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Spatial distributions of hot electrons from a helicon plasma source, as measured by a retarding field energy analyzer (RFEA).[1] ASHILD FREDRIKSEN[2], UiT The Arctic University of Norway — The information about the electron population emanating from a helicon source plasma is important in order to understand the formation of the current-free double layer (CFDL) between the source and the downstream region of a helicon plasma. The electrons need an energy higher than the potential drop across the CFDL to escape downstream from the source, and at these energies, the signal of a standard Langmuir probe is less accurate. We present measurements of the high-energy tail of the electrons by an inverted RFEA. To reach the probe, these electrons must have energies above V_p, which can vary over the region of the measurement. By constructing a full distribution from the electron temperature T_e obtained from the electron IV curve and the V_p obtained from the ion IV-curve from a standard RFEA setup, we obtained a density measure of the hot distribution independent of V_p. We compared the axial development of this high-energy density by a simple model of the electron density taking the product of the Boltzmann relation and magnetic flux conservation. The agreement between the measured and calculated energetic electron density development was in qualitative agreement to within <10 % error of the experimental values.

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