PhD Position: Attosecond electron dynamics in solids

We seek doctoral candidates to conduct experimental research in attosecond science with the goal of exploring electron dynamics in various solid-state systems on shortest time scales.

Due to the much larger inertia of atomic nuclei, the fastest dynamical processes in solids are found in their electronic response. In recent years, attosecond science has successfully expanded from its more traditional atomic and molecular physics origin towards condensed matter. Our group has played a leading role in this process. In terms of general time-resolved spectroscopic techniques, mainly two approaches are used: attosecond transient absorption spectroscopy and attosecond photoemission spectroscopy. The former detects photons while the latter measures ejected electrons. While transient absorption is mainly bulk sensitive, photoemission rather probes the outermost atomic layers of a solid. We are one of the few groups worldwide that successfully used both of these complementary approaches. Both techniques can be performed on the same setup in our laboratory, which opens up unique experimental capabilities.

This doctoral project builds on our previous track record of attosecond studies on solids (see, e.g., *Science* **353**, 916 (2016); *Nature Phys.* **14**, 560 (2018); *Nature Phys.* **15**, 1145 (2019)). A particular emphasis will be on electron dynamics in systems with reduced dimensionality and attosecond electron dynamics across interfaces. This is a major step forward compared to previous work that mainly used bulk materials. Furthermore, both aspects represent a hot topic in research areas far beyond ultrafast science.

The doctoral student working on this project will be integrated into our Attoline team that presently consists of two postdocs and two doctoral students. Our laboratories are equipped with state-of-the-art lasers and instrumentation to support this research.

The topics covered by this project are of significance for the fields of attosecond science and solid-state physics. The experimental tools and theoretical concepts are rooted in ultrafast laser science, atomic and solid-state physics. An applicant's experience in any of these fields is advantageous but not necessary. The most important considerations will be the applicant's overall interest in solid-state and ultrafast laser physics, enthusiasm for the research, and ability to work in a team environment.

Requirements: The successful candidate should hold a diploma or masters degree in physics with outstanding grades and ideally already has some experience in one of the above-mentioned fields. Excellent written and oral communication skills, as well as English language skills are required. German language skills are advantageous, but not necessarily needed. The position is available immediately. Applicants are encouraged to send a curriculum vitae, the diploma or master thesis, and provide names and contact information for at least two referees.

Please direct any inquiries to Prof. Dr. Lukas Gallmann, gallmann@phys.ethz.ch

https://ulp.ethz.ch/group/open-posititions.html