First Result with T2K Neutrino Beam Monitor INGRID

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Long base line neutrino oscillation experiment in Japan -First Application of off-axis beam (need precise measurement of beam direction) -Intense beam (750kW design)



Monitor the beam center (=direction, monitor the beam center with a precision much better than 1mrad for physics goal).



14 (+2) identical modules around beam center. Module is a sandwich of iron and scintillator tracking planes. Scintillation light is read by MPPC via wave length shifting fiber.



3. Construction & Installation

 $\delta(\sin^2 2\theta_{23}) \sim 0.01, \, \delta(\Delta m_{23}^2) < 1 \times 10^{-4} [eV^2]$

All scintillator planes (9,592 channels) were assembled Aug.~ Dec.2008, All 14 modules were assembled and installed Jan.~Aug.2009



4. Detector performance

Light yield measurement with cosmic rays just after assembly



Beam timing

MIP detection efficiency of each channel were measured with cosmic rays after installation



High efficiency(~99.0%)

5. Neutrino beam measurement

Physics data taking from Jan. 2010. INGRID took 1.6x10¹⁹ delivered protons data ~May. 20th, data taking efficiency > 99%.



Beam monitor INGRID is working well. We are taking beam data towards 1st physics result.