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The SAND detector of the DUNE experiment

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The Deep Underground Neutrino Experiment (DUNE) is a long-baseline neutrino oscillation experiment, being built with the goal of determining the neutrino mass ordering, the possible CP-violating phase in the neutrino mixing matrix as well as the observation of proton decay and the detection of supernova neutrinos.

The System for on-Axis Neutrino Detection (SAND) is one of the three components of the DUNE Near Detector complex. Its primary goals are to monitor the neutrino beam, perform measurements to control systematic uncertainties for the oscillation analysis, precision measurements of neutrino cross-sections and short-baseline neutrino physics.

SAND is composed of a 0.6T solenoid and an electromagnetic calorimeter made of alternating lead/scintillating fibers layers, both refurbished from the KLOE experiment. The Straw Target Tracker (STT) occupies the majority of the internal volume. It is composed of alternating planes of thin graphite/polymer targets and straw tube planes, providing multiple nuclear targets for the measurement of ν -p and ν -C cross-sections. A 1-ton active target for ν -Ar interactions, known as GRAIN, is located in front of the STT. GRAIN will use a novel readout technique based on imaging of the scintillation light with SiPM-based cameras.

All of the SAND detectors, including their baseline design and alternative solutions, will be discussed in this contribution.

Primary experiment

DUNE

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