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Optimized magnetic field design for superferric rapidly cycling synchrotron magnets and their measurement.

Superferric magnets using a Nuclotron cable are an effective choice for rapidly cycled synchrotrons with a maximum field of about two Tesla. The core component of FAIR, SIS 100, is based on the hollow cable cooled by a two phase forced helium flow. The dipole magnets are curved and the used aperture is elliptic within all magnets. In this talk we show the requirements to calculate the fields of such magnets, illustrate the theoretical tools for a parameterized description of the fields and show the major impact of the vacuum chamber design on the field quality. Finally we illustrate the MM system to measure these rapidly-cycling magnets.