

12th Beam Telescopes and Test Beams Workshop



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Development of a High-Resolution, High-Dynamic-Range Charge Detector for Ion Beam Monitoring

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This paper introduces a novel concept for a charge detector featuring high resolution and a wide dynamic range. The prototype of this detector was specifically designed and constructed to serve the ion beam monitoring requirements of the High-Energy cosmic-Radiation Detection (HERD) experiment during beam tests conducted at CERN SPS facilities.

The prototype incorporates a series of silicon pad sensors and utilizes the same readout electronics employed in the HERD Calo photodiode system. Initial testing and experimentation with the prototype have demonstrated exceptional performance, showcasing both high resolution and a dynamic range that enables the measurement of nuclei with atomic numbers ranging from 1 to 80.

An integral aspect of the prototype's success lies in its compatibility with fast and practically real-time data analysis, making it suitable for online applications. In this presentation, we will share the achieved results from the prototype's testing phase, highlighting its capabilities and performance metrics. Furthermore, we will discuss the potential applications of this charge detector in the broader context of the HERD experiment and outline our ideas for future development and refinement.

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