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The Tracker Systems for the Muon Ionization Cooling Experiment

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The Muon Ionization Cooling Experiment (MICE) will be the first experiment to demonstrate muon ionization cooling in the momentum range of $140 \text{ MeV}/c < p_\mu < 240 \text{ MeV}/c$. The experiment is a single-particle experiment where the input and output beam emittances are made from an ensemble of selected single-muon candidates. The two fiber trackers in a solenoidal field of 4T (one before and one after the cooling channel) measure the muon 4-momenta and provide the basic information for determining the emittances. This paper gives a brief overview of MICE and then describes the details of the fiber tracker assemblies, their unique construction technique (which for the first time used 350 micron diameter scintillating fiber), the readout electronics and performance with respect to light yield, hit resolution and tracking efficiency as measured in a recent cosmic-ray test of the two final tracker systems.

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