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Expansion of Collisional Radiative Model for Helium line ratio spectroscopy DAVID CINQUEGRANI, UW-Madison, CHRIS COOPER, General Atomics, CARY FOREST, JASON MILHONE, UW-Madison, JORGE MUNOZ-BORGES, Johns Hopkins U, OLIVER SCHMITZ, UW-Madison, EZEKIAL UNTERBERG, ORNL — Helium line ratio spectroscopy is a powerful technique of active plasma edge spectroscopy. It enables reconstruction of plasma edge parameters like electron density and temperature by use of suitable Collisional Radiative Models (CRM). An established approach is successful at moderate plasma densities ($\sim 10^{18} m^{-3}$ range) and temperature (30-300eV), taking recombination and charge exchange to be negligible. The goal of this work is to experimentally explore limitations of this approach to CRM. For basic validation the Madison Plasma Dynamo eXperiment (MPDX) will be used. MPDX offers a very uniform plasma and spherical symmetry at low temperature (5-20 eV) and low density ($10^{16} - 10^{17} m^{-3}$). Initial data from MPDX shows a deviation in CRM results when compared to Langmuir probe data. This discrepancy points to the importance of recombination effects. The validated model is applied to first time measurement of electron density and temperature in front of an ICRH antenna at the TEXTOR tokamak. These measurements are important to understand RF coupling and PMI physics at the antenna limiters.
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