SYSTEMS ANALYSIS FOR MODULAR VERSUS MULTI-BEAM HIF DRIVERS*

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Previous modeling for HIF drivers has concentrated on designs in which 100 or more beams are grouped in an array and accelerated through a common set of induction cores [1,2]. The total beam energy required by the target is achieved by the combination of final ion energy, current per beam and number of beams. Economic scaling favors a large number of small (~1 cm dia.) beams. An alternative architecture has now been investigated, which we refer to as a modular driver. In this case, the driver is subdivided into many (>10) independent accelerators with one or many beams each. A key objective of the modular driver approach is to be able to demonstrate all aspects of the driver (source-to-target) by building a single, lower cost module compared to a full-scale, multi-beam driver. We consider and compare several design options for the modular driver including single-beam designs with solenoid instead of quadrupole magnets in order to transport the required current per module in a single beam. Multi-beam, quad focus modules and solenoid/quad combinations are also evaluated. The drivers are designed to meet the requirements of the hybrid target, which can accommodate a larger spot size than the distributed radiator target that was used for the Robust Point Design [2]. We compare the multi-beam and modular driver configuration for a variety and assumptions and identify key technology advances needed for the modular design.

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