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Analysis and control of attosecond electron dynamics with near-fields

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When compared to atoms and solids, the collective and correlated electron dynamics in finite systems under intense light fields can be substantially modified, enhanced and controlled by plasmonic near-fields [1]. Localized near-fields result from electronic polarization and charge separation, may unfold on femtosecond or even attosecond time scales, and can have various implications on the strong-field physics of nanostructures, nanoparticles, and clusters [2]. Examples include waveform-controlled electron acceleration through resonant plasmonic field amplification [3], directionally controlled surface backscattering via field propagation effects [4], or near-field induced attosecond streaking [5].

In this talk, three new aspects of controlling near-field induced strong-field dynamics with bichromatic laser fields will be discussed. The first scenario addresses the plasmon enhanced forward acceleration in metal clusters [3]. The second case is the directional control achieved through spectrally selective field amplification at isolated nanospheres. The third scenario concerns two-color control of electron backscattering from metallic nanotips.

References:

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