Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Frequency threshold for ion beam formation in expanding RF plasma SAIKAT CHAKRABORTY THAKUR, ZANE HARVEY, IOANA BILOIU, ALEX HANSEN, ROBERT HARDIN, WILLIAM PRZYBYSZ, EARL SCIME, West Virginia University — We observe a threshold frequency for ion beam formation in expanding, low pressure, argon helicon plasma. Mutually consistent measurements of ion beam energy and density relative to the background ion density obtained with a retarding field energy analyzer and laser induced fluorescence indicate that a stable ion beam of 15 eV appears for source frequencies above 11.5 MHz. Reducing the frequency increases the upstream beam amplitude. Downstream of the expansion region, a clear ion beam is seen only for the higher frequencies. At lower frequencies, large electrostatic instabilities appear and an ion beam is not observed. The upstream plasma density increases sharply at the same threshold frequency that leads to the appearance of a stable double layer. The observations are consistent with the theoretical prediction that downstream electrons accelerated into the source by the double layer lead to increased ionization, thus balancing the higher loss rates upstream [1]. 1. M. A. Lieberman, C. Charles and R. W. Boswell, J. Phys. D: Appl. Phys. **39** (2006) 3294-3304

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Date submitted: 19 Jun 2008 Electronic form version 1.4