

Commissioning of the neutrino beam facility for the first superbeam experiment, T2K

T2K (Tokai to Kamioka) is an accelerator based long baseline neutrino oscillation experiment. The experiment aims to discover the ν_e appearance mode and precisely measure the ν_μ disappearance mode. A high intensity muon neutrino beam is produced at J-PARC (Japan Proton Accelerator Research Complex) and measured with a 50 kt water Cherenkov detector, Super-Kamiokande, 295 km from J-PARC. A 2.5-degree off-axis beam is used to produce a narrow energy band beam and reduce background to achieve high sensitivity.

The proton beam is extracted from the accelerator and transported to a graphite target to produce pions. These pions are focused with three electro-magnetic horns before decaying to muons and muon neutrinos. The neutrino beam direction and stability can be determined from proton and muon beam parameters. To measure these parameters and protect the beam line components from high intensity beam, several kinds of beam monitors are used: intensity, position, profile and loss monitors for proton beam and silicon PIN photodiode and ion chamber for muon beam.

Operation of the neutrino facility started from April 2009. Following beam tuning and performance studies, physics data taking started from January 2010. An overview of the neutrino facility, results of performance studies, beam parameters measured with beam monitors and prospects for higher intensity operation will be given in this presentation.

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