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Detection of supernova neutrino signal with NOvA detectors

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The NOvA experiment has two segmented liquid scintillation detectors, which are sensitive to the neutrino signal from a core-collapse supernova in our galaxy. Each of these detectors performs an online reconstruction and analysis of the neutrino interaction candidates, comparing their time distribution to that of the signals expected from a core-collapse supernova. The statistical significance calculated in this comparison is used to decide if a detector is currently observing a supernova signal.

The combination of these significance values from both detectors provides a more efficient metric for detecting the supernova signal, increasing the maximum distance at which NOvA can detect a core-collapse supernova.

NOvA's approach for its combination of two detectors for supernova detection can be generalized to a network of various detectors with different background levels and sensitivities.

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