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Optical control of Feshbach resonances in Fermi gases using molecular dark states HAIBIN WU, Department of Physics, Duke University, Durham, NC 27708, USA, JOHN E. THOMAS, Department of Physics, North Carolina State University, Raleigh, NC 27695, USA — We investigate optical control of magnetic Feshbach resonances in ultracold atomic gases with more than one molecular state in an energetically closed channel. Using two optical fields to couple two states in the closed channel, inelastic collisional loss arising from spontaneous emission is greatly suppressed by destructive quantum interference near the two-photon resonance, i.e., dark-state formation, while the scattering length is widely tunable. Further, the effective range can be controlled by varying the parameters of optical fields. The method opens many new fields of study, such as nonequilibrium strongly interacting Fermi gases and new cooling mechanisms with narrow Feshbach resonance.

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