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Towards Ultracold Mixtures and Molecules of Lithium and Ytterbium Atoms SUBHADEEP GUPTA, ANDERS HANSEN, ALEXANDER KHRAMOV, JANA SMITH, University of Washington — Exquisite control of interactions between ultracold atoms is possible using scattering resonances. Ultracold diatomic molecules can also be formed using Feshbach and photoassociation resonances. Applying these methods between two different atomic species can lead to novel quantum phases of matter. These include Fermi superfluids with mass imbalance and strongly dipolar molecular superfluids. Further, stable ultracold dipolar molecular samples are promising systems for precise tests of fundamental symmetries and time variations of fundamental constants. We will report on progress towards building a system of ultracold lithium and ytterbium atoms to achieve these goals.

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