MATTER AND TECHNOLOGIES

Contribution ID: **144** Type: **Poster ARD**

Automation of GSI key beam manipulations with AI methods

Monday 3 November 2025 18:40 (3 minutes)

We present the Geoff framework for automated accelerator tuning, demonstrated in real-world experiments at GSI. Using classical optimizers like BOBYQA, Geoff enables fast deployment, control room integration, and efficient beam optimization, reducing SIS18 injection losses from 45% to 15% and speeding up FRS setup. This work also reports the first application of multi-objective and multi-fidelity Bayesian optimization to SIS18 injection tuning. Complementary simulation studies employ model predictive control via model-based reinforcement learning for fast, constraint-aware tuning. These model-based methods outperform classical optimizers by guiding experiments with probabilistic surrogate and dynamic models.

Geoff's modular design supports easy switching between algorithms and integration with modern ML tools, bridging accelerator operations and data-driven optimization.

Speed talk:

Normal speed talk selection

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