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Electrical Integrity and its Protection for Reliable Operation of Superconducting Machines

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The long term operation of such a complex facility as the superconducting SIS100 accelerator of the FAIR project requires adequate Electrical Integrity (EI). Issues related to EI shall be taken into account at the design, production and commissioning stage respectively. In order to assure the safe and reliable operation of the superconducting magnets at cryogenic conditions, the facility shall be equipped with active protection systems. When using superconducting technology, quench detection and magnet protection are the most essential systems. Their design has a strong influence on the coordination of electrical insulation systems. This paper focuses on the correlation between EI and active protection systems. The presented study provides the basis for the development of adequate electrical integrity tests (including acceptance criteria) that should be performed at both the production and test stage. The case of SIS100 synchrotron is considered as an example.

Primary author: STAFINIAK, Andrzej

Co-authors: Dr FLOCH, Eric (GSI); Mr SZWANGRUBER, Piotr (GSI); Mr FREISLEBEN, Walter (GSI)

Presenter: Mr SZWANGRUBER, Piotr (GSI)

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