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Formation of ultracold Rb_2 in the ground $X^1\Sigma_g^+$ state in an optical dipole trap H.K. PECHKIS, R. CAROLLO, M. BELLOS, J. BANERJEE, E.E. EYLER, P.L. GOULD, W.C. STWALLEY, Department of Physics, University of Connecticut, Storrs, CT 06269, USA — We present a study of the formation of ultracold ground-state Rb_2 molecules in an optical dipole trap formed by a focused CO_2 laser. Rubidium atoms are efficiently loaded from a magneto-optical trap (MOT) into the dipole trap, after a brief cooling and compression stage. The atomic sample is cooled significantly from 100 μK to 30 μK and the density is increased up to 10^{12} cm^{-3}. After loading atoms into the dipole trap, a photoassociation laser is introduced to form ultracold molecules. The excited ultracold molecules spontaneously decay to the ground-state, which is subsequently detected by resonance-enhanced two-photon ionization using a pulsed dye laser. With the ultracold molecules trapped, we will pursue an experiment involving vibrational quenching of the molecules due to collisions with ^{85}Rb atoms. With our state-selective detection, we will be able to measure the individual loss rates of each vibrational level. This work is supported by NSF.

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