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Feshbach molecules from an atomic Mott insulator THOMAS VOLZ, NIELS SYASSEN, DOMINIK BAUER, EBERHARD HANSIS, STEPHAN DUERR, GERHARD REMPE, Max Planck Institute of Quantum Optics — Feshbach molecules from bosonic atomic species have proven to be very unstable with respect to inelastic collisions [1]. As a result, the typical lifetime observed for a cloud of ultracold $^{87}Rb_2$ molecules stored in an optical dipole trap is limited to a few ms. Here, we report on the observation of long-lived Feshbach molecules in an optical lattice. A BEC of ^{87}Rb atoms is loaded into the lowest Bloch band of a 3D optical lattice operated at a wavelength of 830 nm. By ramping up the lattice depth, the atomic gas enters the Mott insulator regime. A magnetic-field ramp through the Feshbach resonance at 1007 G creates molecules [2]. Lattice sites initially occupied with more than 2 atoms experience fast inelastic collisional losses. The observed lifetime of the remaining molecules is $\sim$ 100 ms, which is much longer than for a pure molecular sample in an optical dipole trap. Similar results have recently been reported in Ref.[3]. The increased lifetime is an important step on the route to a BEC of molecules in the vibrational ground state [4].

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[2] S. Dürr et al., Phys. Rev. Lett. 92, 020406 (2004)
[3] G. Thalhammer et al., cond-mat/0510755
[4] D. Jaksch et al., Phys. Rev. Lett. 89, 040402 (2002)

Thomas Volz
Max Planck Institute of Quantum Optics

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