

Abstract Submitted
for the GEC11 Meeting of
The American Physical Society

The characteristics of a Hall plasma discharge ion accelerator operating on molecular nitrogen KEITH LOEBNER, EUNSUN CHA, NICOLAS GASCON, MARK CAPPELLI, Stanford University — Generally, ionization and acceleration efficiencies are low in Hall ion sources operating on low molecular weight gases. The reasons for such low efficiencies include energy losses into internal molecular modes (including dissociation) as well as short residence times within the discharge itself due to the high neutral molecular speeds. In this study, we have designed and fabricated a Hall discharge with an extended channel and magnetic field distribution to promote longer residency. The design was motivated by hybrid simulations of the discharge with the desire to optimize ion current. Preliminary operation confirms that unlike operation on pure heavy monatomic gases such as krypton, the discharge currents are significantly higher at comparable discharge voltage. The discharge characteristics and ion current are compared to hybrid fluid/PIC simulations which use a parameterized electron transport model driven by azimuthal shear in the electron fluid.

Mark Cappelli
Stanford University

Date submitted: 18 Jul 2011

Electronic form version 1.4