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Electron-ion collision frequency in very cold plasma[1] SHANNON DICKSON, DEVIN KONECNY, SCOTT ROBERTSON, University of Colorado — We have generated very cold plasma in carbon monoxide gas in a large-diameter cooled copper microwave cavity supported within a larger vacuum chamber. The cylindrical cavity is 57 cm in diameter and 61 cm tall and has a microwave resonance at 872 MHz. The cavity wall and the interior CO gas are cooled to 90 K by liquid nitrogen. Earlier experiments showed that CO is an effective electron cooling agent as a consequence of its dipole moment [Phys. Plasmas 17, 033508 (2010)]. With hot-filament discharge currents in the range 1 - 16 mA, densities are in the range 10^8 - 10^9 cm^{-3} and electron temperatures are as low as 0.019 eV (∼200 K). At room temperature, the Q of the cavity is reduced from 396 without plasma to 320 with plasma, which provides a measure of the electron-ion collision frequency. Experiments are continuing with cooled plasma to make the first measurements of the electron-ion collision frequency at these low temperatures.

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