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## Integration of LHC-type beam loss monitors into the protection system for the SIS100 synchrotron at FAIR

*Thursday, 23 May 2024 16:00 (2 hours)*

The SIS100 heavy ion synchrotron is the central machine of the FAIR (Facility for Antiprotons and Ions Research) project at GSI. It presents complex challenges due to its features handling high-intensity ion beams from protons up to uranium. It demands sensitive beam diagnostics with robust Machine Protection Systems (MPS). Due to anticipated extreme conditions, one safety subsystem includes LHC-type Beam-Loss Monitors (BLMs). These BLMs play a critical role in beam diagnostics and machine safety, strengthening protection measures by enhancing monitoring capabilities for severe beam losses and triggering safe beam dump requests. These BLMs are gas chamber detectors which aim to prevent beam-induced quenching superconducting magnets and protect other machine components from damage.

This document outlines a conceptual study of a Machine Protection System, integrating 168 LHC-type BLMs to safeguard the SIS100 synchrotron. The integration involves upgrading the readout electronic chain and adopting FPGA-based logic firmware to handle intricate rate counting requirements over specified time windows. Additionally, hardware sanity checks are carried out to prevent non-conformities and ensure reliability alongside beam loss rate counting. Overall, the focus on beam loss monitoring for the SIS100 within the FAIR project underscores the necessity for sophisticated diagnostic tools and protective measures to ensure the safe and efficient operation of this state-of-the-art synchrotron.

### Footnotes

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### Region represented

Europe

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