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SOLPS modeling of the ORNL helicon and PhIX experiments[1]
L.W. OWEN, Y.K.M. PENG, J.B. CAUGHMAN, R.H. GOULDING, ORNL, X. BONNIN, CNRS LSPM UPR 3407, Université Paris 13 — The ORNL helicon experiment has produced large cross section plasmas (12cm) at high densities (up to $4x10^{19}/m^3$ in D and $6x10^{19}/m^3$ in He) at high powers (up to 90kW). The Physics Integration eXperiment (PhIX) will investigate adding electron heating with Whistler waves (18GHz) and EBW (18GHz) to the helicon source plasma in order to increase T_e. Interpretative analyses of the helicon discharges in D and He with the SOLPS transport code show that 2D heating profiles based on resonant power absorption calculations reproduce the main features of the measured density and temperature distributions. The PhIX plasma column, including the helicon and RF heated mirror cell, has diameter $\approx$ 12-15 cm and length $\approx$ 3 m. Predictive SOLPS simulations of PhIX, with additional EBW and Whistler power absorption profiles from the GENRAY-C code, indicate a doubling of T_e in the mirror cell. With plasma fueling by an upstream gas puff, calculations indicate $\approx$ 2:1 power split between the downstream and upstream targets.

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