

AntiMatter-OTech / CLOUD: first LiquidO-based reactor antineutrino physics experiment.

Wednesday 9 April 2025 11:00 (45 minutes)

The AntiMatter-OTech collaboration is pioneering the first fundamental research reactor antineutrino experiment using the novel LiquidO technology (<https://arxiv.org/abs/1908.02859>) for event-wise antimatter tagging. The project's programme (<https://doi.org/10.5281/zenodo.10049845>) is twofold. First, the demonstration of antineutrino detection for reactor monitoring on industrial reactor innovation, which is the primary goal of AntiMatter-OTech —funded by the EU-EIC and UKRI. And second, a complementary programme of fundamental neutrino science, which is referred to as the CLOUD experiment. The experimental setup envisioned is the first 10-tonne LiquidO detector, filled with an opaque scintillator (<https://doi.org/10.5281/zenodo.10629927>). The detector will be located at EDF-Chooz at around 35 m from the core of one of the most powerful European nuclear plants, with minimal overburden (a few meters). Detecting of order 10,000 antineutrinos daily (reactor-ON) with a high (≥ 100) signal-to-background discrimination also enables a new level of accurate exploration of reactor-OFF data. In addition, CLOUD aims for the highest precision of the absolute flux, along with explorations beyond the Standard Model physics. Subsequent phases plan to exploit metal-doped opaque scintillators for further detection demonstration, including exploring the potential for surface detection of even solar neutrinos.

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