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Optical Feschbach Resonances Beyond the Single Bound-State Model[1] KRITTIKA KANJILAL, University of New Mexico, IRIS REICHENBACH, Max Planck Institute for the Physics of Complex Systems, IVAN DEUTSCH, University of New Mexico — Optical Feshbach resonances (OFR) provide the promise of control of interatomic cold collisions for species with no magnetically controlled resonances, such as Group-II elements, and have potential advantages such as rapid spatio-temporal variation. OFRs are, however, typically associated with large inelastic collisions due to absorption and decay. It has been proposed that the ${}^1S_0 \rightarrow {}^3P_1$ intercombination line of Group-II elements are particularly suitable for optical Feshbach resonances (OFRs), but the appropriate regime of operation is still not clear. In the case that the laser frequency is detuned very far from resonance to reduce losses, the scattering state in the ground-electronic open channel couples to more than one bound state of the excited-electronic closed channel potential. So far theoretical treatments of Feshbach resonances have only considered a single excited bound state. We explore the effects of the multiple eigenstates of the closed channel potential on the scattering length and the loss rate. We study this using a toy model is based on a simplified coupled channels approach within a finite quantization volume.

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