

Abstract Submitted  
for the DPP07 Meeting of  
The American Physical Society

Sorting Category: 1.3.8 (T)

**Plume Narrowing in a Cylindrical Hall Thruster<sup>1</sup>**

NATHANIEL FISCH, PPPL, AMNON FRUCHTMAN, Holon, YEVGENY RAITSES, PPPL, JEAN MARCEL RAX, Ecole Polytechnique — The cylindrical Hall thruster features high ionization efficiency, quiet operation, ion acceleration in a large volume-to-surface ratio channel, and performance comparable with the state-of-the-art conventional Hall thrusters [1]. The magnetic field of the cylindrical Hall thruster also differs from conventional annular Hall thrusters in that significant numbers of electrons can be trapped through magnetic-electric mirroring. Recently, by overrunning the discharge current, these thrusters also featured very significant plume narrowing, accompanied by significantly enhanced efficiencies [2]. This plume narrowing may be related in detail to the unusual magnetic configuration of the cylindrical thruster and the populations of electrons that it can support.

[1] Y. Raitses and N. J. Fisch, Parametric Investigations of Non-Conventional Hall Thruster, *Physics of Plasmas* 8, 2579 (2001).

[2] Y. Raitses, A. Smirnov, and N. J. Fisch, Enhanced Performance of Cylindrical Hall Thrusters, *Applied Physics Letters* 90, 221502 (2007).

<sup>1</sup>This work was supported by the AFOSR and US DOE.

Prefer Oral Session  
 Prefer Poster Session

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Date submitted: 21 Jul 2007

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