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Phase Separation in a Fermi-Bose Mixture of ^{6}Li and ^{41}K[1] RIANNE S. LOUS, BO HUANG, ISABELLA FRITSCHE, FABIAN LEHMANN, MICHAEL JAG, EMIL KIRILOV, RUDOLF GRIMM, Inst. for Quantum Optics and Quantum Information (IQOQI), Austrian Academy of Sciences, and Inst. for Experimental Physics, University of Innsbruck — We report on the observation of phase separation between a ^{41}K Bose-Einstein condensate (BEC) and a ^{6}Li Fermi sea with strong repulsive interspecies interactions. After evaporation in an optical dipole trap, we obtain a BEC of 10^4 ^{41}K atoms and a Fermi sea of 10^5 ^{6}Li atoms with $T/T_F < 0.07$. We explore this double-degenerate mixture by tuning the heternonuclear interaction with the help of a Feshbach resonance at 335.08 G. We use three-body recombination as a probe to study the overlap between the two species for various interaction strengths. We see a decrease in losses when the interactions become strongly repulsive and compare the loss rate to that of a non-condensed bosonic cloud. In a phase-separated mixture, losses only happen at the interface of the two species and are therefore reduced, when compared to a mixed phase of both species. To understand our loss rate results, we calculate the spatial overlap between the two components with a mean-field model. This model fits nicely to our experimental results and reveals effects beyond the local density approximation (LDA).

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