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Neutron detection of the System of on-Axis Neutrino Detection in the DUNE near detector

The System for on-Axis Neutrino Detection (SAND) is a reference detector in the Near Detector complex of the Deep Underground Neutrino Experiment (DUNE). It is composed of a 3-Dimensional Projection Scintillator Tracker (3DST), surrounded by a low-density tracker, an ECAL and a Magnet used for the KLOE experiment. This system aims at detecting all final-state particles including neutrons from neutrino charged-current interaction , thus providing a full reconstruction of each individual interaction channel. Because the precise information of neutron kinetic energy is largely missed in current neutrino experiments, SAND is unique and unprecedented for the measurement of neutron kinetic energy using the time-of-flight technique. Such a measurement can constrain the neutrino interaction and flux uncertainty for each exclusive neutrino interaction channel. In this poster, the capability of detecting final state neutrons in SAND is demonstrated with a full picture of background and detection uncertainty.

Mini-abstract

System of on-Axis Neutrino Detection in the DUNE near detector

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