



## Research Fellow position in the Surface Plasma Attosources (SPA) Group within the Secondary Sources Division of ELI ALPS

ELI ALPS (<https://www.eli-alps.hu/>), part of the Extreme Light Infrastructure (ELI), is a world-leading research facility in Szeged, Hungary, dedicated to studying ultrashort high energy processes. As one of the three pillars of this European megaproject, ELI ALPS provides cutting-edge ultrashort light sources, including attosecond XUV and X-ray pulses, for the scientific community, enabling groundbreaking research in light–matter interactions, valence and core electron science, materials science, 4D imaging, and various biomedical applications.

We are looking for a highly motivated, self-driven, experienced candidate. Major activities of the SPA Group include the investigation of the ultrafast dynamics of intense laser interaction with solid, liquid and gas targets at relativistic intensities and the application of the secondary sources resulting from such interactions for time-resolved studies. The direction offers a synergy of photonics, matter in dense form and relativistic plasma physics.

### Description of the laser plasma based instruments

The group operates two state-of-the-art solid and liquid plasma mirror based high harmonic generation beamlines [1,2] driven by a few-cycle kHz SYLOS3 laser and a PW level HF laser, respectively. The SYLOS SHHG beamline is designed for few-cycle relativistic interaction at 1 kHz repetition rate for studies on plasma optics and secondary sources and their applications. The details and current state of the art can be found in [3]. The SHHG HF [1] beamline is driven by a PW laser, similar to [3], but the interaction is driven at a much higher laser intensity and lower repetition rate.

[1] S. Mondal et al. *J. Opt. Soc. Am. B* 35, A93-A102 (2018)

[2] M. Shirozhan et al. *Ultrafast Science* 4, 0067 (2024)

[3] <https://up.eli-laser.eu/equipment/sylos-shhg-1101563819>

### What you will do:

The tasks of the Research Fellow to be hired include but are not limited to the following:

- The successful candidate will contribute new ideas and implement them within the R&D scope of the equipment, advancing pump–probe experiments in the temporal and spectral domain.
- Opportunity to participate in the upgradation, functional improvements of the above equipment to enhance their scope and versatility for accommodating diverse scientific experiments.



- Take proactive steps in the preparation of international collaborative as well as user campaigns and ensure the operational stability of the instruments and the metrology tools during experiments.
- The candidate is expected to contribute to the development of a vision of projects that could be implemented in line with the scientific goals of the SPA Group and ELI ALPS, using the available infrastructure towards exotic interactions, e.g. with structured light and/or generation of structured light in the XUV and/or time-resolved imaging and/or transient absorption spectroscopy in the soft XUV etc.

### **What we expect:**

The candidate must have appropriate experience in one of the following fields: attosecond physics, laser–matter interaction, time-resolved imaging or spectroscopy, and should hold a PhD in physics, chemistry or other related scientific fields. (Applications of candidates on track to complete their PhD are also considered). The seniority of the position would be decided by paying due weight to the experience and scientific profile of the candidate.

### **Desired skills and abilities:**

- Experience in laser plasma metrology, HHG, attosecond physics, AMO physics or related research fields.
- Experience in wavefront sensing with ultrafast (femtosecond) lasers and ultrafast optics.
- Good technical knowledge in conducting time-resolved measurements, operating vacuum systems and characterizing ultrashort infrared or extreme ultraviolet pulses.
- The successful candidate is expected to have the ability to work both independently in the lab and as part of a team.
- Good written and oral communication skills in English.

### **Additional preferred qualifications:**

- Good programming skills (Python and/or MATLAB and/or C++).
- Experience in charge particle spectrometers, XUV metrology, pump–probe studies is an asset.
- Ability to manage and lead a (research) project alone.
- Experience in projects where people from different disciplines (physics, engineering, IT) work together.
- PIC simulations on laser plasma.

**Job location:** Hungary, Szeged

**Start time:** Open until filled



### Why join us?

- **International collaborations:** Our team frequently engages in international scientific collaborations with both experimental and theoretical areas, offering excellent opportunities to expand your global network and engage in pioneering research with experts in the field.
- **Cutting-edge facility:** ELI ALPS is part of the Extreme Light Infrastructure (ELI) project, providing access to some of the most advanced research tools in the world. ELI ALPS provides cutting-edge ultrashort light sources, including attosecond XUV and X-ray pulses, for the scientific community.
- **Quality of life:** We offer very competitive salaries in regional comparison, and the city of Szeged provides pleasant living conditions.

### Apply now:

For further information on ELI ALPS, please visit the ELI ALPS website (<http://www.eli-alps.hu>), while for position-related information please contact the Head of the Secondary Sources Division, Dr. Subhendu Kahaly at [subhendu.kahaly@eli-alps.hu](mailto:subhendu.kahaly@eli-alps.hu).

Your CV including your list of publications and a letter of motivation should be submitted via our career portal:

### Extreme Light Infrastructure ERIC / ALPS Facility / ELI-Beamlines

The Extreme Light Infrastructure (ELI ERIC) is the world's largest high-power laser research facility, offering cutting-edge lasers for groundbreaking science and innovation. Operating across two sites – ELI Beamlines in the Czech Republic (near Prague) and ELI ALPS in Hungary (Szeged) – it employs a diverse team of experts from around the globe.

ELI Beamlines operates four advanced femtosecond laser systems, delivering unmatched intensities. These lasers drive unique X-ray and particle sources for groundbreaking research in physics, chemistry, materials, life sciences, and astrophysics.

ELI ALPS operates lasers and secondary sources to deliver ultrafast light pulses (including attosecond pulses) for pioneering research in physics, chemistry, materials and life sciences. Its advanced systems enable exploration of ultrafast electron dynamics and complex molecular processes.