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State-selective detection by two-photon ionization and magnetic trapping of ultracold Rb_2 triplet state molecules HYEWON K. PECHKIS, YE HUANG, DAJUN WANG, E.E. EYLER, P.L. GOULD, W.C. STWALLEY, Physics Department, University of Connecticut, Storrs, CT 06269 — We have produced and detected ultracold $^{85}Rb_2$ in high vibrational levels of the lowest triplet state, $a^3\Sigma_u^+$, by one-color resonance-enhanced two-photon ionization through the $2^3\Sigma_g^+$state, in the transition energy range of 14000-17000 cm^{-1}. The cold molecules are formed by photoassociation followed by radiative decay into the $a^3\Sigma_u^+$state. Many levels corresponding to the$2^3\Sigma_g^+$,$2^3\Pi_g$,$1^3\Delta_g$, and $3^1\Sigma_g^+$ states have been observed for the first time, and the vibrational levels of the $a^3\Sigma_u^+$state have been assigned. Experimental spectroscopy agrees well with a new theoretical analysis. In particular, the measured vibrational spacings correspond very well with those calculated from the potential curves of the $a^3\Sigma_u^+$state and the $2^3\Sigma_g^+$state. The relative vibrational state populations are also consistent with the Franck-Condon factors. Additionally, we present evidence for the trapping of triplet $^{85}Rb_2$ molecules by the inhomogeneous magnetic field of our MOT. This work is supported by NSF.

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