Abstract Submitted
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Newly observed rovibrational levels of the 3 and $4^1\Sigma_u^+$ states in molecular hydrogen[1] AARON MARKS, JOE CROMAN, Bryn Mawr College, ROBERT EKEY JR., University of Mary Washington, ELIZABETH MCCORMACK, Bryn Mawr College — Double resonance spectroscopy via the $EF^1\Sigma_g^+, v'_{EF} = 6, J'$ state has been used to probe the rovibrational structure of the *ungerade* double-well $B"\overline{B}(3)^1\Sigma_u^+$ state of H_2. Many transitions have been observed for the first time by detecting both molecular and atomic ion production as a function of energy by using a time-of-flight mass spectrometer. Rovibrational states with J = 0-4 and $v = 50$ up to the $n = 3$ dissociation limit are reported. A comparison of the experimentally determined and theoretically calculated rotational constants using the latest set of *ab initio* molecular potentials is presented. In addition, transitions to the $4^1\Sigma_u^+ v = 10, J$ state, the next electronic state in the series, have been observed for the first time and term energies are reported. The double-well $^1\Sigma_u^+$ states are of interest because they have unusually large internuclear separation, and while many levels lie above the ionization potential, they remain extremely stable against autoionization. The new energy measurements presented here provide significant constraints on *ab initio* calculations of the $^1\Sigma_u^+$ series in this fundamental system.

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