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Observation of Supernova Neutrino Bursts via CEvNS
ADRYANNA MAJOR, KATE SCHOLBERG, Duke University — Coherent elastic neutrino-nucleus scattering (CEvNS) is a neutral-current process in which a neutrino scatters off an entire nucleus, depositing a tiny recoil energy. The process is important in core-collapse supernovae and also presents an opportunity for detection of the burst of neutrinos ejected in the collapse. The CEvNS process dominates low-energy interactions (tens of MeV) but produces very little energy deposition from the target nuclear recoil. The challenge of its observation is reduced somewhat if a nearby core-collapse supernova acts as a high-flux source, producing thousands of CEvNS events in larger detector volumes over mere seconds. For detectors making use of scintillation to record particle energy loss, the effect would be a uniformly distributed, isotropic scintillation, a "CEvNS glow", throughout the detector. This overall time-localized increase in photon activity could be measurable, giving us critical constraints on the total energy and flux of the explosion. This talk will cover prospects for supernova burst detection via CEvNS in existing and future large detectors of liquid argon and organic liquid scintillator and present a semi-analytic method for obtaining the detected photon spectra of both the CEvNS signal and major expected backgrounds.

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