



Research Fellow position is available in the Laser 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.

Description of the Laser Sources Division at ELI-ALPS

Our Mission:

Here at ELI-ALPS (<https://www.eli-alps.hu/>) we offer beamtime for external research applications which require state-of-the-art attosecond and femtosecond pulsed laser technologies. Our main goal is to provide the shortest possible light pulses at the highest available average power for the scientific community.

The Laser Sources Division is responsible for the operation of all laser systems in order to drive the attosecond beamlines, end-stations and individual user experiments with the requested beam parameters, including pulse energy, beamsize, polarization state, pulse duration, CEP etc. specified for a given research project.

Other scientific activities within the Laser Sources Division include

- research towards further pulse shortening via post-compression techniques at all available wavelengths at ELI-ALPS,
- laser pulse metrology developments at high repetition rates and average powers, and
- advancement in new sources (UV, VIS, far IR) with few-cycle durations and CEP stability.

Technologies:

- High average power and high repetition rate (100 kHz) ultrafast fibre laser systems: HR1 under development in Szeged, HR2 under development in Jena. These unique few cycle laser systems deliver few mJ, CEP stabilized, near-infrared pulses for gas harmonic attosecond beamlines.
- Mid-infrared and high repetition rate ultrafast OPCPA systems: MIR (100 kHz) and MIR-HE (1 kHz, under preparation). Wavelengths around 3 μm sub-two-cycle pulse duration with exceptional CEP stability and control for various experimental applications.



- High peak power, near-single cycle 1 kHz OPCPA systems: SYLOS 2, SYLOS 3 (under development in Vilnius) and SYLOS Experiment Alignment. CEP-stabilized, near-infrared pulses with excellent overall stability features. The most versatile systems for gas and surface harmonic attosecond beamlines and electron and proton acceleration.
- High repetition rate PW laser: Ti:sapphire-based HF PW laser (under development in Szeged). The only 2 PW peak power system at 10 Hz repetition rate, which delivers 34 J with 17 fs for surface harmonics attosecond beamlines and particle acceleration.
- THz pump lasers: high pulse energy systems with moderate pulse durations designed specifically to drive high energy THz pulse generation and THz spectroscopy applications.

What you will do:

The duties and responsibilities in the position include but are not limited to the following:

- Participating in or leading the laser support team in external user campaigns.
- Participating in or leading the design, preparation and execution of upgrades of existing laser sources.
- Participating in or leading the design and building/assembly of additional group-managed equipment.
- The candidate will also have the possibility to carry out his/her own research, when beamtime is available. The candidate is expected to have a vision of projects that could be carried out using the available infrastructure.

What we expect:

Minimum education and experience:

The successful candidate must hold a PhD in physics, laser engineering, optics, photonics or other related scientific field. Applications of candidates on track to complete their PhD are also considered. Candidates with 5+ years of experience in the field of laser physics and/or laser engineering together with a demonstrated record in research will be considered too.

Required skills and abilities:

- the successful candidate must be able to work as part of a scientific support team, but also have the ability to handle tasks independently in the laboratory,



- broad practical knowledge of high-power, ultrafast pulse generation, amplification, propagation and manipulation,
- experience with ultrafast pulse characterization methods,
- good written and oral communication skills in English.

Additional preferred skills and qualifications:

- experience in scientific projects carried out by interdisciplinary research teams,
- hands-on experience with both solid-state-based and optical parametric amplifiers,
- experience in supervising students,
- good practical problem-solving skills, being eager to acquire new knowledge,
- good programming skills (Python, Matlab, etc.),
- experience with ray tracing software (e.g. Zemax),
- good written and oral communication skills in Hungarian.

What we can offer:

- challenging tasks and room for career advancement while working with cutting-edge technology in an international scientific environment,
- competitive benefit package in regional comparison,
- flexible working hours,
- very attractive standards of living in a socially vibrant city.

Job location: Hungary, Szeged

Start time: As soon as reasonable

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.

Please upload your CV and motivation letter to our Career Site: <https://www.eli-alps.hu/en/Career-1>



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.