

Abstract Submitted  
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**Production of high-density highly-ionized helicon plasmas in the ProtoMPEX**<sup>1</sup> J.F. CANESES, ORNL, N. KAFLE, M. SHOWERS, University of Tennessee, Knoxville, R.H. GOULDING, T.M. BIEWER, J.B.O. CAUGHMAN, T. BIGELOW, J. RAPP, ORNL — High-density ( $2\text{-}6 \times 10^{19} \text{ m}^{-3}$ ) Deuterium helicon plasmas in the ProtoMPEX have been produced that successfully use differential pumping to produce neutral gas pressures suitable for testing the RF electron and ion heating concepts. To minimize collisional losses when heating electrons and ions, plasmas with very low neutral gas content ( $\ll 0.1 \text{ Pa}$ ) in the heating sections are required. This requirement is typically not compatible with the neutral gas pressures ( $1\text{-}2 \text{ Pa}$ ) commonly used in high-density light-ion helicon sources. By using skimmers, a suitable gas injection scheme and long duration discharges ( $>0.3 \text{ s}$ ), high-density plasmas with very low neutral gas pressures ( $\ll 0.1 \text{ Pa}$ ) in the RF heating sections have been produced. Measurements indicate the presence of a highly-ionized plasma column and that discharges lasting at least  $0.3 \text{ s}$  are required to significantly reduce the neutral gas pressure in the RF heating sections to levels suitable for investigating electron/ion RF heating concepts in this linear configuration.

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