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The Laser-Assisted Photoemission from Surfaces LUIS MIAJA AVILA, GUIDO SAATHOFF, MARGARET MURNANE, HENRY KAPTEYN, JILA, Univ. of Colorado, MARTIN AESCHLIMANN, Univ. of Kaiserslautern, Germany — The Laser-assisted photoelectric effect (LAPE) is a powerful tool for characterizing femtosecond-to-attosecond EUV pulses, and for time-resolved spectroscopy of electron dynamics in atoms. Recently, we observed this process for the first time in the original manifestation of the photoelectric effect i.e. photoemission from surfaces. Irradiating a surface in infrared light as an EUV photon ejects an electron from a surface, this electron can also absorb or give-up energy from the infrared field. We can extract sideband amplitudes from the continuous photoemission spectra, making it possible to record a cross-correlation between the two beams. This result is of interest because LAPE has the potential to study ultrafast, femtosecond-to-attosecond time-scale electron dynamics in solids and in surface-adsorbate systems where complex, correlated, electron relaxation processes are expected. However to extend these applications of LAPE to surfaces, it must be unambiguously distinguished from hot electron excitation, above-threshold photoemission, and space charge acceleration, as these effects can potentially lead to similar modifications of the photoemission spectrum. We present new data that reveals surface LAPE in a regime where a wealth of surface-adsorbate dynamics is known to occur.

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