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Neutral density profiles in a helicon source AMY KEESEE, EARL SCIME, West Virginia University, ANNEMIE BOGAERTS, University of Antwerp — Ion-neutral and electron-neutral collisions can be important mechanisms for Alfvén wave damping [Hanna and Watts, 2001], ion cyclotron wave damping, and flow thermalization in helicon sources [Kline et al., 1999, 2003, Scime et al., 1998]. Neutral pumping, which leads to reduced neutral pressures on axis, has been suggested to play an important role in the physics of cylindrically symmetric helicon sources [Gilland et al., 1998, Degeling et al., 1999]. The spatial distribution, temperature, and flow of neutral atoms in helicon sources are poorly understood quantities. The presence of an electron beam at the center of a helicon source has been debated [Chen and Hershkowitz, 1998, Chen and Blackwell, 1999]. We have measured radial profiles of argon neutral density using laser-induced fluorescence (LIF) and passive emission spectroscopy. These diagnostics only measure the relative densities of the probed atomic states. To find the overall neutral density, a collisional-radiative (CR) model is used. The EEDF and a test neutral density profile are inputs to the CR model code. The output profiles of argon excited states are compared to the respective states measured via LIF and spectroscopy. If the spectroscopic data are inconsistent with a purely Maxwellian electron energy distribution, an electron beam at the center of the discharge can be included in the EEDF to test for its presence.

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