



Contribution ID: 14

Type: **Poster**

First Demonstration of Ionization Cooling by the Muon Ionization Cooling Experiment

Muon colliders have the potential to carry the search for new phenomena to energies well beyond the reach of the LHC in the same or smaller footprint. Muon beams may be created through the decay of pions produced in the interaction of a proton beam with a target. To produce a high-brightness beam from such a source requires that the beam be cooled. Ionization cooling is the novel technique by which it is proposed to cool the beam. The Muon Ionization Cooling Experiment collaboration has constructed a section of an ionization cooling cell and used it to provide the first demonstration of ionization cooling. Here the observation of ionization cooling is described. The cooling performance is studied for a variety of beam and magnetic field configurations. The cooling performance is related to the performance of a possible future muon collider facility.

Mini-abstract

MICE built a section of an ionization cooling cell and provided the first demonstration of cooling.

Experiment/Collaboration

MICE

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Session Classification: Poster Session 1