



Contribution ID: 1245 Contribution code: TUPR42

Type: **Poster Presentation**

Design fabrication and measurements of a quadrupole wiggler prototype

Tuesday, 21 May 2024 16:00 (2 hours)

A quadrupole wiggler consisting of a row of alternating polarity quadrupoles is used in a collinear wakefield accelerator under development at Argonne National Laboratory. We designed such a wiggler and fabricated a prototype consisting of four quadrupoles. The permanent magnet-excited quadrupole has a bore diameter of 3 mm, a length of 25 mm, and a peak magnetic field gradient of 0.94 T/mm. Fine translational and angular adjustment mechanisms were implemented in all quadrupoles to obtain better than one-micrometer alignment of the quadrupole wiggler assembly. The quadrupole wiggler prototype was measured and aligned employing the pulsed wire technique. We describe the design, fabrication, and alignment of this quadrupole wiggler prototype and describe the influence of the ambient temperature on the quadrupole wiggler alignment.

Footnotes

Funding Agency

Work supported by the U.S. DOE Office of Science-Basic Energy Sciences, under Contract No. DEAC02-06CH11357.

Paper preparation format

LaTeX

Region represented

North America

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Session Classification: Tuesday Poster Session

Track Classification: MC7: Accelerator Technology and Sustainability: MC7.T09 Room Temperature Magnets