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Feshbach spectroscopy and dual-species Bose-Einstein condensation of ^{23}Na - ^{39}K mixtures KAI VOGES, TORBEN SCHULZE, TORSTEN HARTMANN, PHILIPP GERSEMA, ALESSANDRO ZENESINI, EBERHARD TIEMANN, SILKE OSPELKAUS, University of Hannover, Institute of Quantum Optics — Ultracold polar ground state molecules are a powerful tool for the investigation of a wide range of physical phenomena as quantum chemical processes or exotic dipolar quantum phases. One way to prepare ultracold ground state molecules is based on a two-photon coherent Raman transfer starting from ultracold weakly-bound Feshbach molecules. Here, we report on magnetic Feshbach resonance loss spectroscopy in all possible combinations of hyperfine sub-levels with an ultracold atomic mixture of ^{23}Na and ^{39}K. We use our results to refine potential energy curves for bosonic NaK molecules. Further, we identify and discuss the suitability of different magnetic field regions for the purposes of sympathetic cooling of ^{39}K in a bath of ^{23}Na atoms. We use our findings for the demonstration of dual-species degeneracy in the ^{23}Na ^{39}K mixture. The two condensates are created simultaneously by evaporation at a magnetic field of about 150 G, which provides sizable intra- and interspecies scattering rates needed for fast thermalization. Finally, we discuss the pathway for the production of Feshbach molecules as well as the two-photon Raman transfer to the rovibronic ground state.

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