

Contribution ID: 899 Contribution code: MOPS68 Type: Poster Presentation

# Automated optimization of accelerator settings at GSI

Monday, 20 May 2024 16:00 (2 hours)

The complexity of the GSI/FAIR accelerator facility demands a high level of automation in order to maximize time for physics experiments. Accelerator laboratories world-wide are exploring a large variety of techniques to achieve this, from classical optimization to reinforcement learning. This paper reports on the first results of using Geoff at GSI for automatic optimization of various beam manipulations. Geoff (Generic Optimization Framework & Frontend) is an open-source framework that harmonizes access to the above automation techniques and simplifies the transition towards and between them. It is maintained as part of the EURO-LABS project in cooperation between CERN and GSI. In dedicated beam experiments, the beam loss of the multi-turn injection into the SIS18 synchrotron has been reduced from 40% to 10% in about 15 minutes, where manual adjustment can take up to 2 hours. Geoff has also been used successfully at the GSI Fragment Separator (FRS) for beam steering. Further experimental activities include closed orbit correction for specific broken-symmetry high-transition-energy SIS18 optics with Bayesian optimization in comparison to traditional SVD-based correction.

### **Footnotes**

#### **Funding Agency**

The EURO-LABS project has received funding from the European Union's Horizon Europe Research and Innovation programme under Grant Agreement no. 101057511.

#### Paper preparation format

LaTeX

## Region represented

Europe

Primary author: APPEL, Sabrina (GSI Helmholtzzentrum für Schwerionenforschung GmbH)

**Co-authors:** OEFTIGER, Adrian (GSI Helmholtzzentrum für Schwerionenforschung GmbH); CALIARI, Conrad (Technische Universität Darmstadt); KAZANTSEVA, Erika (Technische Universitaet Darmstadt); WEICK, Helmut (GSI Helmholtzzentrum für Schwerionenforschung GmbH); MADYSA, Nico (GSI Helmholtzzentrum für Schwerionenforschung GmbH); BOINE-FRANKENHEIM, Oliver (Technische Universität Darmstadt); PIETRI, Stephane

(GSI Helmholtzzentrum für Schwerionenforschung GmbH); ISENSEE, Victoria (Technische Universitaet Darmstadt)

**Presenter:** MADYSA, Nico (GSI Helmholtzzentrum für Schwerionenforschung GmbH)

Session Classification: Monday Poster Session

Track Classification: MC5: Beam Dynamics and EM Fields: MC5.D13 Machine Learning