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Emission of a Correlated Photo Electron Pair from Molecular Hydrogen: A T. Young Double Slit Experiment THORSTEN WEBER ET AL., Lawrence Berkeley National Lab — We have studied experimentally the influence of the molecular alignment and spacing on the electron emission from a two body Coulomb potential induced by single photon absorption with 130, 160, 200 and 240 eV circular polarized light at the Advanced Light Source. Applying successfully the technique of COLTRIMS, it was possible to measure fully differential cross sections (FDCS) for the photo double photo ionization of hydrogen for fixed in space molecular orientations by detecting three particles in coincidence. The measurements covered 4π solid angle. We present angular distributions of the electrons studying the influence of diffraction, symmetry effects, selection rules and molecular orientations in body fixed frames. Thus for the first time a T. Young double slit experiment of a correlated electron pair inside a hydrogen molecule can be presented. We can illustrate the evolution from knock-off to shake-off processes and the interference of single particles as well as correlated pairs, while changing the deposed photon energy as well as the energy sharing of the two electrons. In addition the angular distributions show a distinct dependency on the Kinetic Energy Release (KER) of the recoiling ions, e.g. the size of the molecular double slit. The experimental results are also compared with quantum mechanical calculations.

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