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Quantum control with quantum light of molecular nonadiabaticity[1] ANDRAS CSEHI, AGNES VIBOK, GABOR HALASZ, University of Debrecen, MARKUS KOWALEWSKI, Stockholm University — Coherent control experiments in molecules are often done with shaped laser fields. The electric field is described classically and control over the time evolution of the system is achieved by shaping the laser pulses in the time or frequency domain. Moving on from a classical to a quantum description of the light field allows one to engineer the quantum state of light to steer chemical processes. The quantum field description of the photon mode allows one to manipulate the light-matter interaction directly in phase space. In this work we demonstrate the basic principle of coherent control with quantum light on the avoided crossing in lithium fluoride (Phys. Rev. A 100 053421, 2019). Using a quantum description of light together with the nonadiabatic couplings and vibronic degrees of freedoms opens up alternative perspective on quantum control. We show the deviations from control with purely classical light field and how back-action of the light field becomes important in a few-photon regime.

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