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The MICE Demonstration of Muon Ionization Cooling

Muon beams of low emittance provide the basis for the intense, well characterised, neutrino beams necessary to elucidate the physics of flavour at the Neutrino Factory and to provide lepton-antilepton collisions up to several TeV at the Muon Collider. The international Muon Ionization Cooling Experiment (MICE) will demonstrate ionization cooling, the technique proposed to reduce the phase-space volume of the muon beam at such facilities. In an ionization cooling channel, the muon beam traverses a material (the absorber) losing energy, then replaced by reaccelerating RF cavities. The combined effect is to reduce the transverse emittance (transverse cooling).

The rebaselined project will deliver a demonstration of ionization cooling by September 2017. In the revised configuration 1) a central lithium hydride absorber provides the main cooling effect 2) the magnetic lattice is two SC focus-coil modules 3) acceleration is provided by two 201 MHz single-cavity modules. The phase space of the muons in and out of the cooling cell will be measured by two SC solenoidal spectrometers. All the SC magnets for the ionization-cooling demonstration are available at RAL and the first single-cavity prototype has been tested successfully in the MuCool Test Area at Fermilab. The design of the cooling demonstration experiment, a summary of the performance of each of its components and the cooling performance of the revised configuration will be described.

additional information

This is an abstract aiming at a poster in the accelerator session complementing, together with another poster, a talk in the same session.

The three are submitted by the chair of the Speakers Bureau of the MICE collaboration as a coherent set of contributions. The Bureau will identify a member of the collaboration to present each accepted contribution.

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