

A Convenient Method for Real Time Monitoring of Charged Particle Beam Profile and Fluence

Thursday, 15 August 2013 14:45 (25 minutes)

Systems of detectors installed at the LHC operate in the radiation field produced by LHC beam collisions. To measure the radiation damage of the components of the detector systems, prototype devices are irradiated at test beam facilities that reproduce the radiation conditions expected at the LHC. The profile of the test beam and the fluence applied per time must then be known. Techniques such as thin metal foil activation and radiographic image analysis have been used to measure these. However, these techniques typically do not operate in real time or else have large uncertainties; a new technique is necessary. We have developed a technique to monitor in real time the beam profile and fluence using an array of p-i-n semiconductor diodes whose forward voltage is linear with fluence over the fluence regime relevant to, for example, tracking in the LHC Upgrade era.

APS member ID

61150504

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Session Classification: Accelerators, Detectors, and Computing

Track Classification: Accelerators, Detectors, and Computing