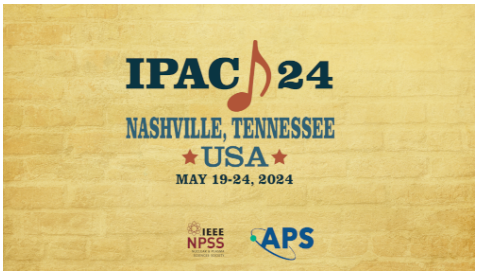

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Simulation studies for the confinement of antiprotons for the AEgIS experiment classification: beam dynamics

Wednesday, 22 May 2024 16:00 (2 hours)

The AEgIS (Antimatter Experiment on Gravity, Interferometry and Spectroscopy) project, based at CERN's Antiproton Decelerator (AD) facility, has undergone significant enhancements, capitalizing on the increased quantity of colder antiprotons made available by the new Extra Low Energy Antiproton Ring (ELENA) decelerator. These improvements aim to create a horizontal beam and enable a direct investigation into the impact of gravity on antihydrogen atoms. This exploration seeks to probe the Weak Equivalence Principle for antimatter.
In AEgIS a series of circular ring electrodes and an axial magnetic field of 1T are utilized for the trapping of antiprotons. This contribution describes the design and optimization of the electrodes to generate a parabolic potential well to effectively trap the antiprotons. The behavior of the trapped antiprotons is reproduced by simulating a spherical source under different bias voltage settings applied to the electrodes. The general layout of the AEgIS trap is shown, alongside suitable electrode configurations, and results from electrostatic particle-in-cell code simulations carried out to optimize the confinement time of the antiprotons.

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