replacing DPP16-2016-001426.

Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

MEMS based ion beams for fusion[1] A. PERSAUD, P.A. SEIDL, Q. JI, W.L. WALDRON, T. SCHENKEL, LBNL, S. ARDANUC, K.B. VINAYAKUMAR, Z.A. SCHAFFER, A. LAL, Cornell — Micro-Electro-Mechanical Systems (MEMS) fabrication provides an exciting opportunity to shrink existing accelerator concepts to smaller sizes and to reduce cost by orders of magnitude. We revisit the concept of a Multiple Electrostatic Quadrupole Array Linear Accelerator (MEQALAC) and show how, with current technologies, the concept can be downsized from gap distances of several cm to distances in the sub-mm regime. The basic concept implements acceleration gaps using radio frequency (RF) fields and electrostatic quadrupoles (ESQ) on silicon wafers. First results from proof-of-concept experiments using printed circuit boards to realize the MEQALAC structures are presented. We show results from accelerating structures that were used in an array of nine (3x3) parallel beamlets with He ions at 15 keV. We will also present results from an ESQ focusing lattice using the same beamlet layout showing beam transport and matching. We also will discuss our progress in fabricating MEMS devices in silicon wafers for both the RF and ESQ structures and integration of necessary RF-circuits on-chip. The concept can be scaled up to thousands of beamlets providing high power beams at low cost and can be used to form and compress a plasma for the development of magnetized target fusion approaches.

[1]This work was supported by the Office of Science of the US Department of Energy through the ARPA-e ALPHA program under contracts DE- AC0205CH11231 (LBNL).

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Date submitted: 25 Jul 2016 Electronic form version 1.4