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Magnetic Field Measurements of the Super-FRS magnets

Thursday 3 April 2025 16:00 (30 minutes)

The Super-FRS (Superconducting FRagment Separator) is part of the new superconducting accelerator complex (FAIR) [1], which is under construction at the Helmholtz Center for Heavy Ion Research (GSI) in Darmstadt, Germany. The Super-FRS is composed of 24 superferric dipole magnets and 31 multiplet assemblies, with up to nine magnets in a common cryostat (175 quadruple and corrector magnets in total). The acceptance tests are currently taking place at CERN in a dedicated cryogenic test facility [2]. To date, two dipole magnets and 13 multiplets have been tested.
This talk will highlight the magnetic measurements testing program. Instruments for the magnetic measurements include, for the multiplets, a 334 mm diameter rotating-coil magnetometer and a single stretched wire system [3]. For the dipole magnets, we use an array of induction coils translating longitudinally through the aperture (i.e., a translating fluxmeter [4]), a single stretched wire, and the 3D mapper. The presentation will compare the applied measurement techniques addressing their respective advantages and limitations.
The talk will outline the measurement results, present the metrological performance of the instruments, and describe the data analysis techniques. The results will include the magnetic axis, field strength and field quality, as well as the crosstalk effect between adjacent magnets. The measurement results will be compared to simulation and the sources of the differences will be discussed. The presentation will conclude with the challenges encountered and lessons learned during the initial part of the measurement campaign.

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