

Development of an Absolute Coordinate Calibration Device for Beam Profile Monitor

Thursday, November 14, 2024 1:00 PM (1h 30m)

Beam profile monitors (BPRMs) based on fluorescent screen plates have been widely used in various accelerator facilities due to their intuitive structure and convenient camera-based readout system. However, calibration methods to correct the complex measurement errors caused by factors such as the misalignment of screen, distance variations from the camera, and assembly tolerances with actuators have not yet been well developed. We have developed a device capable of performing absolute coordinate calibration for the beam image on the screen, using the ends of the beam pipe flange as reference points. This device consists of a two-axis motorized linear stage, two pairs of precision grid glass plates, a digital camera, and a BPRM chamber support. By utilizing geometrically well-aligned grid plates and a camera, we derived a method to get a perspective calibration matrix that maps the projected coordinates of the BPRM screen onto a 2D raster image. By applying this matrix, we were able to accurately obtain both the absolute central position and the shape of the beam in precise coordinates. In this presentation, we will showcase the development process of the device, the numerical model, and the measurement results.

Paper submission Plan

Yes

Best Presentation

Yes

Contribution track

ICABU WG2. Beam Physics, Diagnostics & Novel Techniques

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