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RES-NOVA: detecting Supernova neutrinos with archaeological Pb-based cryogenic detectors

Saturday, 9 July 2022 15:45 (15 minutes)

The RES-NOVA project will hunt neutrinos from core-collapse supernovae (SN) via coherent elastic neutrino-nucleus scattering (CEνNS) using an array of archaeological lead (Pb) based cryogenic detectors. The high CEνNS cross-section on Pb and the ultra-high radiopurity of archaeological Pb enable the operation of a high statistics experiment equally sensitive to all neutrino flavors with
reduced detector dimensions in comparison to existing neutrino observatories. The first phase of the RES-NOVA project is planned to operate a detector with a volume of $(60\ \mathrm{cm})^3$. It will be sensitive to SN bursts from the entire Milky Way Galaxy with >3σ sensitivity while running $PbWO_4$ detectors with 1 keV energy threshold. RES-NOVA will discriminate core-collapse SNe from black-holes forming collapses with no ambiguity even with such small volume detector. The average neutrino energy of all flavors, the SN neutrino light curve, and the total energy emitted in neutrinos can potentially be constrained with a precision of few %. We will present the performance of the first prototype detectors, and sensitivity projections for the full detector. We will demonstrate that RES-NOVA has the potential to lay the foundations for a new generation of neutrino observatories , while relying on a very simple and modular experimental setup.

In-person participation

Yes

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