

Abstract Submitted
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High-density operation of the Proto-MPEX High Intensity Plasma Source¹ J.B.O. CAUGHMAN, R.H. GOULDING, T.M. BIEWER, T.S. BIGELOW, I.H. CAMPBELL, J. CANESES, S.J. DIEM, E.H. MARTIN, C.M. PARISH, J. RAPP, Oak Ridge National Laboratory, H.B. RAY, G.C. SHAW, M.A. SHOWERS, D. DONOVAN, University of Tennessee, P.A. PIOTROWICZ, D.C. MARTIN, University of Illinois — The Prototype Materials Plasma Experiment (Proto-MPEX) is a linear high-intensity RF plasma source that combines a high-density helicon plasma generator with ion and electron heating sections. It is being used to study the physics of heating over-dense plasmas in a linear configuration with the goal of delivering a plasma heat flux of ~ 10 MW/m² at a target. The helicon plasma is produced by coupling 13.56 MHz RF power at levels of >100 kW. A ~ 30 kW ion cyclotron antenna has recently been installed, and microwaves at 28 GHz (~ 150 kW) are coupled to the electrons in the over-dense helicon plasma via Electron Bernstein Waves (EBW). High plasma densities near the target have been produced in D ($\sim 5 \times 10^{19}$ /m³), and electron temperatures range from 3 to >10 eV, depending on the source parameters. IR camera images of the target plate indicate plasma heat depositions >10 MW/m² for some operating conditions. Details of the experimental results of the operational domain with respect to T_e and n_e as well as results from initial plasma material interaction tests will be presented.

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