

Current status of ion swarms  
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It is now routine to compute transport properties of atomic ions in atomic gases *ab initio*, i.e. starting from computational chemistry calculations of the ion-neutral interaction potential, when the external fields are electrostatic. An illustration of this will be presented for  $O^+$  and  $O^-$  ions moving in the rare gases. Systems with molecular ions and/or molecular gases are of more interest, but a brief review will show that *ab initio* calculations are still limited by the large amount of computation that would be required. Current research has turned to more complicated experimental situations, where there may be magnetic as well as electric fields and where either or both fields may vary with time and position. Recent progress in describing such experiments using momentum-transfer theory and moment theories obtained from the Boltzmann equation will be discussed, with particular attention given to comparison with data obtained in ion traps and field-asymmetric ion mobility spectrometers.