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Heteronuclear molecules in a 3D optical lattice C. OSPELKAUS, S. OSPELKAUS, L. HUMBERT, P. ERNST, K. SENGSTOCK, K. BONGS, Instut fuer Laser-Physik, Universitaet Hamburg, Luruper Chaussee 149, 22761 Hamburg, Germany, F. WERNER, Laboratoire Kastler Brossel, Ecole Normal Superieure, 24 rue Lhomond, 75231 Paris Cedex 05, France, F. DEURETZBACHER, K. PLASSMEIER, D. PFANNKUCHE, I. Inst. fuer Theoretische Physik, Universitaet Hamburg, Jungisusstrasse 9, 20355 Hamburg, Germany — We report on experiments with Fermi-Bose mixtures confined in 3D optical lattices, especially the first production of ultracold long-lived heteronuclear molecules in a 3D optical lattice. The molecules are associated from a quantum degenerate mixture of fermionic ^{40}K and bosonic ^{87}Rb atoms loaded into a 3D optical lattice. Molecules are produced at a heteronuclear Feshbach resonance in the vicinity of 546.7(1) G. Molecule formation is studied on both the attractive and the repulsive side of the resonance. The binding energy of the heteronuclear molecules is precisely determined by rf spectroscopy and compared to a theoretical model based on a pseudopotential approach. We also characterize both the lifetime of the sample and the efficiency of rf association; comparison to the pseudopotential model results in excellent agreement.

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