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Progress towards the creation of an ultracold RbYb mixture

VARUN VAIDYA, CRESTON HEROLD, XIAO LI, JIRAPHAT TIAMSUPHAT, STEVEN ROLSTON, University of Maryland - Joint Quantum Institute, TREY PORTO, University of Maryland - Joint Quantum Institute, NIST — Alkali metals such as rubidium-87 have become the workhorse in degenerate gas experiments, and large condensates of up to 10^7 atoms have been created. On the other hand, alkaline earth metals like ytterbium offer a range of isotopes, both Fermionic and Bosonic, and have closed ground shells and narrow intercombination transitions that offer different possibilities than alkali gases. We describe progress made towards creating a degenerate mixture of rubidium-87 and ytterbium and discuss the scope of experiments planned with this apparatus. In particular we discuss the production of a rubidium-blind optical lattice and the possibility of using a rubidium-87 BEC to cool lattice-trapped ytterbium atoms. We will also discuss exploiting the narrow intercombination transition in ytterbium to explore long-lived optical Feshbach resonances between rubidium and ytterbium. In addition, we will present the results of a recent experiment to accurately determine the dipole matrix elements of the $5s \rightarrow 6p$ transition in rubidium-87.

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