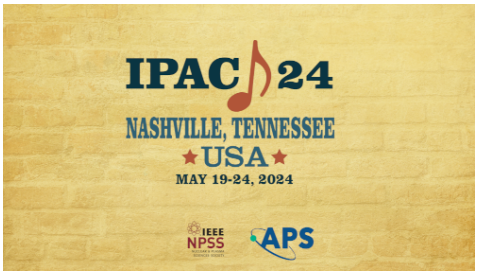

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Comprehensive modeling of Siberian Snakes in BNL's AGS: symplectic tracking and optical compensation

Monday 20 May 2024 16:00 (2 hours)

Meaningful prediction and enhancement of spin-polarization in the RHIC/EIC accelerator complex relies on accurate modeling of each sub-component. Here we describe a symplectic field approximations of both Siberian Snakes in the AGS, enabling practical long-term tracking calculations. Without such symplectic representations, particle motion destabilizes very quickly close to injection energy. This optical instability manifests in $O(10^3)$ turns, and makes dynamic aperture smaller than realistic emittances. Combined with optimization using the Bmad toolkit, we implement steering and optical corrections of the snake effects at 80 distinct energies from injection to extraction, mimicking the measured lattice conditions at each energy. This process unveils unforeseen snake distortions of the vertical dispersion near injection energy, which are addressed. By interpolating between such optimized lattice configurations, Bmad's tracking capabilities allow advanced simulation of polarization transmission through the full AGS cycle.

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