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Multielectron polarization and nondipole effects in strong-field ionization

LARS BOJER MADSEN, Aarhus University

In theoretical strong-field and attosecond physics, we are faced with a number of fundamental and computational challenges. Two central related research themes are

1. How to deal with the time-dependent nonperturbative driving of a multielectron system?

2. How to deal with situations where the nature of the external laser pulses leads to a breakdown of conventional approximations, like, e.g., the electric dipole approximation?

In this talk, I will discuss recent progress addressing certain aspects of points 1 and 2. Specifically, I will (i) give a status on formulation and numerical implementation of the tunneling theory for large molecules. I will (ii) show how multielectron polarization effects may lead to a simplification of the response of a many-electron system facilitating the formulation of effective single-active electron models. Finally, I will (iii) show how an approximate nondipole approach, which is described by a nondipole strong-field approximation Hamiltonian, accounts for nondipole effects in an accurate and effective manner.