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Sheath and collisional corrections in microwave hairpin resonators NICHOLAS SIEFERT, Air Force Research Laboratory, BRIAN SANDS, UES, Inc., BISWA GANGULY, Air Force Research Laboratory — We report the effect of electron-neutral collisions on the quality factor Q of hairpin resonators operating near 1 Torr. From the changes in Q, it is possible to determine change in the product of the electron-neutral collision frequency and the electron number density. The electron number density can be determined from the shift of the resonant frequency, so it may be possible to determine changes in the electron-neutral collision frequency. We also discuss effects of hairpin geometry and the sheath on electron number density measurements when considering a truncated transmission line model of the hairpin. Here, the location along the hairpin and the diameter of the wire are important for hairpin sensitivity and in determining the appropriate correction factor for the sheath. Additionally, we consider the collisionless sheath assumed by previous groups (e.g. Piejak et al. [*J. Appl. Phys.,* **95**, 3785 (2004)]) and its viability at higher pressures. We also report measurements of the steady state electron number density using four different hairpins, with resonant frequencies between 2 GHz and 4 GHz, in order to demonstrate the reproducibility of the density measurements and we compare these measurements with numerical calculations.

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