

Poster NUCLEUS Experiment

Thursday 7 October 2021 12:15 (2 minutes)

Exploring coherent neutrino-nucleus scattering with NUCLEUS

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 with reactor anti-neutrinos down to unprecedented low nuclear recoil energies. NUCLEUS will make use of CaWO₄ and Al₂O₃ based cryogenic detectors to perform precision measurements of CE ν NS in order to reach a 20eV detection threshold and a rise time of a few 100 μ s which allows the operation above ground. After commissioning at TUM in late 2021, the experiment will be assembled at the Very Near Site, a new shallow experimental room in CHOOZ B nuclear power plant in France, in between two 4.25GW reactor cores with an average neutrino flux of $1.7 \cdot 10^{12} \frac{\bar{\nu}_e}{\text{s cm}^2}$ at the detector's location. NUCLEUS plans to start its first phase in early 2023 and to obtain a measurement of the process with 10g target in few months of data taking, thanks to the high CE ν NS cross-section.

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Session Classification: Poster session