

Abstract Submitted
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AC Stark effect in a spin-orbit mixed quantum states in a five-level molecular system coupled by three lasers JIANBING QI, Penn State University — The interaction of the spin orbital motion of electrons can mix quantum states with different spin multiplicity. Thus the mixed states can carry both characteristics of the two states depending on the mixing coefficients. The spin-orbit coupled rovibrational levels in diatomic alkali are ubiquitous. These levels are classified as singlet states (if the total spin is zero) and triplet states (if the total spin is one), respectively. A transition from a singlet level can only go to singlet levels and a triplet only to triplet levels. The spin-orbit coupled states can be used as a gateway to access some normally prohibited transitions. By coupling the mixed states to an auxiliary quantum state with lasers, the coupling coefficient of two mixed singlet-triplet molecular states can be modified by ac Stark effect via varying the Rabi frequency of the coupling lasers and the detuning of the laser frequency, We use density matrix equations and a five-level molecular model to show that a coupled singlet-triplet pair of rovibrational levels can be used as a channel to enhance the probability of accessing target quantum states.

Jianbing Qi
Penn State University

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