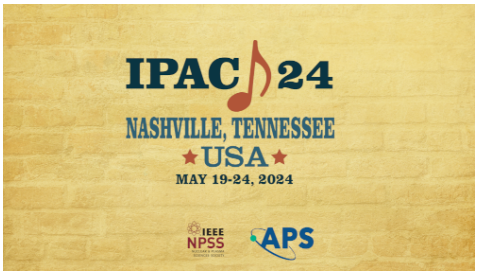

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Simulation and study of the nuSTORM (neutrinos from Stored Muons) experiment

Tuesday, 21 May 2024 10:10 (20 minutes)

The nuSTORM experiment aims to create neutrino beams through muon decay in a storage ring, targeting %-level precision in flux determination. With access to two neutrino flavors, it enables precise measurement of nu-A cross sections and exhibits sensitivity to Beyond Standard Model (BSM) physics. With muons in the 1-6 GeV/c momentum range, it covers neutrino energy regimes relevant to experiments like DUNE and T2HK. Additionally, nuSTORM serves as a step towards a muon collider, a proof of concept for storage rings, and a test for beam monitoring and magnet technologies. The lattice structure consists of a pion transport line and a racetrack storage ring based on a hybrid FFA design, with conventional FODO cells in the production straight combined with FFA cells in the return straight and arcs. Using the nuSIM framework and BDSIM, this study simulates and optimizes the nuSTORM lattice, using beams from existing proton drivers. Using GENIE, neutrino events and their rates at the detector at different energies are also presented. The creation of synthetic neutrino beams like nuPRISM, allowing for >65% narrower neutrino beams than the natural muon decay spectrum is also discussed.

Footnotes

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