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Measurements of Electron Energy Distribution and Metastable Atom Density in the Afterglow of an RF ICP Discharge in Helium[1] JON BLESSINGTON, WVU, CHARLES DEJOSEPH, JR., AFRL, VLADIMIR DEMIDOV, MARK KOEPKE, WVU — In previous work [1], it was shown that even a small number of nonlocal fast electron, which do not significantly affect the overall mean electron energy, can dramatically change the plasma and near-wall sheath properties. In this work, Langmuir probe measurements of electron density, temperature, energy distribution functions (EEDF), metastable atom density and their temporal evolution in the afterglow of low-pressure (50 mTorr) helium rf ICP discharges have been carried out. The experimental setup is described in [2]. The primary focus of this work is the investigation of the high energy portion of the EEDF which shows peaks corresponding to electrons with energies 14.4 and 19.8 eV. These peaks arise from electrons produced in Penning ionization with metastable helium atoms and metastable-electron collisions of second kind. This fast component of the EEDF can be controlled independently on the slow electrons, which is a direct consequence of the EEDF nonlocality.
[1] V. Demidov et al. *PRL* **95**, 215002 (2005).
[2] W. Guo et al., *PSST* **10**, 43 (2002).

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