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Exploring coherent neutrino-nucleus scattering with NUCLEUS experiment

The NUCLEUS experiment aims at a high-precision measurement of the coherent elastic neutrino-nucleus scattering (CEvNS). This process is a unique tool to search for new physics beyond the Standard Model and to understand the properties of its most elusive particles, neutrinos.

NUCLEUS will use CaWO_4 and Al_2O_3 cryogenic detectors to perform precision measurements of CEvNS at unprecedentedly low energies. It is based on recently demonstrated cryogenic detectors with nuclear-recoil energy thresholds in the 20eV regime. After commissioning at TUM in 2021, the experiment will be assembled at a new shallow site, the Very Near Site, in between the two 4.25GW reactor cores of the CHOOZ B nuclear power plant in France. NUCLEUS plans to start its first phase in late 2022 and to obtain a measurement of the process with 10g target in 1 year of data taking, thanks to the high cross-section of CEvNS. In this talk, the design, the current status and the expected sensitivity of the experiment are presented.

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