

Abstract Submitted  
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**Coherent control of  $\text{H}_2^+$  ionization with intense XUV+IR fields<sup>1</sup>**

C.B. MADSEN, B.D. ESRY, J. R. Macdonald Laboratory, Physics Dept., Kansas State University, Manhattan, KS, 66506, USA — We recently developed a method to calculate how the electron and nuclei of the  $\text{H}_2^+$  share the energy absorbed from an intense laser pulse. While neither the electron energy spectrum nor the nuclear energy spectrum showed much structure separately, their joint energy spectrum revealed considerable structure. It showed multiphoton absorption with the energy shared between the nuclei and the electron. A number of questions followed our initial results: Can the joint energy distribution be used to map the vibrational wave function? To what extent can we control the asymptotic energies of the ionization products? The model behind above Coulomb threshold explosion [PRL **97**, 013003 (2006)] seems to give a consistent explanation for the calculated energy distributions. We present joint energy distributions of the ionization resulting from an IR+XUV pump-probe laser scheme. In this way, we may investigate the controllability of the asymptotic energies of the ionization fragments and explore the possibility of using the joint energy distribution to map the vibrational wave function.

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