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Development of CMOS beam loss monitor for Korea-4GSR

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The beam loss monitor (BLM) is a diagnostic system designed to protect accelerator components from unexpected high-energy radiation. We have developed a cost-effective BLM system for the next-generation synchrotron light source, Korea-4GSR.
The system uses plastic scintillators, optical fibers, and a CMOS camera to localize beam losses with 10 ms time resolution. Scintillators placed along the beam-line emit blue light proportional to the ionization energy deposited by beam losses. The light is transmitted through optical fibers, bundled into a 2D array, and imaged by a CMOS sensor at 100 Hz.
The BLM's sensitivity and calibration were verified using a 2 MBq Co-60 gamma-ray source. The preliminary result shows ˜45 counts/GeV. Energy deposition was estimated using Geant4 simulations, and photon-to-count conversion was characterized with a calibrated LED source. The DAQ includes a built-in LED pulser for in-situ calibration of the CMOS detector and cable integrity check. This presentation outlines the system design, calibration methods, and performance results.

Footnotes

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