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Transport properties of electrons and transition of an electron avalanche into a streamer in atomic liquids SASA DUJKO, ILIJA SIMONOVIC, Institute of Physics, University of Belgrade, Serbia, GREGORY BOYLE, RONALD WHITE, College of Science, Technology Engineering, James Cook University, Australia, DANKO BOSNJAKOVIC, ZORAN PETROVIC, Institute of Physics, University of Belgrade, Serbia — A Monte Carlo simulation technique is developed and used to calculate transport coefficients of electron swarms in non-polar atomic liquids. We employ the two model processes in which only momentum and energy are exchanged, respectively, to account for structure dependent coherent elastic scattering at low energies. The validity of the code is confirmed by comparison with results of previous authors. We apply two scenarios for higher energy cross sections. In the first scenario excitations in the liquid phase are approximated by excitations in the gas phase. In the second scenario excitations are completely neglected. Ionization threshold is reduced to values which are suggested in the literature, in both scenarios. Transport coefficients in these two scenarios, as well as transport coefficients for gas and liquid phases are compared. Special attention has been given to the structure induced negative differential conductivity (NDC), which has been observed both in this work, and in previous publications. Spatially-resolved electron transport properties are calculated in order to understand this phenomenon. The important aspect of this work is modeling of the transition of an electron avalanche into a streamer. Calculations are performed using 1D and 1.5D fluid models. Streamer properties in scenarios with and without excitations are compared.

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