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Design and measurement of prototype magnets for FETS-FFA

Wednesday 4 June 2025 16:00 (2 hours)

With no pulsed high intensity Fixed Field Alternating gradient accelerator (FFA) ever built, a prototype called FETS-FFA was proposed to study the FFA option for the next generation spallation neutron source (ISIS-II). The main magnets must satisfy the following conditions: zero chromaticity during acceleration, flexibility in operating tunes and a large dynamic aperture.
The chosen design utilizes a novel double spiral cell. The magnetic field ratio between the magnets and the field index can be adjusted to control the tune working point, while the circumference of the machine minimised by introducing a spiral angle on the magnets. The magnetic field is generated by distributed conductors wrapped around the pole, each carrying a different current. Three dimensional studies were carried out in OPERA 3D, where the magnets were optimised to achieve a ring tune variation of +/- 0.02 in both planes (target 0.01). The optimisation procedure together with the simulation results are presented below. In addition, a smaller sector magnet was manufactured to verify the effects of the distributed conductors experimentally; the set up and results of the experiment will also be discussed.

Footnotes

Paper preparation format

LaTeX

Region represented

Europe

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