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Observation of the effects of stronger magnetic fields on warm, higher energy electrons and ion beams transiting a double layer in a helicon plasma[1] JOHN SCHARER, YUNG-TA SUNG, YAN LI, University of Wisconsin, Madison — Fast, two-temperature electrons (>80 eV, Te=13 eV tail, 4 eV bulk) with substantial tail density fractions are created at low (<=1.7 mtorr) Ar pressure @ 340 G in the antenna region with nozzle mirror ratio of 1.4 on MadHeX @ 900W. These distributions including a fast tail are observed upstream of a double layer. The fast, untrapped tail electrons measured downstream of the double layer have a higher temperature of 13 eV than the trapped, upstream electrons of 4 eV temperature. Upstream plasma potential fluctuations of $+-30$ percent are observed. An RF-compensated Langmuir probe is used to measure the electron temperatures and densities and OES, mm wave IF and an RPA for the IEDF are also utilized. As the magnetic field is increased to 1020 G, an increase in the electron temperature and density upstream of the double layer is observed with Te= 15-25 eV with a primarily single temperature mode. Accelerated ion beam energies in the range of 65-120 eV are observed as the magnetic field is increased from 340 to 850 G. The role of the nozzle, plasma double layer and helicon wave coupling on the EEDF and ion acceleration will be discussed. Y.-T. Sung, Y. Li, J. E. Scharer, Phys. Plasmas 23, 092113 (2016)

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