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Double resonance spectroscopy of molecular hydrogen near the third dissociation threshold ALEXANDER CHARTRAND, ELIZABETH MCCORMACK, Bryn Mawr College — Understanding the structure and dynamics of highly excited, long range states of molecular hydrogen is important as it has the potential to inform theoretical models that attempt to accurately account for extremely high energy and extremely long range interactions. Double-resonance laser spectroscopy via the E, F, $v = 6$ state was used to probe such an energy region: the third dissociation threshold of molecular hydrogen. Resonantly enhanced multiphoton ionization spectra were recorded by detecting ion production as a function of energy using a time-of-flight mass spectrometer. Assignments have been made to the D' state, the $B''\bar{B}$ state and the energy and line width results compared to ab initio calculations. However, many features in this region of the spectrum remain unassigned. To guide us in further assignments, we are using Multi-Channel Quantum Defect Theory (MQDT) to make assignments to molecular Rydberg states converging to various levels of the ion. In addition, states with ion-pair configuration at long range and high vibrational levels of other valence states are considered.

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