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Optical Feshbach resonances in a Rubidium BEC MATTHIAS THEIS, GREGOR THALHAMMER, KLAUS WINKLER, University of Innsbruck, RUDOLF GRIMM, University of Innsbruck and IQOQI Innsbruck, JOHANNES HECKER DENSCHLAG, University of Innsbruck — We demonstrate optical tuning of the scattering length in a Bose-Einstein condensate with a so-called optical Feshbach resonance as predicted by Fedichev et al. [1]. This resonance is based on optically coupling pairs of atoms to a bound molecular state. We show that this scattering resonance can be induced via one-photon transitions to an excited molecular state [2] or via two-photon transitions to a molecular ground state [3]. By controlling the laser power and the detuning from the optical resonance we are able to change the atomic scattering length over a wide range and we can describe the results with the theoretical model by Bohn and Julienne [4]. [1] P. Fedichev et al., Phys. Rev. Lett. 77, 2913 (1996) [2] M. Theis et al., Phys. Rev. Lett. 93, 123001 (2004) [3] G. Thalhammer et al., Phys. Rev. A in press, cond-mat 0409552 (2004) [4] J. L. Bohn et al., Phys. Rev. A 60, 414 (1999)

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