Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Operation of Proto-MPEX with High Magnetic Field Strength in the Helicon Source Region R. H. GOULDING, J. F. CANESES, J. B. CAUGHMAN, C. H. LAU, E. H. MARTIN, T. M. BIEWER, T. S. BIGELOW, J. RAPP, Oak Ridge National Laboratory, C. J. BEERS, University of Tennessee — Several changes to the operating configuration in Proto MPEX have allowed successful production of high density deuterium plasmas at the highest magnetic field strength yet achieved in the helicon region of 0.15 T. The changes include: combining of power from two 13.56 MHz transmitters, achieving a net RF power into the helicon antenna of up to 180 kW, increasing the diameter of the hole in the skimmer plate downstream from the helicon source, and ramping of the magnetic field in the helicon region from an initial value during plasma breakdown of 0.05 T. With these changes, record deuterium plasma density up to $1.5 \times 10^{20} m^{-3}$ at the target has been achieved, as measured with a double Langmuir probe, and consistent with Stark broadening measurements that have also been made. The highest central/edge heat fluxes for plasmas heated only by the helicon RF were also achieved of 1.8/2.8 $MW - m^{-2}$, simultaneously with an increased plasma diameter at the target of 4 cm. This high-performance operation has been useful for other experiments, for instance it has allowed the demonstration of successful EBW heating of electrons at a plasma density considerably above the cutoff value.

Richard Goulding
Oak Ridge National Laboratory

Date submitted: 02 Jul 2020 Electronic form version 1.4