse, during which the star's core releases most of its binding energy as neutrinos. Neutrinos are subatomic particles that weakly interact with matter. A burst of neutrinos is quickly expelled from the star and reaches Earth well before the explosion becomes visible.



The remaining energy released during core-collapse propagates more slowly through the dense stellar material in a shock wave. Shock-breakout emission is light that arises when the shock wave, generated by the core-collapse explosion, passes through the star's outer envelope.

The time delay between neutrino burst and shock-breakout is uncertain because the radius of the dense stellar material can vary greatly, and **has NEVER been observed before**. This delay could last a few minutes to several days.

Where to Look?

The neutrino burst comes from the collapsing core of a massive star in our galaxy, therefore the most crucial candidates to watch are **Red SuperGiant stars (RSG)**.

Cycle through and monitor all accessible candidate stars by observing each field once before repeating it. Wide-field setups can instead attempt to capture portions of the entire SNEWS localization to monitor additional stars not accounted for in our list of RSGs.

Click [HERE](#) for our galactic RSG candidate catalog.

Important Observing Notes:

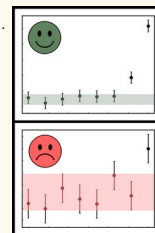


Rapidly collect photometric data.
Keep a precise clock!

Aim for color corrected RMS < 5 mmag.
AAVSO Guidelines: click [HERE](#)



Unfiltered is okay!
Use multiple wide-band filters if feasible.



When to Observe?

Your goal is to find the exploding star! After a SNEWS alert, get on sky **as soon as possible** and continue monitoring for **as long as possible**. It will be challenging to recognize that a star is in the act of exploding. It is important to record data that can be analyzed alongside all observations obtained.