

Abstract Submitted
for the GEC14 Meeting of
The American Physical Society

Hairpin resonator probes with frequency domain boxcar operation for time resolved density measurements in pulsed RF discharges
DAVID PETERSON, THERESA KUMMERER, North Carolina State University, DAVID COUMOU, MKS Instruments, ENI Power Division, Rochester NY, STEVEN SHANNON, North Carolina State University — In this work, microsecond time resolved electron density measurements in pulsed RF discharges are shown using an automated hairpin resonance probe using relatively low cost electronics, on par with normal Langmuir probe boxcar mode operation. A low cost signal generator is used to produce the applied microwave frequency and the reflected waveform is filtered to remove the RF component. The signal is then heterodyned with a simple frequency mixer to produce a dc signal read by an oscilloscope to determine the electron density. The applied microwave frequency is automatically shifted in small increments in a frequency boxcar routine through a LabviewTM program to determine the resonant frequency. A simple dc sheath correction is then easily applied since the probe is fully floating, producing low cost, high fidelity, and highly reproducible electron density measurements. The measurements are made in a capacitively coupled, parallel plate configuration in a 13.56 MHz, 50-200 W RF discharge pulsed at 500 Hz, 200 W, 50% duty cycle. The gas input ranged from 50-100mTorr pure Ar or with 5-10% O/He mixtures.

David Peterson
North Carolina State Univ

Date submitted: 13 Jun 2014

Electronic form version 1.4