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Developments of wide dynamic-range halo monitor for 8 GeV proton beams at FNAL

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The FNAL accelerator complex has been upgrading in increasing beam intensity and beam quality. A new beam halo diagnostic device is required in the beam transport line between booster and Recycler.

For this purpose, it was decided to introduce the wide dynamic range monitor technique that was developed in 2012 and has been in operation at the J-PARC beam transport line. The device is a two-dimensional beam profile monitor, and it has a dynamic range of approximately six digits of magnitude by using of Optical Transition Radiation and fluorescence screens. Eliminating harmful beam halos is the most important technique for high-intensity proton accelerators. Therefore, beam halo diagnosis is indispensable and becomes more and more important.

New FNAL device has been manufactured in a collaboration between J-PARC and FNAL as a part of U.S.-Japan Science and Technology Cooperation Program in High Energy Physics. The equipment will be manufactured at J-PARC and will be shipped to FNAL in 2025.

We designed the device to satisfy FNAL specifications: the beam energy, intensity, and size. Currently, most of the equipments are under construction. The large-aperture optical system has been completed and its optical characteristics are being evaluated at J-PARC. We have been also investigating measurement methods corresponding to FNAL bunch trains. This paper reports on the current status of these developments.

Footnotes

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