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# Results from Step I of MICE and the Physics Plan for Step IV

The Muon Ionisation Cooling Experiment (MICE) will demonstrate ionisation cooling, an essential technology for a
Neutrino Factory and/or Muon Collider, by measuring a 10% reduction in emittance of a muon beam. A realistic
demonstration requires beams closely resembling those expected at the front-end of a Neutrino Factory, i.e. with large
transverse emittance and momentum spreads. The MICE muon beam line at ISIS, RAL, was built to provide beams of
different momenta and emittance so that the performance of the cooling channel can be fully explored.
During the initial stage of MICE, a novel technique based on time-of-flight counters was used to establish that the beam
emittances are in the range 0.7–2.8 mm-rad, with central momenta from 170–280 MeV/c, and momentum spreads of about
20 MeV/c. These beams will be increased by means of scattering from high-Z material in the next stage of MICE and
measured using magnetic spectrometers. Finally, low-Z absorbers such as liquid hydrogen and LiH will be used to reduce
the emittance of the beam. The physics program of this step of MICE will be discussed, including all stages necessary for a
first demonstration of ionisation cooling.

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