Accelerator Physics

- Assigned in FAIR Project
- Department head: Oliver Boine-Frankenheim (OBF)
- 7 employees, 2 PhD students and 1 master student
- Strong cooperation with TU Darmstadt, Institute for Accelerator Science and Electromagnetic Fields

Physics of high intensity ion beams

- The GSI accelerator physics department contributes to the optimization of the GSI and FAIR machines, in particular to the SIS18 and SIS100.
- The key aspect of the work is in computer modeling and simulations which are validated by measurements on heavy ion beams.

➢ Investigator in ACCLAIM: Sabrina Appel and Adrian Oeftiger

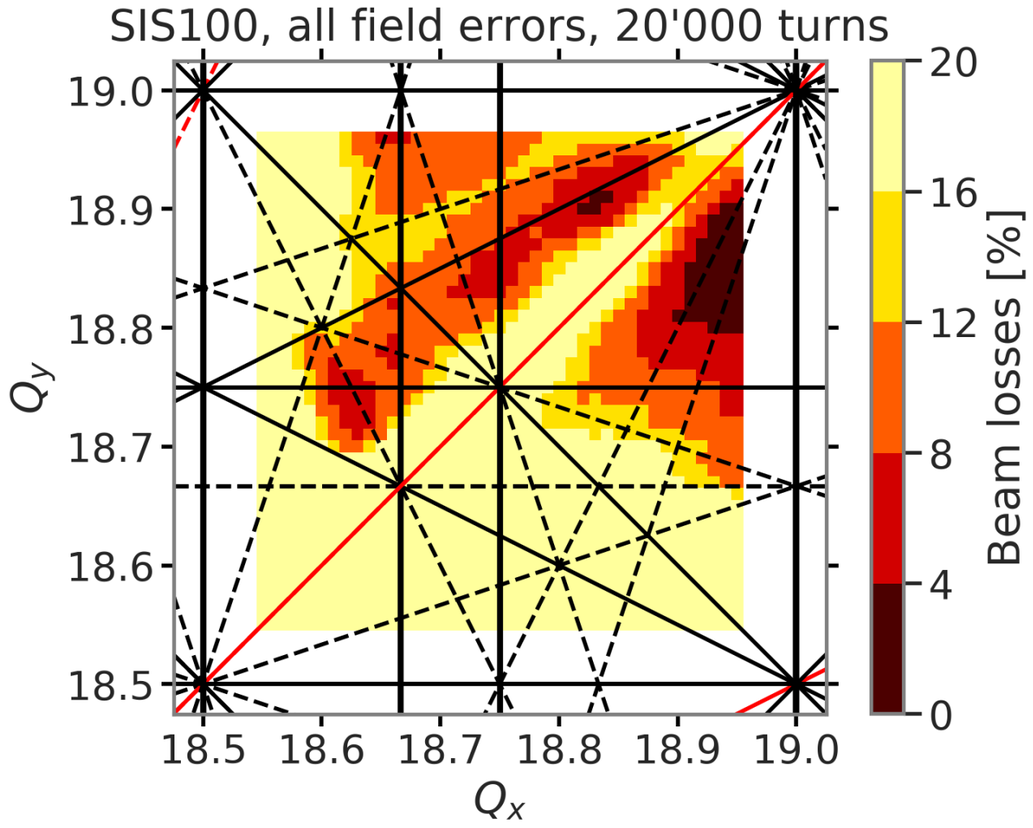
AI Assisted Loss Predictions and Prevention

FAIR SIS100 design and operation goal: Conserve beam quality and minimize beam loss

Evolution of the beam quality and losses is dominated by space charge and magnet error resonances.

Simulation models (on GPUs or multi-core CPU) are very demanding in terms of computing resources.

Fast models are required for optimization, including also counter measures, like correction schemes.



Project: Establish, fast and accurate surrogate models with machine learning, including (simplified) space charge models

Physics-based neural networks[1], requiring no or less training.

- Started already with Master student 3 months ago

[1] A. Ivanov, A. Agapov, PRAB 2020