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Controlling a magnetic Feshbach resonance with laser light MATTHIAS LETTNER, DOMINIK BAUER, CHRISTOPH VO, GERHARD REMPE, STEPHAN DUERR, Max Planck-Institute for Quantum Optics, Hans Kopfermann Str.1, D-85748 Garching, Germany — The capability to tune the strength of the elastic interparticle interaction is crucial for many experiments with ultracold gases. Magnetic Feshbach resonances are a tool widely used for this purpose, but future experiments would benefit from additional flexibility such as spatial modulation of the interaction strength on short length scales. Optical Feshbach resonances offer this possibility in principle, but suffer from fast particle loss due to light-induced inelastic collisions. Here we show that light near-resonant with a molecular bound-to-bound transition can be used to shift the magnetic field at which a magnetic Feshbach resonance occurs. This makes it possible to tune the interaction strength with laser light and at the same time induce considerably less loss than an optical Feshbach resonance would do. For small detuning from the bound-to-bound transition we observe a splitting of the Feshbach resonance similar to an Autler-Towns doublet.

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