

Abstract Submitted  
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**R-dependent ionization of the valence orbitals of I<sub>2</sub> by strong laser fields**<sup>1</sup> HUI CHEN, VINCENT TAGLIAMONTI, GEORGE GIBSON, Department of Physics, University of Connecticut — Using a pump-dump-probe technique and Fourier-transform spectroscopy, we study the internuclear separation  $R$  dependence and relative strength of the ionization rates of the  $\pi$  and  $\sigma$  electrons of I<sub>2</sub>, whose valence orbitals are  $\sigma_g^2\pi_u^4\pi_g^4\sigma_u^0$ . We find that ionization of the HOMO-2 ( $\sigma_g$ ) has a strong dependence on  $R$  while the HOMO and HOMO-1 do not. Surprisingly, the ionization rate of the HOMO-2 exceeds the combined ionization rate of the less bound orbitals and this branching ratio increases with  $R$ . Since our technique produces target molecules that are highly aligned with the laser polarization, the  $\sigma$  orbitals will be preferentially ionized and undergo enhanced ionization at larger  $R$  compared to the  $\pi$  orbitals. Nevertheless, it is highly unusual that an inner orbital provides the dominant strong field ionization pathway in a small molecule.

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