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Low-Energy Muon Beam Production Studies from Tungsten Using the 400-MeV Fermilab Linac

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A new secondary beamline was recently installed in the MeV Test Area (MTA) with the objective of enhancing mu+/mu- production by factors of 3/8 by using a tungsten target versus the conventional graphite production target using the 400 MeV Fermilab proton Linac beam. Ultra-low energy muon beams can support world-class physics experiments for fundamental muon measurements, sensitive searches for symmetry violation, and precision tests of theory. The beamline was designed to transport up to 100 MeV/c decay-in-flight pi-for mu- and down to a few MeV for mu+ surface muons. Mu- will be applied to a muon-catalyzed fusion experiment, which requires a large momentum acceptance within a small transverse acceptance. Studies are also underway towards a high-efficiency source of muonium by stopping the mu+ beam in superfluid helium. Muon production and transport scenarios have been simulated and optimized using the particle tracking code, G4Beamline. The results of these G4Beamline studies and target optimization will be presented here. Plans for experimental measurements to benchmark simulations and future applications using this multi-user, low-energy muon MTA facility will also be discussed.

Funding Agency

Footnotes

I have read and accept the Privacy Policy Statement

Yes

Primary author: IZZO, Christopher (Fermi National Accelerator Laboratory)

Co-authors: MAZZACANE, Anna (Fermi National Accelerator Laboratory); JOHNSTONE, Carol (Fermi National Accelerator Laboratory); KAPLAN, Daniel (Illinois Institute of Technology)

Presenter: IZZO, Christopher (Fermi National Accelerator Laboratory)

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