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Emittance exchange in MICE

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The Muon Ionization Cooling Experiment, MICE, has demonstrated transverse emittance reduction through ionization cooling. Transverse ionization cooling can be used either to prepare a beam for acceleration in a neutrino factory or for the initial stages of beam cooling in a muon collider. Later stages of ionization cooling in the muon collider require the longitudinal emittance to be manipulated using emittance exchange and reverse emittance exchange, where emittance is exchanged from and to longitudinal phase space respectively. A wedge absorber within the MICE cooling channel has been used to experimentally demonstrate reverse emittance exchange in ionization cooling. Parameters for this test have been explored in simulation and applied to experimental configurations using a wedge absorber when collecting data in the MICE beam. This analysis of reverse emittance exchange is presented in detail.

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