

YP talk: Optical System of Beam Induced Fluorescence Monitor toward MW beam power at the J-PARC Neutrino Beamline

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A Beam Induced Fluorescence (BIF) monitor is being developed as an essential part of the monitor update toward MW beam power operation at the J-PARC neutrino beamline, where a 30 GeV proton beam is extracted, bent and struck onto a 90-cm-long graphite target to produce an intense and nearly pure muon (anti-)neutrino beam for the Tokai-to-Kamioka long-baseline neutrino oscillation experiment. By measuring the fluorescence light from proton-gas interactions, the BIF monitor will be used as a continuous and non-destructive diagnostic tool for monitoring the proton beam profile spill-by-spill, with position and width precision on the order of 200 μ m. The main challenge lies in collecting a sufficient amount of fluorescence light for the beam profile reconstruction while controlling the beam-induced noise with the current beamline configuration. Study results will be shown with particular focus on the optical system under development, which allows us to transport fluorescence light away from the high radiation environment near the proton beamline and detect the optical signal with a Multi-Pixel Photon-Counter-based fast readout.

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