

A compact, high power FFAG proton driver for ADS

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Fixed-field alternating gradient accelerators are proving to be a highly promising candidate for next-generation 10 MW-class high power proton drivers due to recent advances in design which demonstrate continuous (CW) operation combined with stable, 2-4 m long straight sections allowing insertion of high-gradient RF. The resulting 1-GeV 'FFAG cyclotron' thus supports a continuous (CW) beam with far lower peak current than the pulsed alternative. Both a circular and racetrack version have been designed including modeling 3D space charge using the OPAL framework and beam dynamics with fast acceleration in the 'serpentine channel'. The addition of strong and reverse gradient in a nonscaling optimized lattice are found to mitigate space charge and emittance blowup. Simulations indicate stability above the 10 mA threshold required for 10 MW operation.

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