

# Attosecond Physics – From Generation of as Pulses to Applications on Solids

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The generation of ever shorter pulses is a key to exploring the dynamic behavior of matter on ever shorter time scales. Attosecond XUV pulses together with the few-cycle (few-femtosecond) laser pulses used for their generation have opened the way to the development of a technique for attosecond sampling of electrons ejected from atoms or molecules or solids [1]. This is accomplished by probing electron emission with the oscillating electric field of the few-cycle laser pulse following excitation of the atom by the synchronized sub-femtosecond XUV pulse [2]. Recently, the dynamics of the photoionization process on solids has been studied [2]. Not only that attosecond metrology now enables clocking on surface dynamics, but also the individual behaviour of electrons of different type (core electrons vs. conduction band electrons) can be resolved. Here, we measured a time delay of about 100 as on the emission of the aforementioned two types of electrons. After a general overview on attosecond physics, recent experiments towards an absolute measurement of the travel time of electron inside solids and other measurements on solid surfaces are discussed.

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[1] A. Cavalieri et al., Nature 2007, 449, 1029.

[2] R. Kienberger et al., Nature 2004, 427, 817.