

# **Atoms, molecules and solids in ultrashort laser and electron pulses: nondipole and electron correlation effects**

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Counterintuitively, in intense laser fields, terms beyond the electron-dipole approximation may become important as the wavelength of the driving field becomes long and enters the mid-infrared regime. In this talk, a nondipole theory is discussed and applied to above threshold ionization (ATI), where a nondipole-induced shift of the energy-conserving ATI rings is identified. It is shown how these shifts cause the ATI peaks to disappear, and how they can be made reappear if the shift of the ATI rings is accounted for. In the adiabatic regime, it is shown how nondipole effects can be considered in the tunneling regime for the initial conditions used in two- and three-step models. The speaker also discusses beyond-electric-dipole effects in intraband high-order harmonic generation in solids. In the last part of the talk, the speaker briefly reports on new findings regarding the impact of electron correlation on high-harmonic generation in solids, and ends with a perspective on applying ultrafast electron pulses for elucidating electron dynamics on the subfemtosecond timescale.