Contribution ID: **119** Contribution code: **TUP024** Type: **Poster Presentation**

Construction of approximate invariants for non-integrable Hamiltonian systems

Tuesday 12 August 2025 16:00 (2 hours)

We present a method to construct high-order polynomial approximate invariants (AI) for non-integrable Hamiltonian dynamical systems, and apply it to a modern ring-based particle accelerator. Taking advantage of a special property of one-turn transformation maps in the form of a square matrix, AIs can be constructed order-by-order iteratively. Evaluating AI with simulation data, we observe that AI's fluctuation is actually a measure of chaos. Through minimizing the fluctuations, the stable region of long-term motions, i.e., the dynamic aperture of the accelerator, could be enlarged.

Please consider my poster for contributed oral presentation

No

Would you like to submit this poster in student poster session on Sunday (August 10th)

No

Footnotes

Funding Agency

Supported by the U.S. DoE under Contract No. DE-SC0012704, FWP 2025-BNL-PS040-Funding, and HEP award DE-SC0019403.

I have read and accept the Privacy Policy Statement

Yes

Author: LI, Yongjun (Brookhaven National Laboratory)

Co-authors: XU, Derong (Brookhaven National Laboratory); HAO, Yue (Facility for Rare Isotope Beams)

Presenter: LI, Yongjun (Brookhaven National Laboratory)

Session Classification: TUP: Tuesday Poster Session

Track Classification: MC5 –Beam Dynamics and EM Fields