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## Tools for modeling beam dynamics in rings based on nonlinear integrable optics

*Thursday, 3 October 2024 16:00 (30 minutes)*

Storage rings based on the integrable optics concept, such as the Integrable Optics Test Accelerator (IOTA) at Fermilab, pose several challenges to effective numerical modeling due to the complex, nonperturbative structure of the nonlinear dynamics and (for operation with protons) the interplay with high-intensity space charge. A primary modeling goal is to ensure symplectic treatment of both single-particle and collective dynamics for high-fidelity modeling on long time scales. We describe numerical tools implemented to address these issues, challenges posed by validation against theory, and applications to understanding nonlinear integrable dynamics with space charge in IOTA.

**Primary author:** MITCHELL, Chad (Lawrence Berkeley National Laboratory)

**Presenter:** MITCHELL, Chad (Lawrence Berkeley National Laboratory)

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