

Simulation and design of the neutrinos from STORed Muons (nuSTORM) experiment

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The neutrinos from STORed Muons (nuSTORM) facility will create neutrino beams through muon decay in a storage ring, targeting % level precision in flux determination. With access to two neutrino flavours, it enables precise measurement of $\bar{\nu}_\mu$ -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 such as DUNE and T2HK. In addition, nuSTORM serves as a step towards a muon collider, a proof of concept for muon storage rings, and a test for beam monitoring and magnet technologies like FFAs. This paper provides an update on the status of the design and simulations of nuSTORM, including horn and lattice optimisations for the production and storage of low energy muons. Along with normalised fluxes, neutrino events and their rates at the detector at different energies are also presented. The creation of synthetic neutrino beams through the combination of beams produced using a variety of stored muon energies, similar to the PRISM technique to be implemented at DUNE and T2HK has also been discussed, allowing for much narrower spectra to aid cross section analysis.

Working Group

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