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Break down of the two-step model in K-shell photoemission and subsequent decay in CO₂¹ TH. WEBER, F. STURM, M. SCHOEFFLER, N. NEUMANN, T. OSIPOV, H.K. KIM, U. LENZ, A. LANDERS, L. COCKE, R. DOERNER, A. BELKACEM, S. LEE, K. UEDA — Recently K. Ueda and coworkers measured at SPring8, Japan molecular-frame photoelectron angular distributions of the carbon 1s photoemission from CO_2 . The electronic emission pattern displays a weak but definite asymmetry with respect to the central carbon atom around the shape resonance, suggesting a breakdown of the two-step model for the description of core-level photo-ionization and subsequent Auger decay. One possible explanation for this puzzling asymmetry is that the angular dependence of the outgoing photoelectron is modified by the instantaneous dipole moment of the vibrating CO_2^+ ion, registering information about its asymmetric vibrational motion at the time of photoejection. Prompt Auger decay may then initiate dynamics sensitive to the asymmetric geometry registered by the photoelectron. Using the COLTRIMS technique we tried to confirm the observation of the asymmetry and study its variation with photon energy, while measuring the Auger and photoelectrons in coincidence with the ionic fragments in order to pinpoint the origin of the breakdown in the expected symmetry of this process. We will show first results.

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