Abstract Submitted
for the GEC08 Meeting of
The American Physical Society

Complex interplay of collisional and RF electric/magnetic field effects for electron transport in gases[1] S. DUJKO, ARC CAMS, MPIT, JCU, Australia & Institute of Physics, Zemun, Serbia, R.D. WHITE, K.F. NESS, R.E. ROBSON, ARC CAMS, MPIT, JCU, Australia — Advancements in modern day technology associated with non-equilibrium low-temperature magnetized plasma discharges demand the most accurate modeling of the underlying transport processes involved. In this work, the non-equilibrium transport of electrons in gases under the influence of **E** and **B** fields is studied via a unified time-dependent multi term solution of the Boltzmann equation. We will focus on the time-dependent behavior of electron transport properties in ICP discharges where **E** and **B** are RF. We systematically investigate the explicit field effects including field to density ratios, field frequency to density ratio, field phases and field orientations. In addition we will highlight the explicit modification of transport coefficients brought about by attachment/ionization. A multitude of kinetic phenomena were observed that are generally inexplicable through the use of steady-state dc transport theory. Phenomena of significant note include the existence of transient negative diffusivity, time-resolved NDC and anomalous anisotropic diffusion. Most notably, a proposed new mechanism for collisional heating in ICPs has emerged.

[1]ARC Centres of Excellence program and the MNTR project 14102J

S. Dujko
ARC CAMS, MPIT, JCU, Australia & Institute of Physics, Zemun, Serbia

Date submitted: 17 Jun 2008 Electronic form version 1.4