Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Probing Long-Range Configurations of Molecular Hydrogen Near the Third Dissociation Energy 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 H(n=1) + H(n=3) dissociation threshold region with quantum state selectivity and high energy resolution. Above threshold the continuum is detected by ionizing H(n=3) to produce H^+, which is then detected by using a time-of-flight mass spectrometer. The ion yield above threshold has several features. Broad structures due to an extension of the series of vibrational levels belonging to the inner and outer wells of the *ungerade* double-well $B"\overline{B}(3)^1\Sigma_u^+$state into the continuum are observed. Also present are sharp features due to vibrationally excited Rydberg states of H_2. Several unassigned features may be explained by transitions to extremely long-range rovibrational levels of the 6th member of the $^1\Sigma_u^+$ series of states in H_2. The new measurements are in good agreement with the energies predicted by *ab initio* calculations of nonadiabatic couplings between the $^1\Sigma_u^+$ and $^1\Pi_u^+$ series of states of this fundamental system.

Elizabeth McCormack
Bryn Mawr College

Date submitted: 22 Jan 2010 Electronic form version 1.4