

A parallelized in-situ plasma measurement setup, consisting of two multipole resonance probes (MRP), a passive signal divider, and two coaxial cables with different lengths is presented in this contribution. The combined reflection coefficient of the applied probes is measured, separated in the time domain, and evaluated. Here, each MRP is able to measure the spatially resolved plasma electron density via its resonance behavior precisely and quasi-simultaneously. Furthermore, the return loss (RL) changes with the collision frequency, which can be detected for each probe. The parallelization and the applied signal processing are confirmed by simulations and combined measurements in CST Schematic as well as by in-situ measurements in an argon plasma. The resulting error is below 1% for the resonance frequency and below 8% for the corresponding RL. Hence, the input power and gas pressure of a plasma process can be controlled effectively.