Research Facility Development Division
Research Instruments Group
Automated Operation Technology Team

1. Abstract

The Team has just launched in April 2023 with the objective of saving labor and inheriting the expertise of skilled researchers and operators of RIBF in producing high-intensity and high-quality primary and secondary beams. Recognizing the difficulty of manualizing specialized skills and experiences, our strategy involves extensive implementation of advanced AI technologies including machine learning and Bayesian optimization, to achieve our objective. At the Nishina Center, there are some initiatives to automate the operation of the RIBF accelerator complex and BigRIPS in-flight separator. In this regard, the Team will play a pivotal role as a central hub for driving and coordinating these automation initiatives.

2. Major Research Subjects

(1) Implementation of automated beam tuning methods for primary and secondary beam preparation
(2) Implementation of predictive maintenance using advanced AI technologies
(3) Development of a “Digital Twin” for BigRIPS in-flight separator

3. Summary of Research Activity

(1) Classification of time-series data of the RIBF accelerator operation
(2) Development of automatic beam tuning software for the RIBF cyclotron cascade, particularly for the “gleaning” process performed during the final stage of beam tuning.
(3) Development of a digital twin for the BigRIPS in-flight separator. The solver component of the ion optics has been developed based on the differential algebraic method.

Member

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