CFEL SCIENCE

SEMINAR

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Attosecond Photoemission from Surfaces and Interfaces

Probing electron dynamics in atoms and solids on an attosecond time scale is still in its infancy and presents a great challenge to both experimentalists and theoreticians. Recently, the attosecond streaking technique [1] was successfully applied to study the dynamics of photoelectrons ejected from different electronics states of atoms in the gas phase [2] as well as from solid surfaces [3] with unprecedented temporal resolution. However, the explanation of the observed delay between the photoemission from distinct electronic levels in these experiments remains controversial [4-6]. Especially, in condensed matter experiments, the observed delay is always entangled with transport effects suffered by the electrons prior to their escape through the surface [4-6].

Here we report on our experimental efforts to shed light on the origin of this delay in solid state systems. We compare attosecond photoemission from free-electron-like metals, transition metal surfaces and from a number of well-defined adsorbate-metal interfaces consisting of chemisorbed or physically adsorbed adatoms. This allows us to estimate the relative importance of inelastic electron scattering, the final state band structure and the character and coupling between the involved initial electronic states for the observed delay. Our experimental results will be discussed in the context of existing theoretical models for attosecond solid state photoemission [4-6].

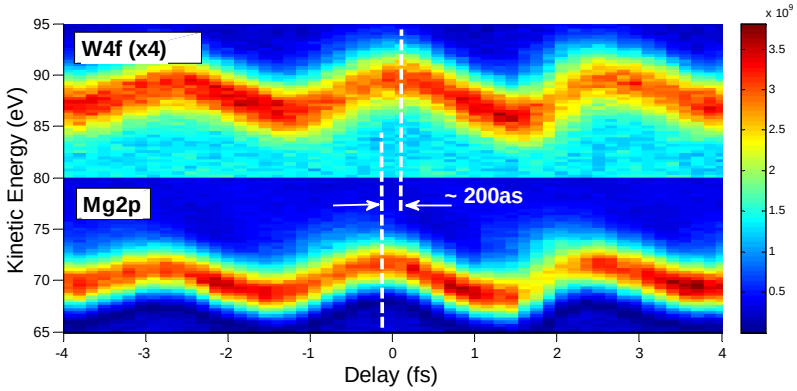

Fig. 1 Result of a streaking measurement from a W(110) surface covered with 3.5ML magnesium.

References

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[2] M. Schultze et al. Science **328**, 1658 (2010).
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[5] C.-H. Zhang et al. PRL. **102**, 123601 (2009).
[6] A.K. Kazansky et al. PRL **79**, 177401 (2009)

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