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LiquidO: Novel Particle Imaging & Detection in Opaque Media

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Breaking the paradigm of transparency, the LiquidO collaboration introduces a novel approach to particle detection (https://arxiv.org/abs/1908.02859). LiquidO uses an opaque medium (scintillating or not) with a short scattering length to stochastically confine light near its point of origin, capturing it with a dense grid of wavelength-shifting fibres read by SiPMs and fast electronics to generate topological information. This enables highly efficient imaging and possible particle identification, for example, allowing event-by-event topological discrimination of positrons, electrons and gamma events at the MeV scale.

With its strong background rejection capability and the possibility of loading dopants at high concentrations (as transparency is no longer required), LiquidO paves the way for a wide range of new physics measurements across neutrino sciences, many of which are under active exploration. In this talk, we shall highlight the results from our latest prototypes (https://arxiv.org/abs/2503.02541), using our novel opaque liquid scintillator systems (https://doi.org/10.5281/zenodo.10629927), validating LiquidO's imaging principle, and explore its physics potential with a larger detector.

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