

Abstract Submitted  
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**Investigating Excited Electronic States of  $I_2^+$  and  $I_2^{2+}$  Produced by Strong Field Ionization Using Vibrational Wave Packets<sup>1</sup>** LI FANG, GEORGE GIBSON, University of Connecticut — In pump-probe experiments with a femtosecond near-UV laser, a vibrational wave packet is produced in a potential well of an excited electronic state of  $I_2^+$  through strong field ionization. The wave packet is further ionized by a probe pulse to an excited electronic state of  $I_2^{2+}$  that dissociates into  $I^{2+}+I^{0+}$ . Projecting the vibrational wave packet onto the dissociation channel reveals characteristics of both potential curves via the periodic variations in kinetic energy distribution of the dissociating fragments. The experimental results are consistent with and interpreted by theoretical simulations. We find that the intermediate state in  $I_2^+$  is  $A^2\Pi_{u,3/2}$  and ionization to this state has an anomalous angular dependence. Moreover, we extract the  $I^{2+}+I^{0+}$  potential energy curve and find evidence for a truly bound potential well, in contrast to the meta-stable ground state potential energy curves.

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