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Radio-frequency detection of electron oscillations in ultracold plasmas K.A. TWEDT, S.L. ROLSTON, Department of Physics and Joint Quantum Institute, University of Maryland — Electron oscillations in ultracold plasmas were previously observed through the enhanced electron emission from the plasma due to resonant rf heating. Both simple Langmuir and Tonks-Dattner resonances were detected in this manner. Recent theoretical work [1] predicts that the resonant energy absorption occurs primarily at the edge of the electron distribution and thus the resonant frequency depends on the charge imbalance of the plasma. To aid in investigating this claim, we have developed a new technique to observe electron resonances by directly monitoring the amplitude and phase changes of the rf field capacitively coupled onto a grid located near the plasma. This technique provides a direct measure of the rf absorption that does not depend on the dynamics of electron evaporation, and can be used in experiments where electron detection is not possible. In addition to studying Langmuir waves, we have also excited and observed an upper hybrid oscillation of the electrons in the presence of a perpendicular magnetic field.

[1] A. Lyubonko, T. Pohl, and J.-M. Rost, arXiv:1011.5937 (2010). Supported by NSF PHY-1004242.

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