

Recent results from the study of emittance evolution in MICE

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The Muon Ionization Cooling Experiment (MICE) has measured the evolution of beam emittance due to ionization cooling. In MICE, a muon beam is focused onto an absorber using a large aperture solenoid. Lithium hydride and liquid hydrogen absorbers have been studied. Diagnostic devices are placed upstream and downstream of the focus, enabling the phase space coordinates of individual muons to be reconstructed. By observing the properties of ensembles of muons, the change in beam emittance can be measured.

Data taken during 2016 and 2017 are currently under study to evaluate the change in emittance due to the absorber for muon beams with various initial emittances, momenta, and settings of the magnetic lattice. Simulations have been used to estimate the regimes in which heating and cooling are expected and to evaluate the equilibrium emittance, at which neither heating nor cooling is observed. The results of the simulations have been compared to the measured emittance changes. The current status and the most recent results of these analyses will be presented.

Primary authors: PALLADINO, Vittorio (Universita e sezione INFN di Napoli (IT)); ROGERS, Chris (STFC)

Presenter: ROGERS, Chris (STFC)

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