

Abstract Submitted  
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**Kinetic Energy Release dependence in the Photo Double Ionization of H<sub>2</sub>** TH. WEBER, S. MIYABE, A. BELKACEM, C.W. MCCURDY, LBNL, U. LENZ, T. JAHNKE, R. DOERNER, University of Frankfurt, J. WILLIAMS, A. LANDERS, Auburn University — In the Photo Double Ionization (PDI) of hydrogen molecules with photon energies of 150eV we were able to probe the electronic two particle density as a function of the bond length, i.e. the Kinetic Energy Release (KER) of the ions, and the orientation of the molecular axis with respect to the polarization vector of the incoming light. We applied the COLTRIMS technique and measured two electrons and two protons in coincidence. We found a shift in the KER for  $\sigma$  and  $\pi$  transitions. While the KER is lower when the molecular axis is aligned parallel to the linear polarization vector ( $\sigma - \sigma$ ), the KER for a perpendicular orientation ( $\sigma - \pi$ ) is clearly higher by a little more than 1eV. Quantum mechanical ab initio calculations are able to quantify the shift in KER and the ratio for the two different transitions ( $\beta$ -parameter) for a broad range of photon energies (75 to 240eV). These results reflect the dependence of the  $\sigma$  and  $\pi$  amplitudes to the bond length. This shows that a simple KER measurement for horizontal and vertical polarization can be used to extract this information; it makes measuring the  $\beta$ -parameter as a function of KER obsolete.

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