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The Superconducting Magnet and Electromagnetic Calorimeter of SAND in DUNE

The Deep Underground Neutrino Experiment (DUNE) is based on a wide-band, intense neutrino beam from Fermilab, a far detector of large liquid argon time projection chambers, and a near detector to characterize the beam and constrain systematic uncertainties. The System for on-Axis Neutrino Detection (SAND) will be part of the DUNE near detector. It is based on a superconducting magnet (0.6T) and an electromagnetic calorimeter (ECAL), repurposed from the KLOE (K-Long Experiment) experiment. The ECAL is a lead-scintillating fiber sampling calorimeter of total thickness of about $15 X_0$, consisting of a cylindrical barrel section and two endcaps. The energy resolution is $\sigma/E = 5\%/\sqrt{E(\text{GeV})}$ and the timing resolution is $54/\sqrt{E(\text{GeV})}$ ps \oplus 50ps. The ECAL provides particle identification and reconstruction of e^\pm , γ , π^0 and neutrons. The upstream barrel ECAL can be used as an additional active target system with a total fiducial mass of 22.8 tons.

Mini-abstract

DUNE's SAND has a magnet and an ECAL for good time and energy resolution.

Experiment/Collaboration

DUNE

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