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**The Laser-Assisted Photoelectric Effect on Surfaces** L. MIAJA, G. SAATHOFF, C. LEI, M.M. MURNANE, H.C. KAPTEYN, Department of Physics and JILA, University of Colorado, Boulder, CO, M. AESCHLIMANN, Department of Physics, University of Kaiserslautern, Kaiserslautern, Germany, J.L. GLAND, Department of Chemistry, University of Michigan, Ann Arbor, MI — While the laser-assisted photoelectric effect (LAPE) in atoms is well established and extensively used for the characterization of femtosecond EUV pulses, the equivalent process in the original manifestation of the photoelectric effect—photoemission from surfaces—has not heretofore been studied. In the present work, we present the first observation of the LAPE process in two-color surface photoemission. In our experiment, IR pulses of 30 fs duration and 1.5 mJ at 780 nm are produced by a Ti:sapphire laser system and split into probe and pump. The probe beam is upconverted to the EUV using phase-matched high harmonic generation in a hollow fiber. A pair of Si:Mo multilayer mirrors spectrally selects the 27th harmonic (30 nm). The pump beam is directed through an optical delay arm and spatially and temporally overlapped with the EUV beam on a Pt(111) sample. A time-of-flight detector then measures the kinetic energy of the photoemitted electrons. In the presence of the pump pulse, these electrons can either absorb or emit an IR photon leading to sidebands in the EUV photoelectron spectrum. This 'dressing' of the continuum states is visible as steps in the Fermi edge.

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