

## Strong-Strong Simulation of Long-Range Beam-Beam effects at RHIC

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Long-range beam-beam interactions can cause significant degrade of beam quality and lifetime in high energy ring colliders. At RHIC, a series of experiments were carried out to study these effects. In this paper, we report on numerical simulation of the long-range beam-beam interactions at RHIC using a parallel strong-strong particle-in-cell code, BeamBeam3D. The simulation includes nonlinearities from both the beam-beam interactions and the arc sextupoles. We observed significant emittance growth for beam separation below 4 sigmas under nominal tunes. A scan study in tune space shows strong emittance growth around 7th order resonance. Including the tune modulation due to chromaticity and synchrotron motion shows larger emittance growth than the case without the tune modulation.

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