

Supernova neutrino and proton decay detection in DUNE

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Abstract

The Deep Underground Neutrino Experiment (DUNE) far detector will consist of four 10-kt LAr TPCs, either single (SP) or Dual Phase (DP). The Photon Detection System (PDS) embedded within the detector adds precise timing capabilities for non-beam events, such as supernova burst neutrinos and proton decay. The DP PDS will be formed of 720 8-inch cryogenic photomultiplier tubes placed on the floor of the detector and it will include a light calibration system. Dedicated light simulation studies considering different detector scenarios have been developed in order to demonstrate the capabilities of DUNE and to check whether the foreseen system is able to fulfill the requirements of the ambitious physics program. In particular, studies for the DP PDS on the light trigger of a supernova neutrino burst, the beam neutrino energy reconstruction and the t_0 reconstruction for proton decay searches have been carried out. The main results of these studies will be presented.

Primary author(s) : GALLEGO, Ana (CIEMAT)

Presenter(s) : GALLEGO, Ana (CIEMAT)

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