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DAQ system and detector response for Super-FGD in the upgraded T2K near detector

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The T2K near detector ND280 is used to constrain cross-section and flux models in the neutrino oscillation analysis. To improve the physics capabilities of the experiment, the upstream part of the detector is modified by adding a new highly granular scintillator detector (Super-FGD), two High-Angle TPCs and six thin Time-of-Flight scintillator layers. This poster focuses on the Super-FGD, which consists of 2 million 1 cm^3 cubic scintillators with readout by fibers in 3 directions.

The readout of the Super-FGD detector is realized by a set of electronics including MPPCs, frontend boards, optical concentrator boards and master clock boards. A data acquisition (DAQ) system based on a software framework, called MIDAS, is developed to integrate the new detector to the current ND280. With MIDAS frontends running on the backend electronics and the personal computer (PC), the PC can control the data taking and obtain the time and amplitude information from the MPPC signals. The global integration of the Super-FGD DAQ system to the current ND280 DAQ system is enabled and the system is now running stably with the T2K neutrino beam. With LED, cosmic and T2K neutrino beam data, the detector response is characterised, including the light yield, fiber attenuation length and the optical cross talk of the cubes. This poster introduces the development of the Super-FGD DAQ system and the detector response with calibration data.

Working Group

WG 6: Detectors

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