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 consortium (ELI-ERIC), 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:

At ELI ALPS, we provide beamtime for external research projects that demand **state-of-the-art attosecond light and particle sources**, driven by advanced femtosecond laser technologies. **Delivering energetic primary and secondary radiation with the shortest possible duration at the highest available average power** is our mission to enable groundbreaking discoveries for the global scientific community.

The Laser Sources Division is in charge of the development and operation of all laser systems aimed at driving the attosecond beamlines, endstations, and user experiments by providing laser beams with unique parameters.

The activities carried out in the Laser Sources Division include but are not limited to:

- **Support external research teams** by configuring operation modes of ELI ALPS ultrafast laser systems to requested beam specifications and performing complex pulse characterizations
- **Engineer** cutting edge technologies to improve stability and reliability
- **Investigate** new technologies related to pulse shortening, average power and energy scaling
- **Explore novel ultrashort light sources** in the UV, VIS and mid- and far-IR spectral domains
- **Develop** the next-generation high-power, ultrafast **laser systems**

State of the art technologies available at ELI ALPS:

- High average power and high repetition rate (100 kHz) ultrafast fiber laser systems: HR1 (100 W, two-cycle, 1 mJ, CEP) and HR2 (500 W, 5 mJ, two-cycle, CEP). These few-cycle laser systems provide unique near-infrared driving beams for high flux gas harmonic attosecond beamlines.

- High-repetition rate, mid-infrared ultrafast OPCPA systems: MIR (100 kHz, 150 µJ, four cycles, CEP) and MIR-HE (1 kHz, 10 mJ, few cycles, CEP) under development. These systems generate few-cycle pulses postcompressed down to single cycle pulses at 3 µm with exceptional CEP stability and control for various experimental applications.
- High peak power, near single cycle, 1 kHz OPCPA systems: SYLOS 2, SYLOS 3 and SYLOS Experiment Alignment systems produce CEP-stabilized up to 120 mJ, near-infrared few cycle pulses with excellent overall stability features. The most versatile systems for gas and surface high-harmonic attosecond beamlines as well as electron and proton acceleration.
- High repetition rate PW laser: HF is a Ti:sapphire-based high intensity laser system (under development). It is the only 2 PW peak power system operating at 10 Hz repetition rate worldwide, which is planned to deliver 34 J with 17 fs for surface harmonics attosecond beamlines and particle acceleration.

What you will do:

As a key member of our team, your responsibilities will include (but are not limited to):

- **Leading or contributing to laser support** during external user campaigns
- **Designing, preparing, and implementing upgrades** to improve current laser performance
- **Investigating groundbreaking concepts** related to fiber, solid or optical parametric sources
- **Developing novel laser systems** targeting UV, mid-IR or THz wavelengths

What we expect:

Minimum education and experience:
The successful candidate must hold a PhD in physics, laser engineering, optics, photonics or other related scientific fields. Applications of candidates on track to complete their PhD might be 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 and development will be considered too. The ideal candidate will demonstrate a proven track record of independent research in laser physics. Applicants are expected to present published work, completed projects, or other tangible contributions that showcase their expertise and ability to drive innovation in the field.

Required skills and abilities:

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

In return we provide you with:

- An attractive remuneration package suited to the candidate's education and experience.
- A stimulating and diverse environment in a cutting-edge international research facility in Szeged.
- A friendly workplace that makes a positive impact on society.
- Opportunities for professional growth and skill development.
- Cafeteria, Resaver pension fund and private health insurance.
- Family friendly employer.

Job location: Hungary, Szeged
Starting time: As soon as reasonable

Why joining us?

- **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, not to mention novel particle sources for the scientific community.
- **In-house research and development activities:** we conduct state-of-the-art theoretical and experimental research projects focusing on laser and parametric amplification, post-compression, diagnostics development, harmonic generation and its characterization, particle acceleration, …
- **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 different fields of ultrafast science.

- **Quality of life:** Szeged, as a university city, provides a pleasant and vibrant living environment, where various events in culture, gastronomy, and sport are organized annually.

Please upload your CV and motivation letter to our Career Site:
https://app.indivizo.com/application?h=692efb71c0cd830006dc7bac

Extreme Light Infrastructure ERIC / ALPS FACILITY/ ELI-Beamlines

The Extreme Light Infrastructure (ELI) 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) – employing a diverse team of experts from around the globe.

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

ELI ALPS operates attosecond laser technology, delivering ultrafast light pulses for pioneering research in physics, chemistry, and life sciences. Its advanced systems enable exploration of ultrafast electron dynamics and complex molecular processes.