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Spectroscopic neutral density and electron temperature measurements in a microwave generated plasma with varying fractional ionization¹ ELEANOR WILLIAMSON, DAVID ENNIS, GREGORY HARTWELL, CURTIS JOHNSON, STUART LOCH, DAVID MAURER, Auburn University — Understanding the coupling of fully ionized and neutrally dominated plasmas is important to the study of transition regions of the magnetosphere/ionosphere of the earth, corona/chromosphere of the sun, and up stream/detached divertors in fusion devices. Precisely characterizing the fractional ionization of the plasma requires accurately measuring neutral density in addition to the plasma density. We use an absolutely calibrated spectrometer coupled with results from a Collisional Radiative Model (CRM) solver to measure the neutral density in low temperature Compact Toroidal Hybrid plasmas heated by ECRH with up to 2 kW of input power. A triple probe and interferometer measure electron densities in the range of $1 \times 10^{17} \text{ m}^{-3}$ to $1 \times 10^{19} \text{ m}^{-3}$ and electron temperatures from 1 eV to 10 eV. A synthetic neutral argon spectrum from the CRM shows good agreement with the experimental spectra. Results will be presented from a study of varying the fractional ionization of the plasma for a variety of discharge conditions.

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