## VCI2025 - The 17th Vienna Conference on Instrumentation



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## **RES-NOVA - Detecting neutrinos and dark matter with archaeological Pb-based cryogenic detectors**

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The RES-NOVA project detects cosmic neutrinos (e.g., Sun, Supernovae) via coherent elastic neutrino-nucleus scattering (CEvNS) using archaeological Pb-based cryogenic detectors. The high CEvNS cross-section and ultra-high radiopurity of archaeological Pb enable a highly sensitive, cm-scale observatory equally sensitive to all neutrino flavors. In its first phase, RES-NOVA plans to operate a  $(30 \text{ cm})^3$  demonstrator detector. It will detect SN bursts from the entire Milky Way with >3 $\sigma$  sensitivity using PbWO<sub>4</sub> detectors with a 1 keV threshold, precisely constraining main supernova parameters by observing (anti-)vµ/ $\tau$ .

Beyond neutrino detection, RES-NOVA significantly enhances dark matter (DM) detection potential. Pb's large atomic mass and sensitivity to low-energy nuclear recoils make it excellent for detecting DM from our galactic halo. RES-NOVA aims to probe unexplored DM parameter spaces, potentially unveiling new insights into its nature. This dual capability allows important astroparticle physics results even without SN observations.

In this contribution, we outline the potential of this new experimental approach for neutrino and dark matter detection, emphasizing experimental sensitivity and the performance of the first prototype detectors.

## **Primary experiment**

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