

**DETERMINING THE ELECTRON DISTRIBUTION  
FUNCTION FROM RF MEASUREMENTS USING AN  
IMPEDANCE PROBE\***

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Using a network analyzer which returns  $\text{Re}(Z_{ac})$  and  $\text{Im}(Z_{ac})$  for a spherical probe in a plasma, we have demonstrated the existence of collisionless resistance in the sheath, shown that this leads to a method of finding the electron sheath density profile, and proposed a method of measuring electron temperature using the rf results<sup>1</sup>. The magnitude of the applied signal from the network analyzer is much smaller in magnitude than typical applied dc potentials and it is therefore transparent to the existing plasma/probe interface. Recently, from determination of plasma potential, we are able to construct the electron distribution function,  $f(E)$ , from the rf measurements. This method requires only a first derivative of the inverse  $\text{Re}(Z_{ac})$  with respect to bias. We will present the method and results for  $f(E)$  for three spherical probes of varying sizes.

1. Walker, D.N., R.F. Fernsler, D.D. Blackwell, W.E. Amatucci, *Phys of Plasmas*, 15, 123506 (2008).

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