The Gas-Liquid Interface: Kinetic and Fluid Modelling of Charged Particle Transport

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Modelling of electron transport in the vicinity of the plasma-liquid requires an accurate treatment of electron transport in the gaseous and soft-condensed phases, together with an understanding of the electron transport across the gas-liquid interface. In this presentation, we present simulations which have informed the design of a new experiment which adapts an existing electron-gas phase scattering experiment (e2e) to consider electron scattering from a liquid micro-jet. The results highlight that electron-scattering information (effective cross-sections) can be obtained from the experiment for both the bulk liquid and from the interface. In addition, we present progress on an ab-initio formalism for electron transport in liquids through appropriate generalisations of Boltzmann's equation and associated higher order fluid models to account for spatio-temporal scattering correlations, screening of the electron potential and the effects of (self-) trapping. Application is considered for various atomic liquids as a starting benchmark to consider more complex polar liquids [1] as well as the non-local nature of electron transport in liquids and gas-liquid interfaces [2,3]. Propagation of ionization fronts between the gas and liquid phases are considered.

References

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