



Contribution ID: 100 Contribution code: THCAB01

Type: Contributed Oral Presentation

The Effect of Magnet Alignment on Closed Orbits in the ISIS Rapid Cycling Synchrotron

Thursday, October 23, 2025 10:00 AM (20 minutes)

The ISIS Rapid Cycling Synchrotron (RCS) operates at a repetition rate of 50 Hz and delivers high-intensity proton beams of up to 3×10^{13} protons per pulse at 800 MeV to two neutron and one muon production targets. Maintaining control over the closed orbit is essential to optimal performance. Magnet alignment surveys are now regularly carried out during accelerator shutdowns, translated into misalignments, and applied to a cpy-mad model of the RCS. The model is used to identify realignment candidates and infer the bare (uncorrected) orbit. This paper includes comparison of inferred and measured bare orbits, and the operational implications of realignment based on the model. The approach demonstrates the value of integrating magnet alignment survey data with beam dynamics modelling to inform machine setup and improve operational performance in high-intensity synchrotrons.

Footnotes

Funding Agency

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Yes

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Session Classification: THCAB WGD contributed oral

Track Classification: WGD:Operations and Commissioning