



Contribution ID: 1089 Contribution code: WEPM129

Type: **Poster Presentation**

Testing of a ZEPTO tuneable permanent magnet quadrupole at Diamond Light Source

Wednesday, 10 May 2023 16:30 (2 hours)

Electromagnets have traditionally been used in accelerators due to their wide range of tuneability with high accuracy, but are a major factor in power consumption due to resistive losses in the coils and inefficiencies in power and cooling systems. Use of permanent magnets can greatly reduce power consumption, but it has proved difficult to produce the same range of tuning with comparable field accuracy and stability. A tuneable permanent magnet quadrupole has been developed at STFC Daresbury Laboratory that moves permanent magnet blocks relative to fixed steel structures that define the field, allowing strength to be changed while suitable field homogeneity is maintained.

This prototype magnet has been installed in the Diamond Light Source booster-to-storage ring transfer line, aiming to demonstrate the operation of ZEPTO (Zero-Power Tuneable Optics) technology on a real accelerator for the first time. We present results of beam-based measurements of gradient and magnetic centre and comparison with an existing electromagnet in the same transfer line, showing that it is capable of maintaining the same injection efficiency as a traditional resistive electromagnetic quadrupole during normal operation.

Funding Agency

Footnotes

I have read and accept the Privacy Policy Statement

Yes

Primary author: FIELDER, Richard (Diamond Light Source Ltd)

Co-authors: HINTON, Alex (Science and Technology Facilities Council); BAINBRIDGE, Alexander (Science and Technology Facilities Council); SHEPHERD, Ben (Science and Technology Facilities Council); MARTIN, Ian (Diamond Light Source Ltd); KRUMPA, Nicholas (Science and Technology Facilities Council)

Presenter: BAINBRIDGE, Alexander (Science and Technology Facilities Council)

Session Classification: Wednesday Poster Session

Track Classification: MC7: Accelerator Technology and Sustainability: MC7.T34: Permanent Magnets