

HIGH INTENSITY CHALLENGES OF THE FAIR PROJECT

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Abstract

The FAIR accelerator project at GSI should increase the intensity of primary proton and heavy ion beams by up to two orders of magnitude, relative to the existing GSI facility. In addition to the design of the new synchrotrons and storage rings, the intensity upgrade of the existing UNILAC linac and SIS-18 synchrotron plays a key role for the FAIR project. In order to reach the FAIR design beam parameters several challenges related to operation with high brightness, high current beams in SIS-18 and in the new SIS-100 have to be mastered. Important issues are

- the minimization of beam loss caused by space charge induced resonance crossing and the identification of appropriate working points.
- The control of coherent beam instabilities in the presence of space charge, image currents and different ring impedance sources.
- Beam quality conservation during the rf cycle.
- The control of dynamic vacuum pressure during operation with medium charge state heavy ions.

Following an overview of the different topics and their status this contribution will also highlight some of the ongoing theoretical and experimental studies related to collective effects in the FAIR synchrotrons.

**CONTRIBUTION NOT
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