

GEC07-2007-000044

Abstract for an Invited Paper  
for the GEC07 Meeting of  
the American Physical Society

### **Current Issues in Electron and Positron Transport Theory<sup>1</sup>**

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In this paper we review the current status of transport theory for low energy electrons or positrons in gases, in the context of both kinetic theory and fluid modelling. In particular, we focus on the following issues: (i) Multiterm vs two-term representation of the velocity distribution function in solution of Boltzmann's equation; (ii) the effect of non-conservative collisions (attachment, ionization, positron annihilation) on transport properties; (iii) the enduring electron- hydrogen vibrational cross section controversy and possible implications for the Boltzmann equation itself; (iv) closure of the fluid equations and the heat flux *ansatz*; and (v) correct use of swarm transport coefficients in fluid modelling of low temperature plasmas. Both hydrodynamic and non-hydrodynamic examples will be given, with attention focussed on the Franck-Hertz experiment, particularly the "window" of fields in which oscillations of transport properties are produced, and the way in which electric and magnetic fields combine to affect transport properties.

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<sup>1</sup>Supported in part by the Australian Academy of Science.