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Creation of heteronuclear Feshbach molecules with ^{85}Rb and ^{87}Rb

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We will report on the creation of ultracold heteronuclear Feshbach molecules. Heteronuclear molecules in low-lying vibrational states are particularly interesting since they are predicted to exhibit a permanent dipole moment due to the unequal distribution of electrons. Although no significant permanent dipole moment is expected to exist in a ^{85}Rb – ^{87}Rb molecule, our work demonstrates a first step toward the efficient production of ground-state ultracold heteronuclear molecules. Starting with a ^{87}Rb BEC and a cold thermal gas of ^{85}Rb, we utilize previously unobserved interspecies Feshbach resonances to create up to 25,000 molecules. The presence of two species with different quantum degeneracy provides a rich system for testing our understanding of the conversion efficiency from atoms to molecules. We can also create a simultaneously Bose-condensed sample of ^{85}Rb and ^{87}Rb. The effects of immiscibility in this two-component quantum fluid on the creation of heteronuclear molecules will be discussed.