

Quantum Coherence in Nonlinear Optical Processes

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Abstract

Phase-dependence in nonlinear optical processes reveals an intriguing interplay between the phase-coherence of a short laser pulse and the laser-induced quantum wave-packet dynamics, which can not be observed in the linear response regime. In first part of the talk, the intra-pulse quantum coherence is demonstrated with two examples: molecular π pulses for total inversion of electron population and unexpected chirp-dependence in multi-photon absorption yield. In the second part of the talk, the relevance of phase coherence in the dynamics of anharmonic coupled molecular systems is explored in the context of vibrational relaxation and multi-dimensional optical spectroscopy.

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