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Resonant Excitation in the Double-Ionization of O₂ Molecule by Intense Short Laser Pulses¹ ALI ALNASER, M. ZAMKOV, C.M. MAHARJAN, P. RANITOVIC, B. SHAN, Z. CHANG, I. V. LITVINYUK, C.L. COCKE, J. R. MACDONALD LABORATORY, PHYSICS DEPARTMENT, KANSAS STATE UNIV., MANHATTAN, KS, 66506 TEAM — The purpose of this experiment is to identify mechanisms whereby doubly charged molecules are produced by short intense laser pulses on neutral targets. We have used the COLTRIMS technique to measure in coincidence O⁺ ion pairs produced in the double ionization of O₂ molecules by intense short laser pulses. High-resolution kinetic energy spectra and the angular distributions of the fragment ions were obtained. By using laser pulses of different durations (8-40 fs), intensities (1-10 X10¹⁴W/cm²) and wavelengths (500-2000nm), we found that double ionization of O₂ may occur from a combination of three different processes: Field ionization, rescattering and resonant multiphoton excitation. The production of the B³Π_g state in the O₂²⁺ dictation shows a strong dependence on the laser wavelength. The data presented provide clear evidence of resonant multiphoton excitation in the production of the B³Π_g state at 800 nm wavelength.

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