

Research fellow position in the Surface dynamics group within Ultrafast Science and Applications Division of ELI ALPS

The ELI ALPS Laser Research Institute is a large-scale research and user facility established at the initiative of the international scientific community as part of the ELI project, primarily funded by the European Structural Funds and supported by national co-financing. Its state-of-the-art laser systems and the light and particle sources driven by them enable high-intensity light-matter interaction experiments. This unique research technology provides previously inaccessible experimental opportunities to study ultrafast processes, opening new fields of research in physics, chemistry, and materials science. The results of the fundamental research carried out here may have a significant impact on several areas of life sciences and may also stimulate important photonic and technological developments.

The objective of the Ultrafast Sciences and Applications Division is to develop and provide state-of-the-art experimental endstations for femtosecond- and attosecond-resolved experiments in solid, liquid, and gas phases. Our research focuses on understanding ultrafast processes across various media, supported by advanced infrastructure including nanofabrication, chemical, and biological laboratories.

The successful candidate, as a member of the NanoESCA team, will be responsible for designing, performing, and evaluating photoemission measurements to investigate the band structure of selected materials using XUV+IR pump-probe techniques on the femtosecond and attosecond timescales. Supporting and participating in external users' research projects are essential parts of the job. **The successful candidate will work as part of a team on the user projects.**

Description of the experimental setup:

The NanoESCA endstation is a photoemission electron microscope (PEEM) with energy- and spin-resolving capabilities. It is suitable for imaging condensed-phase samples and investigating the electronic structure of solid surfaces via both static and time-resolved measurements.

Relevant research fields include interfacial charge transfer, ultrafast demagnetization, orbital tomography, molecule-substrate interactions, ultrafast processes in topological insulators, band structure evolution, and phase transition dynamics.

[1] NPJ 2D Materials and Applications 8 (2024) 48

[2] Carbon, 258 (2026) 121783.

Responsibilities of the new colleague:

- **Independently plan and execute NanoESCA measurement campaigns**, including sample preparation and surface characterization, as well as optimization of experimental parameters.
- **Perform spatially, spectrally, and angularly resolved measurements** under various environmental or external stimulus conditions, in both static and XUV+IR time-resolved modes.
- **Contribute actively to PEEM-based research within the division**, focusing on chemical, electronic, and surface properties of functional materials at the micro- and nanoscale.

- **Design, perform, and evaluate spectroscopic experiments on the femtosecond and attosecond timescales** across a range of material systems (e.g. semiconductors, metallic alloys, TMDCs, thin films, perovskites, nanostructures, and hybrid materials).
- **Process, analyze, and interpret NanoESCA data**, including image processing, spectral fitting, energy calibration, work function determination, and chemical/elemental mapping.
- Document results and contribute to scientific publications, conference presentations, reports, and grant applications.

Essential requirements:

- PhD in physics, chemistry, materials science, or a related field (candidates close to completion will also be considered).
- **Extensive hands-on experience with PEEM, XPS/UPS, ARPES, NanoESCA, or related surface-sensitive techniques.**
- **Strong command of English, especially in scientific writing and communication.**
- **Ability to independently design experiments and analyze data.**
- Precise and well-documented working style.
- Strong problem-solving skills and openness to interdisciplinary research.
- Ability to work both independently and in a team.
- Track record of international publications and ability to develop independent research directions.
- Experience with UHV systems and surface science.

Desirable assets:

- Experience in ultrafast photoemission methods.
- Programming skills in MATLAB, Python, or LabVIEW.
- Experience in operating shared research facilities or user support.

What we offer:

- The opportunity to participate in research connected to a unique ultrafast spectroscopic research infrastructure in Hungary.
- Internationally relevant research topics, with opportunities for publications and conference participation.
- An interdisciplinary, youthful, and collaborative research environment.
- Competitive salary and benefits package (Cafeteria, Private health insurance support)

Starting date: As soon as possible

Place of work: Szeged, Hungary

Application procedure:

Applicants who are interested in the position and meet the requirements are kindly requested to upload their CV combined with a motivation letter to our career portal: <https://www.eli-alps.hu/en/Career-1>.

Please include your salary expectation in your application.