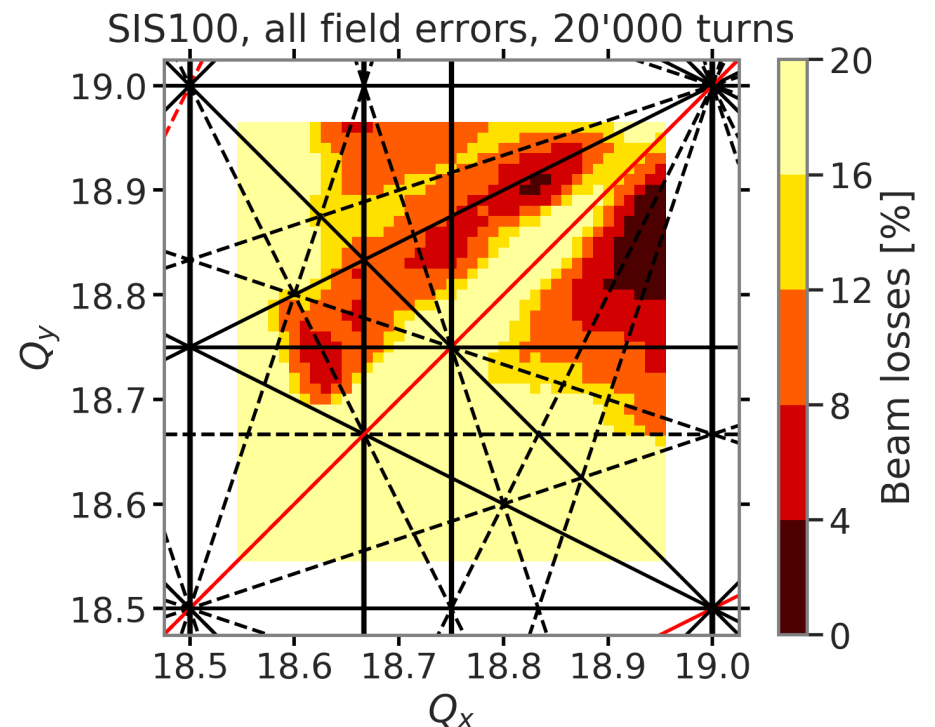


FAIR SIS100 design and operation goal: Conserve beam quality and minimize beam loss

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

Simulation models (on GPUs or multi-core) 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

Computation time:
40 x 40 x 9 x 3 min = 30 day

Physics-based neural networks¹, requiring no or less training.

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