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UPGRADE AND EVOLUTION OF THE AD TARGET BEAM IMAGING SYSTEM AT CERN: A TWO-YEAR PERFORMANCE ANALYSIS

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During CERN's Long Shutdown 2 (LS2) in 2022, the Anti-Proton Decelerator (AD) target area underwent major renovations, including a significant upgrade to its beam imaging system. The previous tube-based camera, used in a high-radiation environment, had limitations in sensitivity and resolution for continuous measurements.

The upgraded design uses an innovative in-air light-emitting screen mechanically coupled to the AD target, monitored by a digital camera through a 20-meter optical line from a radiation-safe zone. This setup improves accessibility during beam operation and enhances measurement capabilities.

Over two years of operation, several crucial modifications were made. A key change was transitioning from a scintillation material screen to an Optical Transition Radiation (OTR) screen, though this created new challenges with background interference. To address temperature-dependent calibration variations, an automated calibration mechanism was developed, utilizing advanced image analysis algorithms for real-time adjustments.

This paper discusses these developments, challenges, solutions, and future optimization opportunities for the AD facility's evolving experimental needs.

Footnotes

Funding Agency

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Yes

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