

Performance Evaluation of a New Sensor for the T2K Muon Monitor in Neutrino Beam Direction Measurements

Wednesday 27 August 2025 18:00 (2 hours)

T2K is a long-baseline experiment using J-PARC neutrino beam to study neutrino oscillations with the near detectors and the Super-Kamiokande detector as the far detector. The T2K experiment uses a muon monitor (MUMON) to indirectly monitor the neutrino direction and intensity. Upgrade of the J-PARC beam is currently ongoing towards a measurement of CP violation in the neutrino sector.

While MUMON has successfully been used for measurements at the current beam intensity, we expect certain issues with MUMON sensors in future operation at higher intensities, such as radiation damage. Sensors that are more radiation tolerant are desired for future operation of MUMON. Electron multiplier tubes (EMTs) are one candidate. It has been demonstrated by beam tests that EMTs have higher radiation tolerance than the currently used sensors. These results suggest that EMTs fulfill the requirements for MUMON at future beam intensity [1].

Based on these results, we have proceeded with the installation of EMTs in the neutrino beamline at J-PARC and test of the performance as a muon beam monitor. The results of muon beam measurements using these EMTs during T2K neutrino beam operation will be presented.

[1] T. Honjo *et al.*, “Performance Evaluation of Electron Multiplier Tubes as a High-Intensity Muon Beam Monitor of Accelerator Neutrino Experiments,” PTEP **2024**, no.12, 123H01 (2024)

Collaboration you are representing

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Session Classification: Poster session

Track Classification: Neutrino Physics and Astrophysics