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Towards State-Resolved Ultracold Chemical Reactions with KRb Molecules YU LIU, YU-TING CHEN, WILLIAM TOBIAS, Department of Physics, Harvard University, KANG-KUEN NI, Department of Chemistry and Chemical Biology, Harvard University; Department of Physics, Harvard University; Harvard-MIT Center for Ultracold Atoms — Ultracold chemistry explores reactions where both the internal and external quantum states of molecules are important and ideally controlled. Ultracold collisions between pairs of $^{40}K^{87}Rb$ molecules have been studied previously where evidence of bimolecular chemical reactions was observed as two-body losses of $^{40}K^{87}Rb$. This reaction pathway is expected to yield products $^{40}K_2$ and $^{87}Rb_2$ with 10 cm^{-1} (14.4 K) excess energy. We will present our design and construction of a new apparatus that aims to directly map out the products and their quantum states. The apparatus combines ultracold gases of K, Rb, and KRb and REMPI (Resonance-Enhanced Multiphoton Ionization) detection capabilities. This apparatus will offer possibilities to study state-to-state chemistry, reversibility of chemical reactions, and controllable ultracold reactions.

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