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Study The Dynamic Aperture Of A Compact Hadron Driver For Cancer Therapy

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ABSTRACT.

A design of a compact hadron driver for future cancer therapies based on the induction synchrotron concept is given. In order to realize a slow extraction technique in a fast cycling synchrotron, which allows the energy sweep beam scanning, the zero momentum-dispersion $D(s)$ region and high flat $D(s)$ region are necessary. The present design meets both requirements. The lattice has the two-fold symmetry with a circumference of 52.8 m, 2 m-long dispersion-free straight section, and 3 m-long large flat dispersion straight section. Assuming a 1.5 T bending magnet, the ring can deliver heavy ions of 200 MeV/au at 10 Hz. Details of the lattice parameters and dynamic aperture approach and method are studied are discussed.