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Non-scaling fixed-field proton accelerator with constant tunes

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Recent studies by Dejan Trbojevic have confirmed that Non-Scaling Fixed Field Accelerators (NS-FFAs) can have their tune dependence on momentum flattened by adding non-linear components to the magnet fields, although not necessarily for an unlimited momentum range. This paper presents such a cell suitable for the proposed 3-12MeV FETS-FFA proton R&D ring at RAL.
The nonlinear magnetic field components are found automatically using an optimiser and settings covering a ring tune range of one unit in both planes independently are attainable. A fully configurable magnet with multiple windings across its horizontal aperture has been designed in 2D using Poisson, which can produce the required nonlinear fields without exceeding 5A/mmˆ2 current density.

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Footnotes

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Yes

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