Contribution ID: **27**   Type: **Poster/Demo**

RL-Based Control Strategies for HIPI Accelerator

Thursday, March 7, 2024 3:09 PM (1 minute)

Beam commissioning is a key procedure to achieve high quality beam. Conventional "Monkey ump"tuning is time-consuming and inefficient. Reinforcement learning (RL) can swiftly make decisions based on the current system state and control requirements, providing an efficient control solution for accelerator systems.

High Intensity Proton Injector (HIPI) accelerator requires a rapid and effective control method to meet user demands. To attain this aim, initially, a neural network-based surrogate model is created by collecting HIPI operational data. Subsequently, an RL-based strategy, based on the surrogated model, is used to control the components of HIPI after training on different initial states. Finally, the policy undergoes ten rounds of validation on HIPI. The results consistently illustrate the strategy's capacity to improve beam transmission efficiency within minutes, showcasing the potential of RL in solving particle accelerator control challenges.

Primary Keyword

AI-based controls

Tertiary Keyword

Secondary Keyword

reinforcement learning

Primary author: SU, Chunguang (Institute of modern physics, Chinese Academy of Sciences)

Co-author: CHEN, Xiaolong (Institute of modern physics)

Presenter: SU, Chunguang (Institute of modern physics, Chinese Academy of Sciences)

Session Classification: Poster/Demos

Track Classification: Optimization & Control