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Optical control of Magnetic Feshbach Resonances using Closed Channel EIT[1] ARUNKUMAR JAGANNATHAN, Duke University, NITHYA ARUNKUMAR, JAMES JOSEPH, JOHN THOMAS, North Carolina State University — Optical techniques can provide rapid temporal control and high-resolution spatial control of interactions in cold gases enabling the study of non-equilibrium strongly interacting Fermi gases. We use electromagnetically induced transparency (EIT) in the closed channel to control magnetic Feshbach resonances in an optically-trapped mixture of the two lowest hyperfine states of a ^{6}Li Fermi gas. In our experiments, the narrow Feshbach resonance is tuned by up to 3 G. For the broad resonance, the spontaneous lifetime is increased to 0.4 s at the dark state resonance, compared to 0.5 ms for single field tuning. We present a new model of light-induced loss spectra, employing continuum-dressed basis states, that agrees in shape and magnitude with loss measurements for both broad and narrow resonances. Using this model, we predict the trade-off between tunability and loss for the broad resonance in ^{6}Li, showing that our two-field method substantially reduces the two-body loss rate compared to single field methods for same tuning range.

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