Abstract Submitted
for the GEC14 Meeting of
The American Physical Society

Iodine as propellant for electric space propulsion PASCALINE GRONDEIN, PASCAL CHABERT, ANE AANESLAND, Laboratoire de Physique des Plasmas — In PEGASES (an electric gridded thruster) both positive and negative ions are expelled after extraction from an ion-ion plasma formed downstream a localized magnetic field placed a few centimeters from the ionization region. For this thruster concept, we believe that Iodine is the best candidate. Its advantages are multiple: heavy and therefore good for high thrust, low ionization threshold and high electronegativity (the latter crucial for PEGASES) leading to high ion-ion densities and low RF power, at solid state at STP with a high vapor, and finally inexpensive. Iodine is also di-atomic and therefore energy loss in dissociation processes are reduced compared to SF6. We present here a dedicated experimental set-up intended for iodine experiments. The injection system consists of an evaporation chamber with temperature controlled gas lines and vacuum chamber to control condensation. A global model of the iodine electronegative plasma will be developed to compare and predict the plasma behavior and composition inside the thruster. The main challenge in this model is to reproduce the conditions of a strongly segregated plasma with two regions: one with rather high electron temperature and low electronegativity and the other an ion-ion plasma with low temperature.

Pascaline Grondein
Laboratoire de Physique des Plasmas

Date submitted: 13 Jun 2014 Electronic form version 1.4