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Observation and analysis of high-lying singlet gerade states of rubidium dimer PHILLIP ARNDT , XINHUA PAN, DAVID BEECHER, MARJATTA LYYRA, ERGIN AHMED, Temple University — The structure of the excited electronic states of Rubidium dimer is important to a number of areas of research including, the production of ultracold ground state molecules, cold atom-molecule collisions, and the development of new *ab-initio* molecular electronic structure methods. In the experiment we used optical double resonance technique to observe large number of ro-vibrational levels of the $5^1\Sigma_g^+$, $6^1\Sigma_g^+$, and $3^1\Pi_g$ electronic states in the 24000-26000 cm^{-1} range. The Rb_2 molecules were initially excited from the ground $X^1\Sigma_g^+$ state to an intermediate level of the mixed $A^1\Sigma_u^+ \tilde{} b^3\Pi_u$ manifold using a narrow band tunable TiSa laser. In the next step the probe laser, a narrow band dye laser tunable in the 13000-14000cm^{-1} range, excited the molecules further to the target states. The resonances of the probe laser were observed by detecting the total fluorescence from the excited states to the $a^3\Sigma_u^+$ state in the 500nm range. Potential energy curve was constructed for each state from the term values of the observed levels.

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