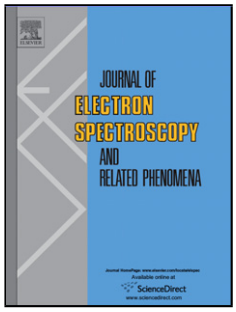

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Space-, Time- and Spin-resolved Photoemission

Gerd Schönhense[1], *Katerina Medjanik*[1,2] *and Hans-Joachim Elmers*[1]

[1] *Institut für Physik, Johannes Gutenberg-Universität, 55128 Mainz, Germany*

[2] *MAX IV Laboratory, Ole Römers vag 1, 22363 Lund, Sweden*

Abstract

This article reviews photoemission experiments that simultaneously resolve at least two of the following degrees of freedom: space (real and momentum space), time (intrinsic time scale of a fast experiment or time-of-flight) and spin. In the *spatiotemporal* domain, imaging of fast processes by PEEM gives direct insight into plasmon dynamics or magnetization processes. In the category *real space & spin* the novel concept of imaging spin filters is discussed. In the *time & spin* chapter we address time-of-flight spin detectors and ultrafast spin processes that are accessible by pump-and-probe techniques. A main part of the paper is devoted to the resolution of *momentum-space & time.* This is implemented in form of the time-of-flight momentum microscope, a very recent development of which the first instrument has been in operation since 2014. In an extended outlook chapter, the potential of new developments and of a novel, highly parallelized delay-line type electron detector will be discussed. The combination of all three degrees of freedom *k-space, time & spin* is emerging through the combination of the ToF momentum microscope with imaging spin filter.

Outline