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Production and Trapping of Ultracold Polar Molecules NATHAN GILFOY, ERIC HUDSON, Yale University Department of Physics, JEREMY SAGE, MIT Lincoln Laboratory, SUNIL SAINIS, Yale University Department of Mechanical Engineering, DAVID DEMILLE, Yale University Department of Physics
— Recently we have demonstrated the production of a sample of ultracold, polar RbCs molecules in their absolute vibronic ground state. The sample has a translational temperature of 100 μK and a narrow distribution of rotational states. The molecules are initially formed from laser-cooled ^{85}Rb and ^{133}Cs atoms via photoassociation, resulting in short-lived, vibronically excited RbCs molecules. A fraction of these excited molecules subsequently spontaneously decay to ground electronic states, populating many excited vibrational levels. We then transfer the population of one of these levels, $a^3\Sigma^+$ (v = 37), to the absolute vibronic ground state via a pump-dump scheme. We discuss progress toward observing strong, anisotropic collisions between these molecules through trapping them using a quasi-electrostatic trap (QUEST). We will also discuss our progress in implementing a Stimulated Adiabatic Raman Passage scheme to improve the transfer process to the vibronic ground state.

Nathan Gilfoy
Yale University Department of Physics

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