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FRONTIERS ARTICLE

Time-resolved spectroscopy of attosecond quantum dynamics

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ABSTRACT

The advent of attosecond pulsed radiation leads to a large unexplored scientific area in chemical physics: the direct time-resolved measurement of electronic quantum dynamics. Major scientific goals include spectroscopy of single- and multi-electron motion and dynamical electron correlations, relating to orbital interactions in valence and core electronic levels of atoms and molecules. The results of such studies address a wide array of scientific and technological applications. Here, the current state-of-the-art of attosecond-dynamics measurements is reviewed and several novel spectroscopic methods are discussed that are particularly important for applications in chemical physics: attosecond transient absorption/dispersion spectroscopy, laser-induced-dipole spectroscopy, and absolute-phase spectroscopy.

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