

Exploring Coherent Elastic Neutrino-Nucleus Scattering of Reactor Neutrinos with the NUCLEUS Experiment

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Coherent elastic neutrino nucleus scattering (CE ν NS) offers a unique way to study neutrino properties and to search for new physics beyond the Standard Model. The NUCLEUS experiment aims to measure CE ν NS of reactor anti-neutrinos down to unprecedented low nuclear recoil energies. The novel gram-scale fiducial-volume cryogenic detectors feature an ultra-low energy threshold of ~ 20 eV in nuclear recoil and a rise time of a few $100 \mu\text{s}$ which allows the operation above ground. The fiducialization of the detectors provides an effective discrimination of ambient γ - and surface backgrounds. Furthermore, the use of multiple targets promises a high physics potential.

The NUCLEUS experiment will be located at a new experimental site at the Chooz nuclear power plant in France, providing a high average anti-neutrino flux of $1.7 \cdot 10^{12} \bar{\nu}_e / (\text{s} \cdot \text{cm}^2)$. The commissioning of the full experimental setup is planned for 2022. This talk will review the physics potential of NUCLEUS and its current status.

Reference to paper (DOI or arXiv)

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