Lawrence Berkeley National Laboratory

Recent Work

Title
Multiple-beam ion guns for heavy ion fusion

Permalink
https://escholarship.org/uc/item/3wv796rw

Author
Henestroza, E.

Publication Date
2000-11-20
Multiple-Beam Ion Guns for Heavy Ion Fusion*
E. Henestroza, D.N. Beck, A. Faltens, J.W. Kwan
Lawrence Berkeley National Laboratory
D.P. Grote
Lawrence Livermore National Laboratory

Latest designs of ion guns for a Multiple-Beam-Injector (~50 A, ~1.6 MeV, ~100 beams) for Heavy Ion Fusion application have focused on two methods.

In the first approach each ion gun will deliver ~500 mA at full energy (~1.6 MeV) for each beam. In this case the accelerating column requires a rather large diameter channel, increasing the risk of electrical breakdowns in the injector. Our present design is based on a voltage holding capability of 1.6 MV in a 75-cm column.

In the second approach each ion gun will consist of multiple miniature beamlets (~20 mA) accelerated to an intermediate energy (~1 MeV) in their own channels and further accelerated while the beamlets are merged to produce the required current and energy (~500 mA, ~1.6 MeV). This method reduces the risk of electrical breakdowns but increases emittance due to beam merging.

We will present the ion gun designs and simulations based on these concepts.

*Work supported by DOE, Office of Fusion Science, under DOE Contract No. DE-AC03-76F00098.