Contribution ID: **2277** Contribution code: **SUPS037** Type: **Student Poster Presentation**

Real-time luminosity optimization in collider experiments using reinforcement learning

Sunday 1 June 2025 14:00 (2 hours)

This study presents the development and implementation of a reinforcement learning-based algorithm for real-time luminosity tuning in collider experiments. The algorithm is initially pretrained on historical collider data and subsequently fine-tuned online during experiments. By analyzing accelerator measurements collected over several seconds, the model adjusts the magnetic structure to stabilize luminosity under varying experimental conditions. The proposed method allows for adaptive optimization without operator involvement, improving operational efficiency and stability. Results from its application on the VEPP-4M collider are presented, showcasing the method's feasibility and offering insights for its future development and application in accelerator systems.

Footnotes

Paper preparation format

LaTeX

Region represented

Asia

Funding Agency

This work was partially supported by the Ministry of Science and Higher Education of the Russian Federation within the governmental order for Boreskov Institute of Catalysis (project FWUR-2024-0041).

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Session Classification: Student Poster

Track Classification: MC6: Beam Instrumentation and Controls,Feedback and Operational Aspects: MC6.D13 Machine Learning