

Abstract Submitted
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Experiments with an ultracold mixture of ^{85}Rb and ^{87}Rb SCOTT B. PAPP, JUAN M. PINO II, CARL E. WIEMAN, JILA and University of Colorado — Magnetic field tunable Feshbach resonances are an invaluable tool for manipulating the inter-particle interactions in a Bose Einstein condensate (BEC). The ^{85}Rb Feshbach resonance in collisions between two atoms in the low field seeking $F = 2$, $m_F = -2$ state is particularly convenient since it occurs at a moderate magnetic field of 155 G and spans more than 10 G. However, ^{85}Rb is difficult to evaporatively cool due to large inelastic loss rates and a zero in the elastic cross section near 400 μK . We have designed and constructed an apparatus to overcome these challenges by making use of the favorable elastic cross section between ^{85}Rb and ^{87}Rb . We can obtain large ^{87}Rb condensates in either the $F = 2$, $m_F = 2$ or the $F = 1$, $m_F = -1$ state. The ^{85}Rb gas is sympathetically cooled due to thermal contact with the ^{87}Rb gas. We discuss our results on cooling ^{85}Rb to quantum degeneracy. With this system we also have the opportunity to study interspecies interactions. A Feshbach resonance is predicted to exist between ^{87}Rb and ^{85}Rb in magnetically trappable states at 270 G. We will discuss our observation of this interspecies Feshbach resonance. We acknowledge funding for this work from the NSF and ONR. One of us (S. B. P.) acknowledges the support of an NSF Graduate Research Fellowship.

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