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Parameters and Requirements of Superconducting Quadrupole Arrays for Heavy Ion Fusion

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In a heavy-ion fusion driver, arrays of superconducting quadrupoles will transport parallel beams through a sequence of induction acceleration cells. The development of such arrays is a unique and challenging task. Since magnetic transport is one of the most expensive subsystems in a fusion driver, economy of fabrication is a primary consideration. A compact design is essential to limit the size and cost of induction cores. Special edge coils have to be implemented to adjust the field in outer cells and terminate the magnetic flux. Excellent beam tube vacuum is needed to minimize beam loss and associated energy deposition in the superconducting coils.

The development of superconducting magnets for both near term experiments and the ultimate driver application is being actively pursued by the Heavy Ion Fusion Program. The main parameters and requirements will be discussed, and present R&D status and plans will be presented.

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