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Exact transition probabilities for a linear sweep through a Kramers-Kronig resonance[1] CHEN SUN, Texas A&M University, NIKOLAI SINITSYN, Los Alamos National Laboratory — We consider a localized electronic spin controlled by a circularly polarized optical beam and an external magnetic field. When the frequency of the beam is tuned near an optical resonance with a continuum of higher energy states, effective magnetic fields are induced on the two-level system via the Inverse Faraday Effect. We explore the process in which the frequency of the beam is made linearly time-dependent so that it sweeps through the optical resonance, starting and ending at the values far away from it. In addition to changes of spin states, Kramers-Kronig relations guarantee that a localized electron can also escape into a continuum of states. We argue that probabilities of transitions between different possible electronic states after such a sweep of the optical frequency can be found exactly regardless the shape of the resonance. We also discuss extension of our results to multistate system.

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Chen Sun
Texas A&M University

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