

Simulation and reconstruction of neutrino interactions in the upgraded T2K ND280 detector

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The T2K magnetized near detector (ND280) at J-PARC is undergoing a major upgrade with a new 3D fine-granularity scintillator active target with 3D imaging capabilities as well as ~ 3 mm spatial resolution and sub-ns time resolution, two novel Time Projection Chambers (TPC), surrounded by a precise scintillator-based Time of Flight detector (ToF) with 200 ps time resolution.

Thanks to such innovative technologies, unprecedented details of neutrino interactions will be provided.

Hence, it becomes crucial to develop an accurate simulation and reconstruction of neutrino interactions to enhance the phase space acceptance and obtain isotropic particle tracking, low proton momentum threshold, neutron detection with measurement of the kinetic energy and an improved TPC tracking resolution thanks to the charge spreading in the novel resistive Micromegas detectors, all with a 2 tonnes neutrino target mass. These ongoing efforts, that will pave a new way of looking at neutrino interactions, will be reported.

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