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A design for very short superconducting quadrupoles

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Powered optics magnets which could be stacked in a very dense alternating pattern could enable a higher density of focusing in beamlines, with potential use for e.g. muon beams or high-current hadron beams at low energy. Here, we investigate such a design of quadrupole, where the yoke is energised by straight conductors running parallel to the beam, and does not require conductor to pass within the gap between yokes of adjacent magnets of opposite polarity. Suitable shaping and design of the steel yokes allows alternating focusing and defocusing quadrupoles, of arbitrary thickness, to be positioned with only the spacing required for constraining fringe fields. We investigate multiple thicknesses/sizes, and the use of thin field clamps to further reduce the required spacing between quadrupoles.

Footnotes

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Europe

Primary author: HERROD, Alexander (Ion Beam Applications SA)

Presenter: HERROD, Alexander (Ion Beam Applications SA)

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