

[R13.05] A Detector Scenario for a Muon Cooling Demonstration Experiment

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As a verification of the concept of ionization cooling of a muon beam, the [Muon Collider Collaboration](#) is planning an experiment to cool the 6-dimensional normalized emittance by a factor of two. We have designed a [detector system](#) to measure the 6-dimensional emittance before and after the cooling apparatus. To avoid the cost associated with preparation of a muon beam bunched at 800 MHz, the nominal frequency of the RF in the muon cooler, we propose to use an unbunched muon beam. Muons will be measured in the detector individually, and a subset chosen corresponding to an ideal input bunch. The muons are remeasured after the cooling apparatus and the output bunch emittance calculated to show the expected reduction in phase-space volume. The technique of tracing individual muons will reproduce all effects encountered by a bunch except for space-charge.