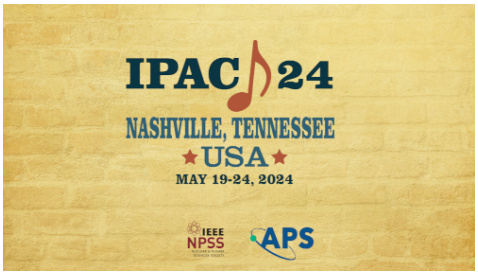

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Simulating a rectilinear cooling channel using BDSIM for the 6D muon cooling demonstrator

Sunday, 19 May 2024 16:00 (2 hours)

Muon colliders hold promise for high luminosity multi-TeV collisions, without synchrotron radiation challenges. However, this involves investigation into novel methods of muon production, acceleration, cooling, storage, and detection. Thus, a cooling demonstrator has been proposed to investigate 6D muon ionization cooling. The MICE experiment validated ionization cooling to reduce transverse emittance. The demonstrator will extend this to also cool longitudinal emittance. It would also use bunched beams instead of single particles from a muon source. The 6D cooling lattice comprises successive cells which consist of: solenoids for tight focusing, dipoles to introduce dispersion in the beam, wedge-shaped absorbers for differential beam absorption, and RF cavities for reacceleration. In this paper, the simulation and further optimization of the rectilinear cooling channel is discussed. This analysis extends existing theoretical and numerical work using BDSIM, a Geant4-based accelerator framework built to simulate the transport and interaction of particles. The study also incorporates beams from existing proton drivers, using output from targetry and capture designs for the same.

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