

Considerations for high current density ion injectors for HEDP*

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For our planned high energy density physics (HEDP) experiments using 20 MeV Ne⁺ ions, the required beam charge is about 1 μ C. Lighter ions would take lower beam energy and more beam charge. For the desired pulse length on target of a few nanoseconds, and with a reasonable time compression factor, the pulse length at the ion source should not be more than a few 100 ns. Thus the beam current at the injector will be on the order of 10 A. To focus the beam onto a small spot requires low transverse emittance, therefore the ion source must be simultaneously both very high current and very high current density. This is typically a difficult beam transport problem at low beam energy. Drawing from our experience in developing injectors for heavy ion fusion (HIF), we will examine the various possible options that can be employed to design injector systems for HEDP drivers and identify our favorite approach.

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