

Towards a symmetric momentum distribution in the Muon Ionization Cooling Experiment

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Abstract

The Muon Ionization Cooling Experiment (MICE) is under development at Rutherford Appleton Laboratory (UK). It's a proof-of-principle experiment for ionization cooling, which is a prerequisite for a future Neutrino Factory(NF) or a Muon Collider. The muon beam will have a symmetrical momentum distribution in the cooling channel of the NF[1]. In the MICE beamline pions are captured by a quadrupole triplet, pion momentum is selected by dipole 1 (D1) before the pions decay to muons in the decay solenoid. After the decay solenoid the muon beam momentum is selected by dipole 2 (D2), the beam focused in two quadrupole triplets and finally characterized by a set of detectors. By doing a so-called D1-scan, where the optics parameters are scaled according to the pion momentum, from 238-450 MeV/c the distribution is changed. In this paper simulation results from G4Beamline[2] and real data from MICE are presented and compared.

[1] Feasibility Study-II of a Muon-Based Neutrino Source, ed., S. Ozaki, R. Palmer, M. Zisman, and J. Gallardo, BNL-52623 (2001)

[2] T. J. Roberts et al. G4BeamLine 2.06 (2010) <http://g4beamline.muonsinc.com/>

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