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Kinetic and fluid equation treatments of non-equilibrium electron and positron transport in dense gases and liquids R.D. WHITE, R.E. ROBSON, G. BOYLE, W. TATTERSALL, ARC Centre for Antimatter-Matter Studies, James Cook University, Townsville 4810, Australia, S. DUJKO, Z. LJ. PETROVIC, Institute of Physics, Pregrevica 118, 11080 Belgrade, Serbia — New frontiers in science and technology have generated a fresh wave of interest in understanding the fundamental physics of electron and positron transport processes in dense, structured and soft condensed materials. This paper focuses on the adaptation of gas phase scattering cross-sections to study the transport of electron and positron in dense systems where the effects of coherent scattering, and hence material structure, become important. In particular we focus on non-equilibrium situations where the electrons and positrons are driven out of equilibrium by an applied electric field, using a recently developed multi-term solution of a generalized Boltzmann's equation. The explicit effects of the material structure on the transport properties will be quantified. A fluid model derived from the generalized Boltzmann equation has furnished generalisations of Wannier energy relation and Einstein relations to account for the structure of the material. The accuracy and applicability of these relations will also be highlighted using various model and real systems. A scheme for the direct calculation of transport coefficients in dense gas/liquid systems from those in the dilute gas limit will also be presented.

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