Contribution ID: **6** Type: **not specified**

The SuperFGD: a novel highly segmented neutrino detector for the T2K experiment

T2K is a long baseline neutrino oscillation experiment with world-leading precision on the measurement of the CP violating phase $_{CP}$ in the lepton sector of the Standard Model. The T2K Near Detector is undergoing an hardware upgrade with the installation of 4 sub-detectors: two High-angle TPCs, a TOF detector, and the Super-FGD. Some of the remarkable advantages of the upgrade are larger fiducial mass of the active neutrino target, improved proton momentum detection threshold, and capability of neutron detection. The upgraded detector will significantly improve the measurements of neutrino-nucleus interactions, representing a major systematic uncertainty in long-baseline neutrino experiments.

The Super-FGD is the active target of the detector, capable of 3D tracking in a 2-tons fiducial mass. It consists of 2 milions scintillating cubes of 1 cm^3 volume, read by nearly 60 thousand wavelength shifting optic fibers. One of the challenging points is the development of the read out electronics, due to the large number of MPPC channels and the high performance required.

This work presents the performance and hardware tests of the read-out electronics, relevant or timing and dynamic range requirements, the first results from the detector commissioning runs and MC-data comparisons, as well as studies of PID by time of flight measurement with the new Near Detector, thanks to the interplay of the Super-FGD and the TOF detector.

Primary author: GIANNESSI, Lorenzo (Universite de Geneve (CH))

Co-authors: Dr MCGREW, Clark (Stony Brook U.); Dr FERLEWICZ, Daniel (Univerity of Tokyo); Prof. SÁNCHEZ, Federico (University of Geneva); Dr DRAPIER, Olivier (LLR); Mr CAP, Sebastien (University of Geneva); Dr DOYLE, Tristan (Stony Brook U.); Mr FAVRE, Yannick (University of Geneva)

Presenter: GIANNESSI, Lorenzo (Universite de Geneve (CH))