

Optimizing Mu2e Experiment: Beam Shadowing with Channeling in Bent Crystals for Enhanced Extraction Efficiency

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The Mu2e experiment at Fermilab investigates rare muon-to-electron conversion using a muon beam generated by an 8 GeV proton beam. To achieve the required high muon flux, minimizing extraction losses is crucial. An important source of such losses are the particles impacting on the electric septum anode. An ideal solution to the problem lies in the beam shadowing scheme tested at CERN SPS. In this approach, a bent crystal is strategically placed upstream of the septum, deflecting particles at a precise angle via the phenomenon of channeling. As a result, a zone with reduced particle flux is created downstream of the crystal, safeguarding the septum anode by minimizing interactions with the beam. This contribution outlines the conducted investigation aimed at optimizing the design of beam shadowing and the manufacturing process of the bent crystal sample. It underscores the significant potential of channeling in bent crystals to assist the Mu2e experiment.

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Authors: SYTOV, Alexei (INFN, Ferrara (IT)); Dr MAZZOLARI, Andrea (INFN); BANDIERA, Laura (INFN, Ferrara (IT)); Dr MALAGUTTI, Lorenzo (University of Ferrara); ROMAGNONI, Marco (Universita e INFN, Ferrara (IT)); Dr TAMISARI, Melissa (University of Ferrara); CANALE, Nicola (Universita e INFN, Ferrara (IT)); NEGRELLO, Riccardo (Universita e INFN, Ferrara (IT)); GUIDI, Vincenzo (Universita e INFN, Ferrara (IT))

Presenter: ROMAGNONI, Marco (Universita e INFN, Ferrara (IT))

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