Abstract Submitted
for the APR21 Meeting of
The American Physical Society

Progress on Radio Frequency Cavities for Use in Muon Cooling Channels DANIEL BOWRING, ALAN BROSS, Fermilab, BEN FREEMIRE, Euclid Techlabs, YAGMUR TORUN, Illinois Institute of Technology, KATSUYA YONEHARA, Fermilab — An intense muon beam produced by the decay of pions coming from a high power proton beam hitting a target requires significant cooling before it can be useful in a Muon Collider or Neutrino Factory. The preferred method of accomplishing this is ionization cooling, recently demonstrated by the Muon Ionization Cooling Experiment. Efficient cooling requires radio frequency cavities to operate in multi-tesla magnetic fields. This has historically been problematic, as cavities operating under this condition exhibit increased susceptibility to RF breakdown. An experimental program carried out at the MuCool Test Area at Fermilab has experimentally verified two methods that allow normal conducting RF cavities to operate in external multi-tesla magnetic fields. Through the careful design and material selection using beryllium elements, stable high vacuum operation at gradients of 50 MV/m were achieved. Additionally, filling a cavity with high pressure hydrogen gas also allowed operation at 50 MV/m. These solutions eliminate a significant technical risk inherent to muon cooling channels.

Ben Freemire
Euclid Techlabs

Date submitted: 08 Jan 2021 Electronic form version 1.4