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## Advanced modeling and optimization of nuclear physics colliders

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High energy colliders provide a critical tool in nuclear physics study by probing the fundamental structure and dynamics of matter. Optimizing the collider's machine parameters is both computationally and experimentally expensive. A fast and robust optimization framework that includes both beam-beam and the detailed machine lattice will be crucial to attaining the best performance of the collider. In this paper, we report on the development of an integrated framework that includes an advanced Bayesian optimization software GPTune, a self-consistent beam-beam simulation code BeamBeam3D, and the detailed lattice model from MAD-X. Some application results to the RHIC facility optimization will also be presented.

### Footnotes

### Funding Agency

### Paper preparation format

### Region represented

North America

**Primary author:** QIANG, Ji (Lawrence Berkeley National Laboratory)

**Co-authors:** FUNG, William (Facility for Rare Isotope Beams); GU, Xiaofeng (Brookhaven National Laboratory); KAN, Yi-Kai (Lawrence Berkeley National Laboratory); HAO, Yue (Facility for Rare Isotope Beams)

**Presenter:** QIANG, Ji (Lawrence Berkeley National Laboratory)

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