Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Measuring the parameters of a high flux plasma in Proto-MPEX[1]

C. SKEEN, Oak Ridge High School, Oak Ridge, TN, T.M. BIEWER, Oak Ridge National Laboratory, Oak Ridge, TN, C.L. CANTRELL, Polk County Early College, Columbus, NC, J.C. KLEMM, Alleghany High School, Cumberland, MD, R.A. MUSICK, Mount View High School, Welch, WV, G. NUNLEY, Tazewell High School, Tazewell, VA, J.S. SALAZAR SANCHEZ, Ashe County High School, West Jefferson, NC, D.J. SAWYER, School of Inquiry and Life Sciences, Asheville, NC, H. RAY, G. SHAW, M. SHOWERS, University of Tennessee, Knoxville, TN — The Prototype Material Plasma Exposure Experiment (Proto-MPEX) is a linear, magnetically confined plasma production device, utilizing a helicon antenna. The plasma column interacts with a material target at the end of the device, creating plasma-material interaction conditions that are relevant to the conditions that are expected in future fusion reactors. Moreover, helicon antenna plasma sources have been proposed as propulsion devices for spacecraft. It has been observed that in some circumstances the Proto-MPEX plasma exerts sufficient force on the target plate to cause the target to recoil. A ballistic probe has been designed to measure the force and heat flux profile of the plasma. The probe response has been calibrated, using scales, thermocouples, and fast camera imaging. The ballistic probe has been inserted into Proto-MPEX plasmas and the heat flux profile of the plasma has been measured. Also the maximum force that is exerted on the probe has been estimated.

[1]This work was supported by the US. D.O.E. contract DE-AC05-00OR22725, and the Oak Ridge Associated Universities ARC program.

Theodore Biewer
Oak Ridge National Laboratory

Date submitted: 15 Jul 2016 Electronic form version 1.4