Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Thermal Phenomena in Gas Confinement Dielectric Tube of the VASIMR Helicon Plasma DAN BERISFORD, Univ of Texas at Austin, R. BENGTSON, L. RAJA, J. SQUIRE, L. CASSIDY, J. CHAUNCERY, G. MCCASKILL, AD ASTRA ROCKET COMPANY COLLABORATION — A quartz dielectric tube provides gas confinement in the helicon discharge of the VASIMR (Variable Specific Impulse Magnetoplasma Rocket) experiment. Despite highly aligned magnetic field lines to confine the plasma in the discharge, significant thermal heating of the dielectric tube occurs. We perform infrared camera imaging studies of heating of the tube with varying operational parameters of the experiment. Results show decreased heating of the tube as the plasma becomes more highly magnetized and less collisional. The data follows a trend that is well represented by a Bohm transport of ions perpendicular to the magnetic field lines suggesting that ion impact on the tube rather than radiation is the primary heating mechanism. Highly localized heating is also observed directly under the antenna in regions where the coils lie closest to the tube surface. This phenomenon is attributed to capacitive coupling effects that accelerate ions under the antenna coils, increasing the local energy flux to the tube surface.

Charles Lee
Univ of Texas at Austin

Date submitted: 20 Jul 2007 Electronic form version 1.4