

ACCELERATOR SEMINAR

Automation of GSI key beam manipulations with AI methods

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Description

We present the Geoff framework for automated accelerator tuning, co-developed by GSI and CERN. 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.

Thursday, November 6th, 2025 at 1:30 PM

**seminar room theory
(SB3.3.170a)**

The seminar takes place exclusively in presence

Coordinator: Udo Weinrich
Secretary: Paola Lindenberg

<https://indico.gsi.de/event/23271/>