Title
Injector development for heavy ion fusion

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☐ Theory ☒ Experiment

Injector Development for Heavy Ion Fusion,* J.W. Kwan, O. A. Anderson, D.N. Beck, F. M. Bieniosek, A. Faltens, E. Henestroza, S. A. MacLaren, P. A. Seidl, LBNL, Berkeley, CA; L. Ahle, D. P. Grote, E. Halaxa, T. C. Sangster, LLNL, Livermore, CA; W. B. Herrmannsfeldt, SLAC, Stanford, CA—A typical driver-scale heavy ion fusion injector is expected to have $>$50 A total beam current at $\sim$ 2 MeV in an array of $\sim$ 100 beams. The traditional way is to start with low current density beams by gradually compress and steer each beam radially. Thus the matching section assembly resembles a large funnel. Another option is to merge high current density miniature beamlets into multiple 0.5 A beams before injecting into the matching section. In this case, both the ion temperature and the grid transparency are important in determining the emittance of the merged beam. An injector based on the multi-beamlet method can be smaller, cheaper and more effective in beam matching, but the requirements on the ion source technology are more demanding. We will compare injector designs based on these two methods and identify critical areas for future development.

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