

12 FEBRUARY 2026

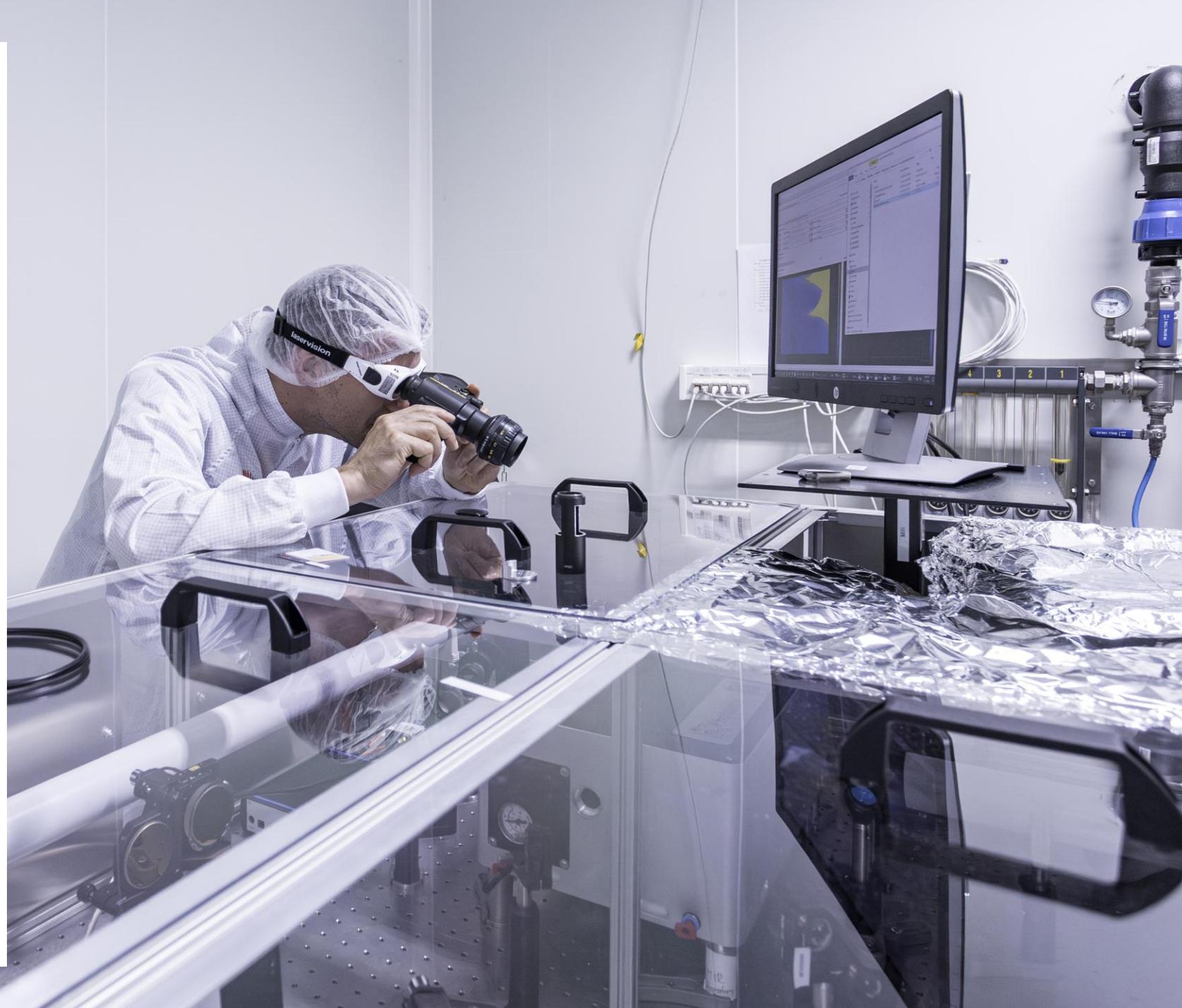
Introducing ELI's Unique Capabilities in Ultrafast Science

Leonida A. Gizzi
ELI ERIC

also at CNR-INO



EXTREME LIGHT
INFRASTRUCTURE





ELI's Mission

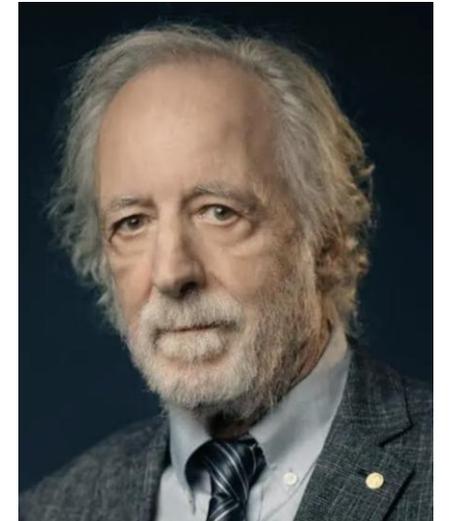
ELI advances science by providing **cutting-edge instruments** for users, **fostering collaboration** across disciplines and borders, and supporting excellence through **training, technology** development, and **outreach** to new communities.

Nobel prizes underline ELI's scientific significance

2018 and 2023 awards in High-Power and Ultrafast Science reflect the contemporary relevance of laser research.



Gérard Mourou and **Donna Strickland** were awarded the 2018 Nobel Prize in Physics for proposing “Chirped Pulse Amplification” for high-power, ultrafast, extremely intense lasers.



Anne L'Huillier, **Ferenc Krausz** and **Pierre Agostini** were awarded the 2023 Nobel Prize in Physics for "for experimental methods that generate attosecond pulses of light for the study of electron dynamics in matter"

Europe at the forefront

Europe leads the world in laser development, production, installation of state-of-the-art systems.



Investment into ELI is a major contribution to European competitiveness through high-power laser technologies and their applications.

The ELI Facilities are introducing multiple PW-class laser systems (3x10PW and 2xPW@10Hz)

Bringing together a world of science

ELI is an international research infrastructure with the world's largest and most advanced high-power and high-repetition-rate lasers.



CZECH
REPUBLIC



HUNGARY



ITALY



LITHUANIA



BULGARIA



ROMANIA



GERMANY

ELI operates as a **European Research Infrastructure Consortium** (a legal entity under EU law, created by EU countries and partners to develop and operate pan-European research infrastructures).

AN ESFRI LANDMARK PROJECT



ELI Beamlines



ELI NP



ELI ALPS

Integration of the ELI Facilities

Unique user access across the three facilities.



ELI Beamlines Facility

High-Energy Beam facility, develops and applies ultra-short pulses of ultra-intense radiation to explore extreme conditions or produce high-energy particles and radiation.

 DOLNÍ BŘEŽANY, CZECH REPUBLIC
SINCE 1 JANUARY 2023



ELI Attosecond Light Pulse Source Facility

Attosecond Light Pulse Source, offers unique time-resolved investigation possibilities for both nonrelativistic and relativistic interaction of light with all states of matter.

 SZEGED, HUNGARY
SINCE 1 JANUARY 2024



ELI Nuclear Physics Facility

Nuclear Physics facility with ultra-intense lasers and brilliant gamma beams (up to 19 MeV) to produce and explore new nuclear states or generate neutron beams.

 MĂGURELE, ROMANIA

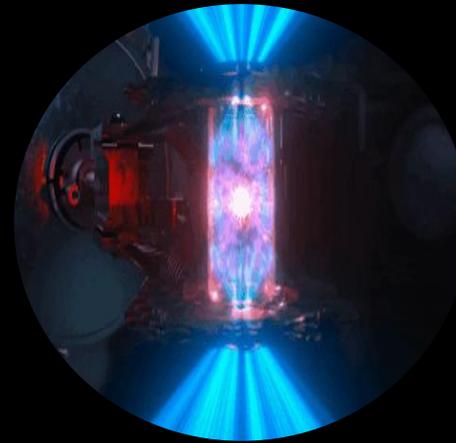
Science at ELI



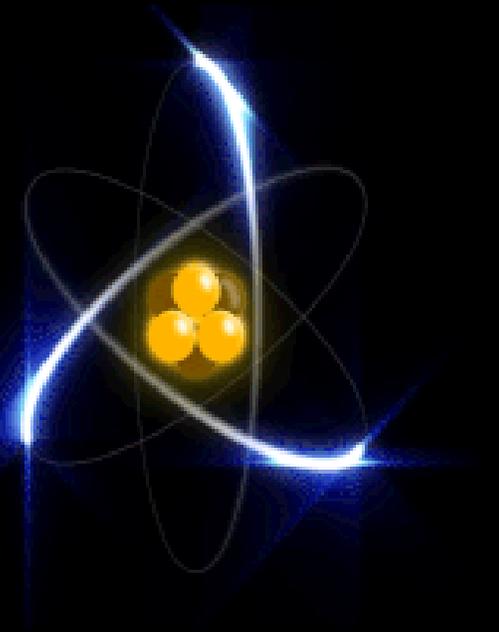
particle acceleration



radiation
physics



high-energy
density (HED)
fusion
astrophysics



ultrafast
dynamics

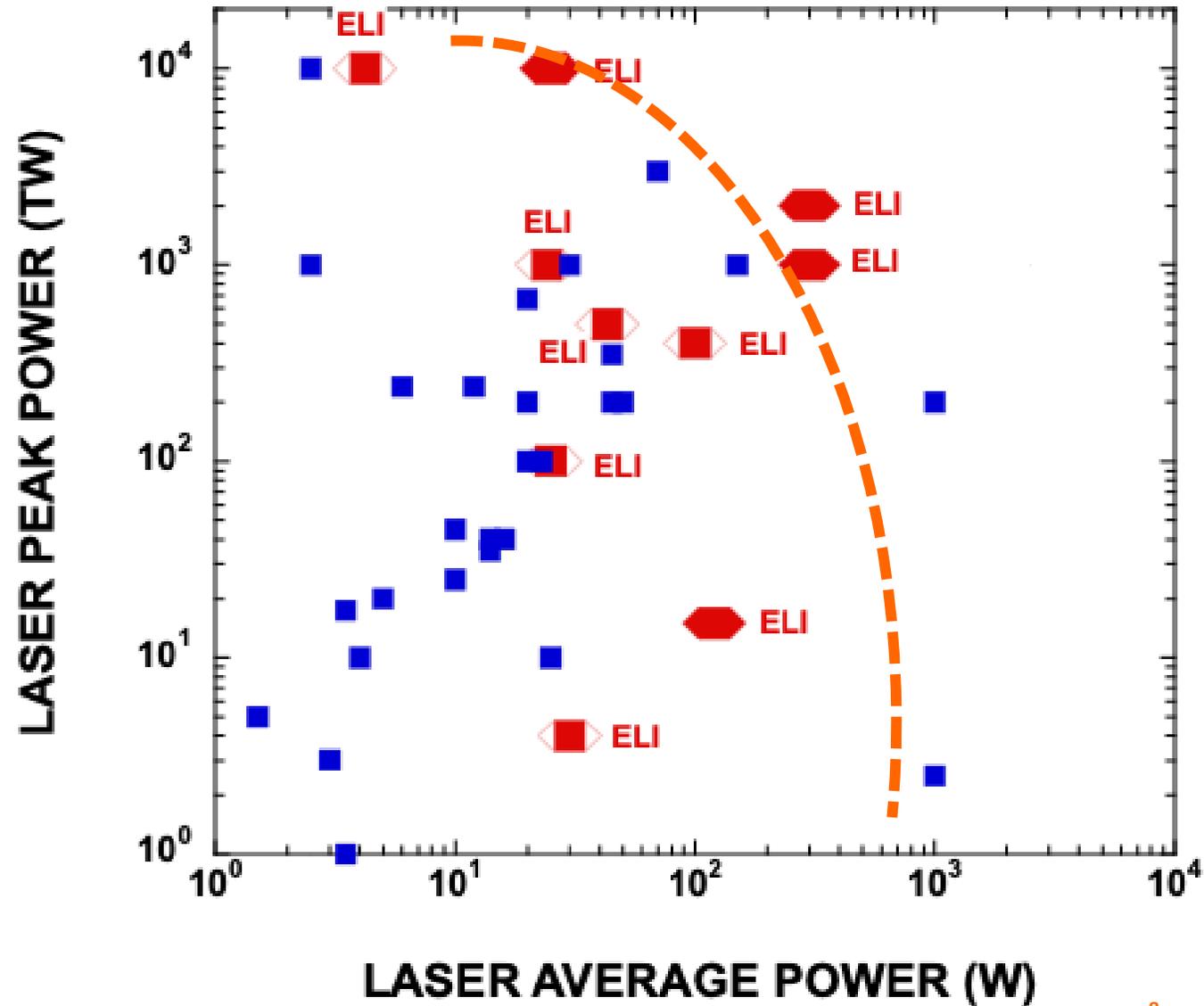
AMO, materials
science, biology

Dominating the laser landscape

The ELI Facilities are powering previously unaccessible laser specification.

ELI's suite of lasers cover the full spectrum of combined high average and high peak power lasers.

The Extreme Light Infrastructure is the world's largest and most advanced high-power laser infrastructure and a global technology and innovation leader in high-power, high-intensity, and short-pulsed laser systems.



One user facility, three modes of access

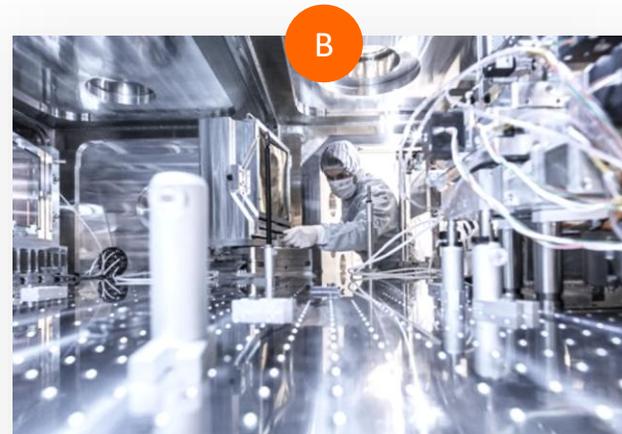
A flexible model to serve
a variety of users.



Excellence-based Access

Evaluation of proposals by international peer-review panels.

RESULTS PUBLISHED AND OPEN



Mission-based Access

Thematic research granted on the basis of scientific missions. Proposals reviewed by international panels.

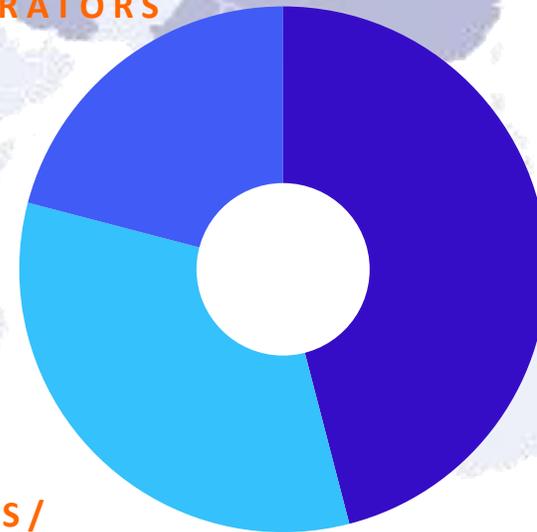
RESULTS PUBLISHED AND OPEN



Proprietary Access

Paid access for industrial or other users.

RESULTS RETAINED BY THE USER

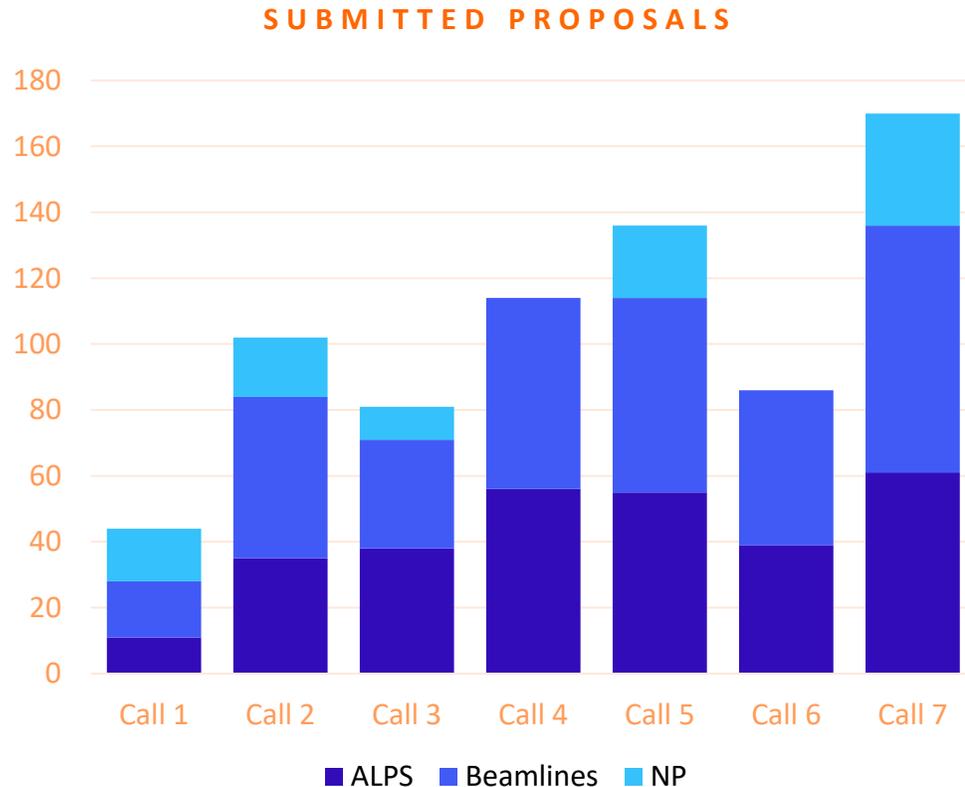


ELI ERIC Staff

International talent powering excellence.

The ELI User Programme

Growing engagement from Call 1-7

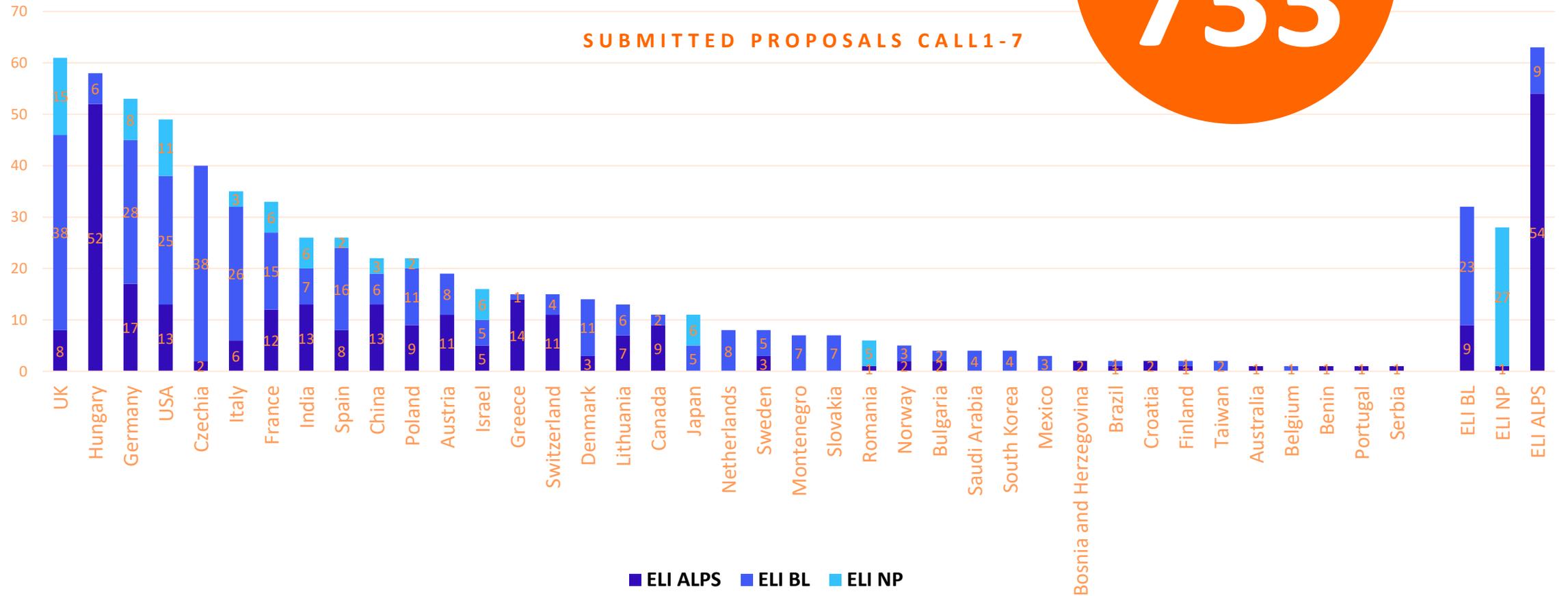


Year	User Call	Proposals Submitted	Beamtime Granted	ELI FACILITIES INDIVIDUALLY		
				ELI ALPS	ELI BL	ELI NP
2022	1 st	44	29	11/8	17/17	16/4
2023	2 nd	102	67	35/32	49/31	18/4
2023	3 rd	81	58	38/28	33/26	10/4
2024	4 th	114	75	56/43	58/32	-
2024	5 th	136	90	55/35	59/39	22/16
2025	6 th	86	50	39/26	47/24	-
2025	7 th	170	98	61/44	75/35	34/19
Total	1-7	733	467	295/216	338/204	100/47
Acceptance rate			64%	73%	60%	72%

The ELI User Programme

Distribution of all proposal submissions across ELI facilities by PI affiliation country in Call1-7

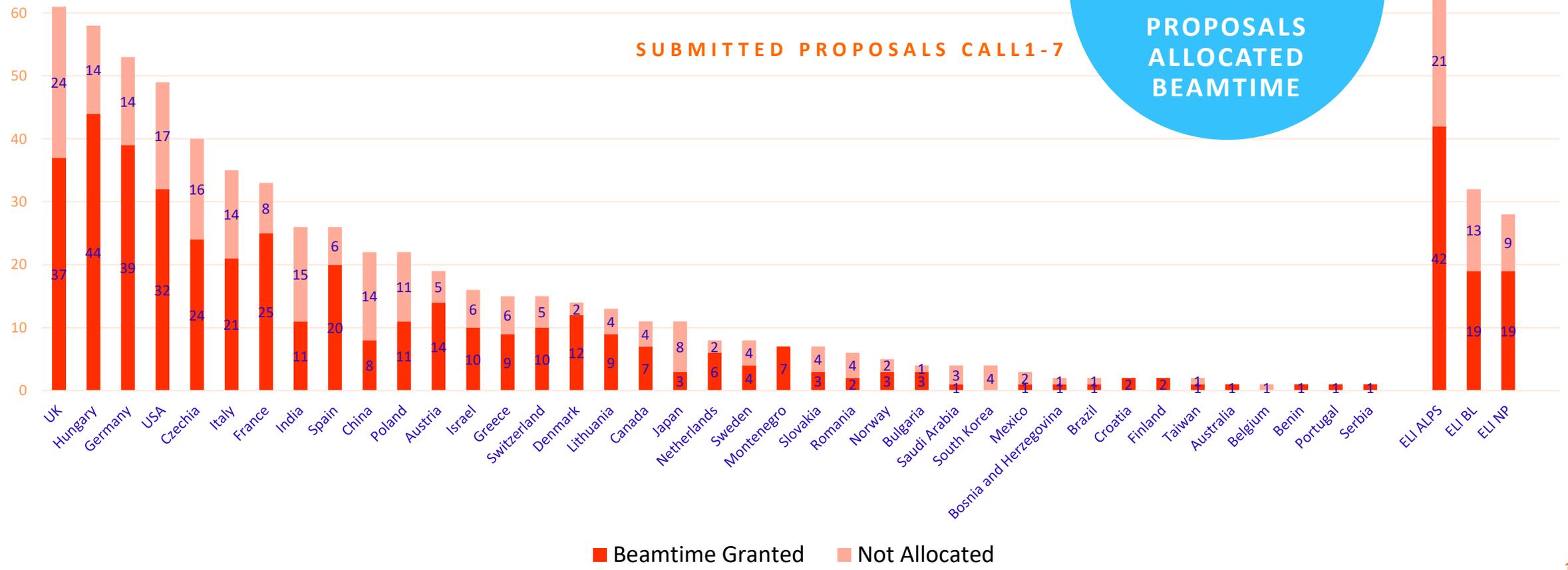
TOTAL PROPOSALS SUBMITTED
733



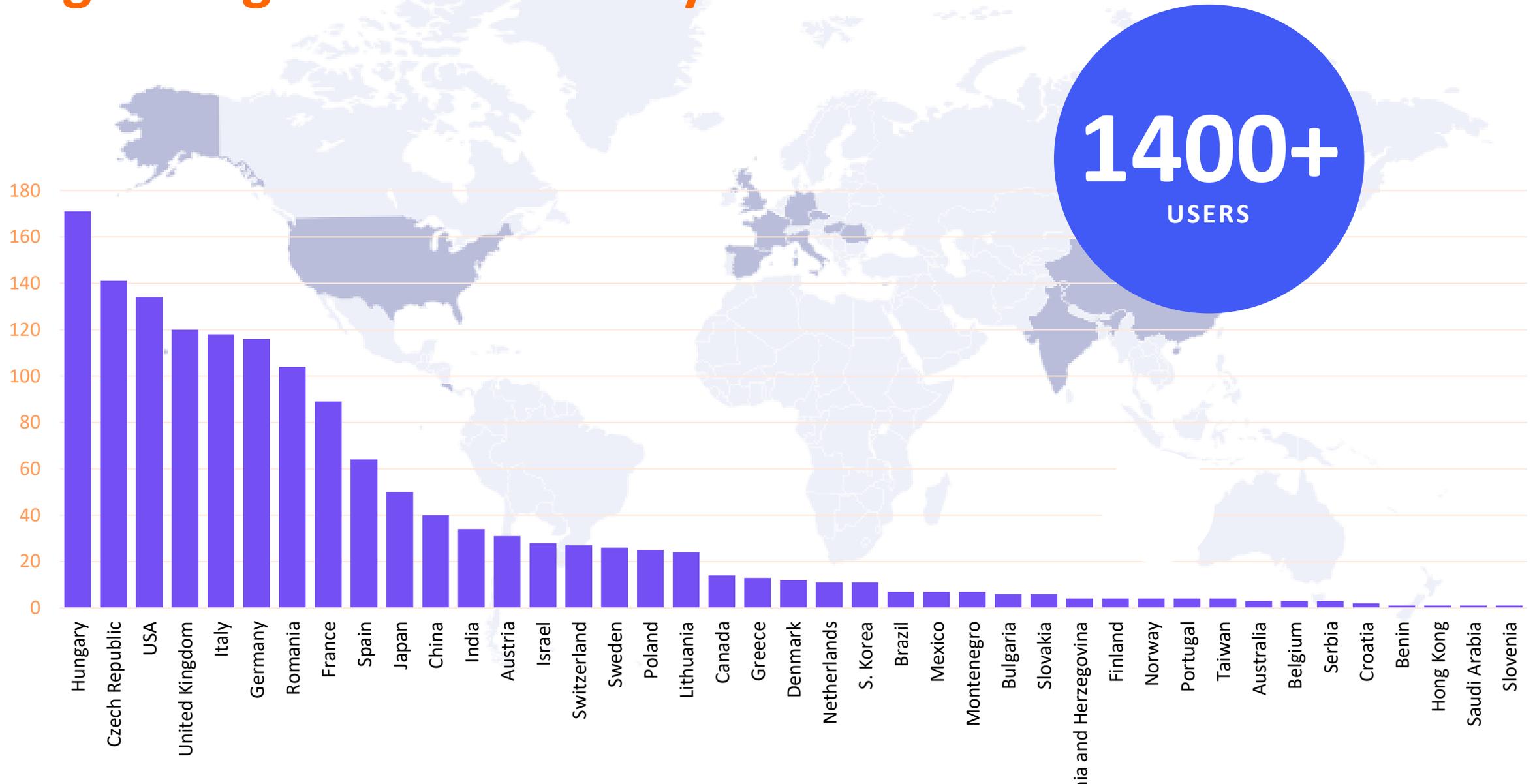
The ELI User Programme

Beamtime allocation overview across Calls 1–7 by PI affiliation country. 467 proposals allocated beamtime out of 733 submissions.

467
PROPOSALS
ALLOCATED
BEAMTIME



A growing user community





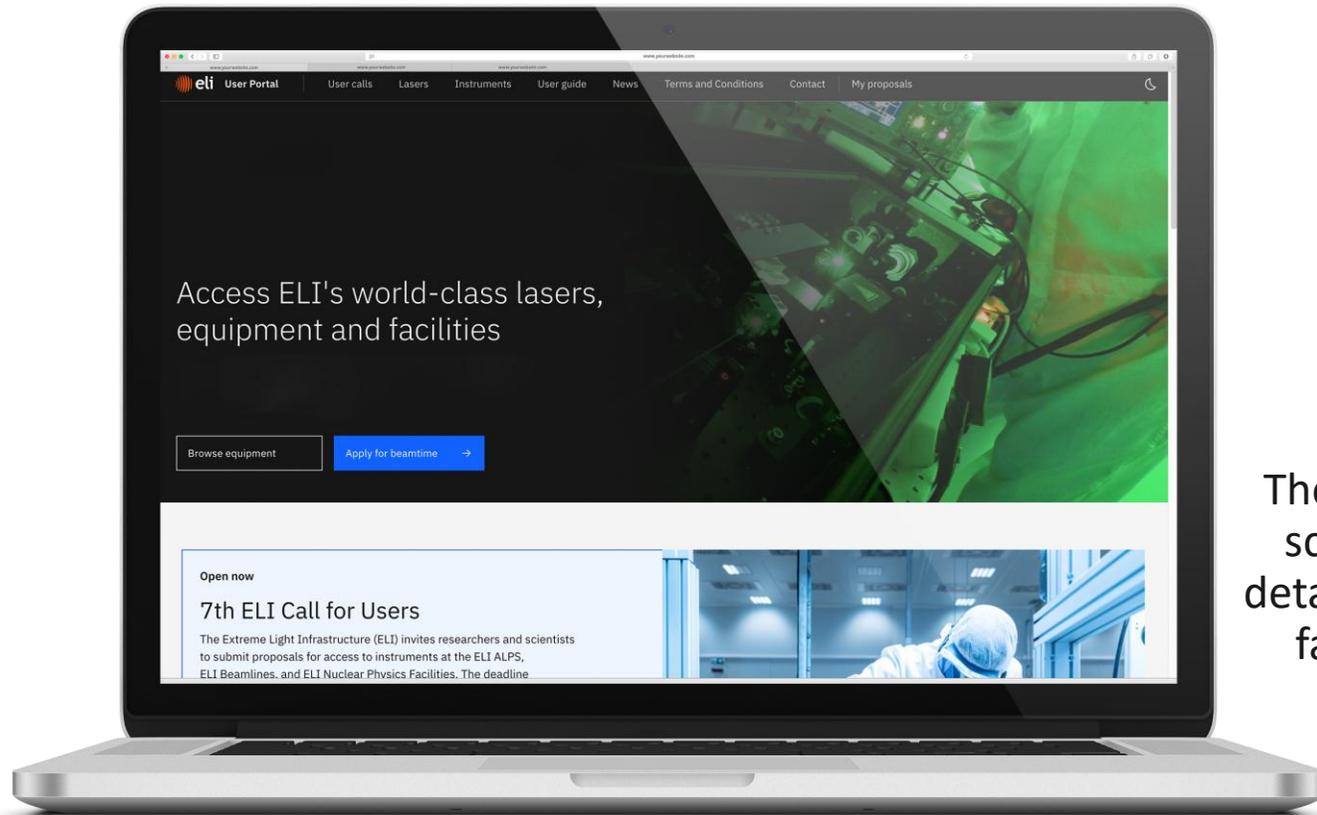
A wealth of technology

Giving users everything they need to advance fundamental and applied science.

ELI EXCELLENCE-BASED CALLS ENABLE ACCESS TO ALL 3 ELI FACILITIES

BI-ANNUAL CALLS – SPRING AND AUTUMN

41 EXPERIMENTAL INSTRUMENTS OFFERED IN LAST CALL



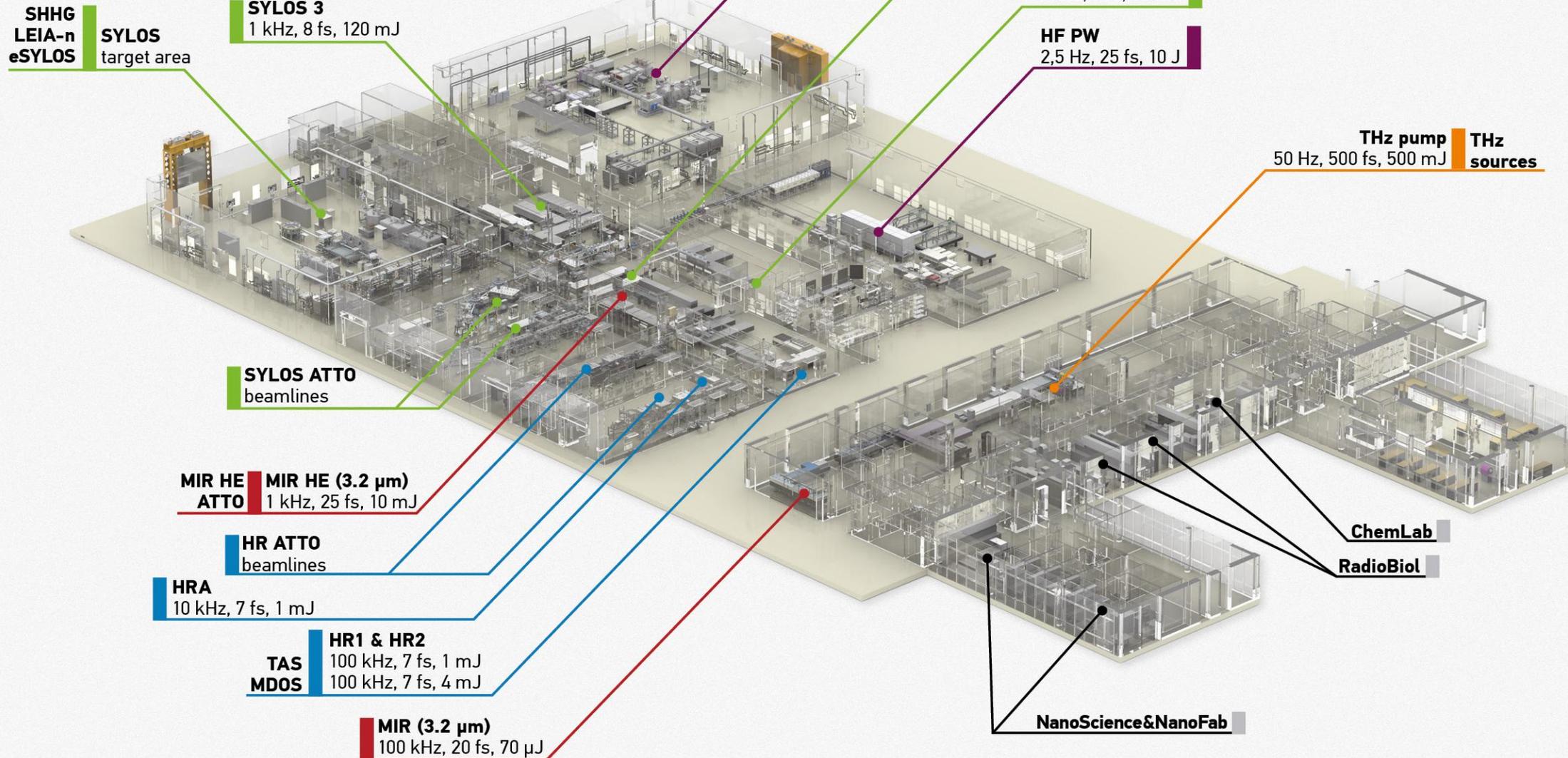
The ELI User Portal

The ELI User Portal is a portal for researchers and scientists to explore and access comprehensive details on ELI's cutting-edge lasers, equipment, and facilities available for groundbreaking science.

**CALL 8 TO BE LAUNCHED
17 MARCH 2026**

up.eli-laser.eu

ELI ALPS Facility Layout



ELI ALPS Lasers

Parameter spaces

100 kHz, 1 kHz, 10 Hz, single shot

850 nm, 1030 nm, 3.2 μm

130 μJ , 1 mJ, 120 mJ, 8.5 J

most few cycles

many CEP-stable

(Target) Specifications	
HR1	100 kHz, 30 fs, 1.8 mJ 100 kHz, 6.2 fs, 1 mJ
HR2	100 kHz, 50 fs, 6 mJ 100 kHz, 6.2 fs, 4 mJ, CEP
HR Alignment	1-6 kHz, 7 fs, 1 mJ, CEP
MIR	100 kHz, 42 fs, 130 mJ, CEP 100 kHz, 15 fs, 45 mJ (11 fs, 35 μJ) CEP
MIR-HE	3.2 μm , 1 kHz, CEP, <50 fs, 20 mJ or <25fs, 10 mJ 1.6 μm , 1 kHz, CEP, <100 fs, 12 mJ
SYLOS 2	1 kHz, 8 fs, 30 mJ (Flat-Top), 24 mJ (Gauss), CEP
SYLOS 3	1 kHz, 9 fs, 120 mJ, CEP
SYLOS Alignment	10 Hz, 12 fs, 40 mJ
SYLOS Alignment 2	50 Hz, 12 fs, 40 mJ
HF PW	10 Hz, <17 fs, 34 J 2.5 Hz/5 Hz/single shot/burst mode, 22 fs, 8.5 J
THz Pump lasers	1 kHz, 100 fs, 4 mJ, 800 nm 50 Hz, 500 fs, 500 mJ, 1030 nm 1-10 kHz, 140 fs, 14 mJ, 1030 nm

SYLOS3 laser chain @ ELI ALPS



- Excellent energy and CEP stability.
- Operates from shot-on-demand up to 1 kHz repetition rate.

Laser output parameters

- Peak power: > 15 TW
- Output pulse energy: 120 mJ
- Pulse duration: < 8 fs
- RMS energy stability: < 0.7 %
- CEP stability: < 200 mrad

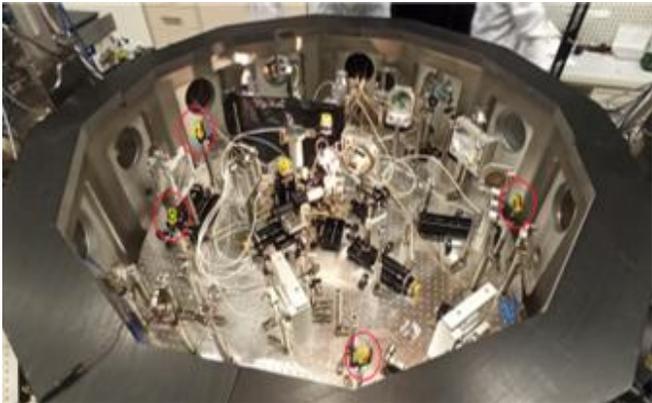
SHHG



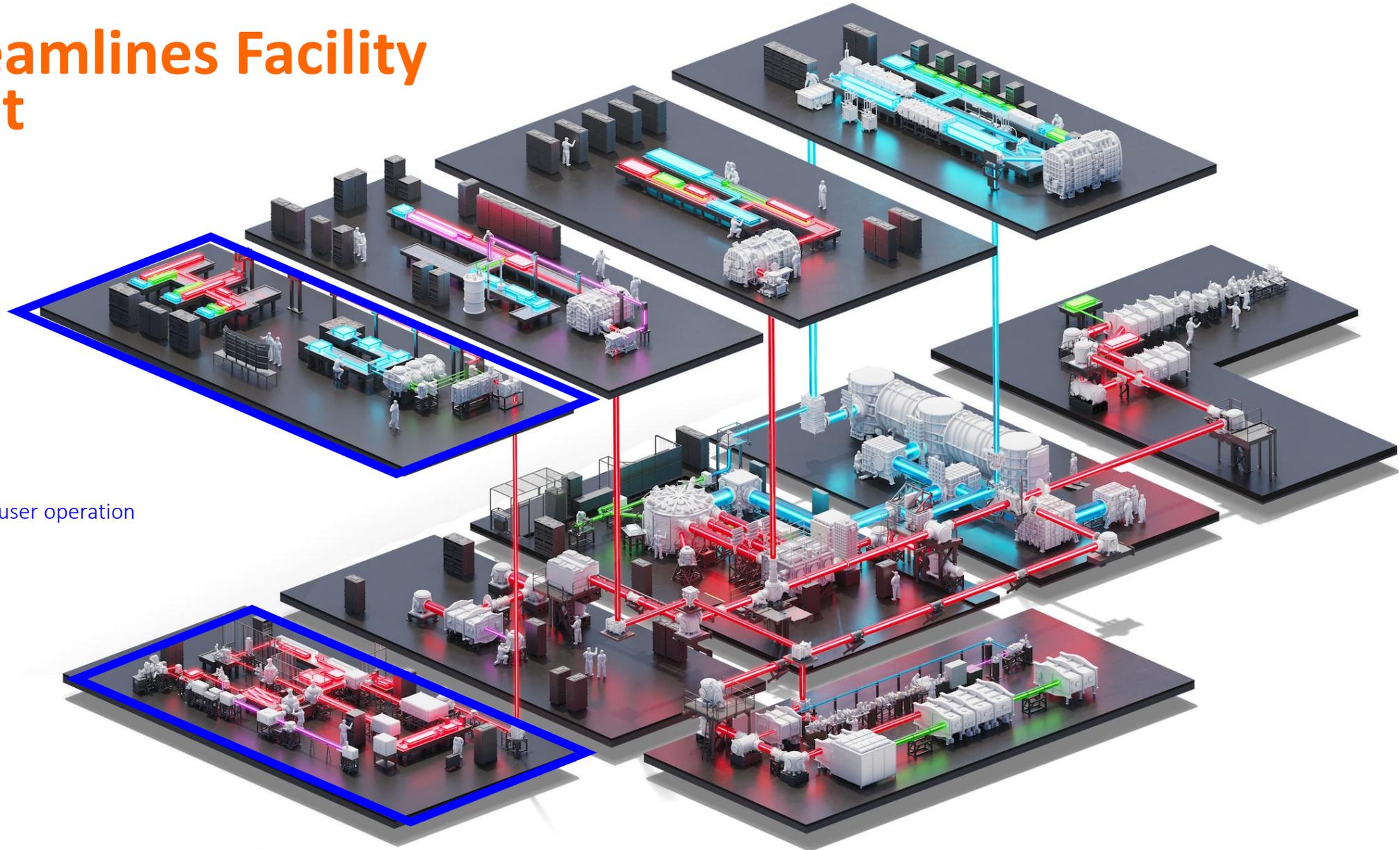
eSYLOS



LEIA-n



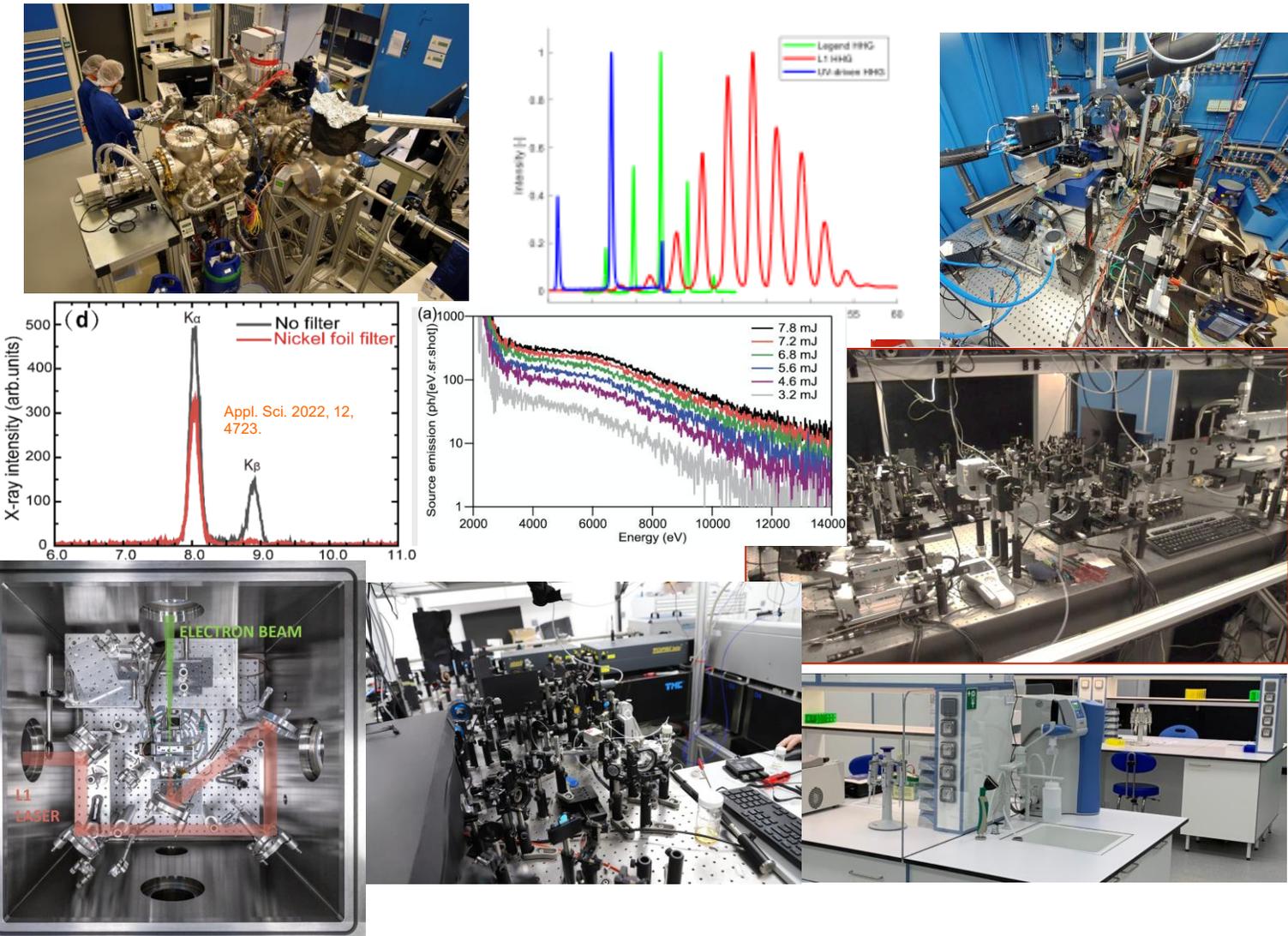
ELI Beamlines Facility Layout



 L1-E1 user operation

E1, L1 User Science @kHz

Experimental hall and associated labs



Science with Coherent XUV radiation

- AMO science, CDI, XUV material science
- Time of flight spectroscopy, Velocity Map Imaging, XUV spectroscopy
- Pure and doped clusters and droplets, molecular beam, fixed targets
- XUV source development, variety of targets and diagnostics

Hard X-ray science

- X-ray diffraction and scattering, X-ray spectroscopy
- Plasma X-ray source development; Cu tape/liquid targets (water, metal)
- CW X-ray sources for steady state characterization
- Eulerian Cradle diffractometer with fully motorised sample positioning system
- Von Hamos spectrometer geometry; solid, powder, liquid samples

Ultrafast optical spectroscopy (E1 and Biolab)

- Femtosecond Stimulated Raman Scattering and Transient Absorption
- Time resolved spectroscopic ellipsometry (E1 optical)
- Transient Current Technique (E1 optical)
- IR spectroscopy

ALFA: kHz electron acceleration

- kHz electron acceleration and X-ray generation and applications

Sample preparations support lab (ELIBIO Biolab)

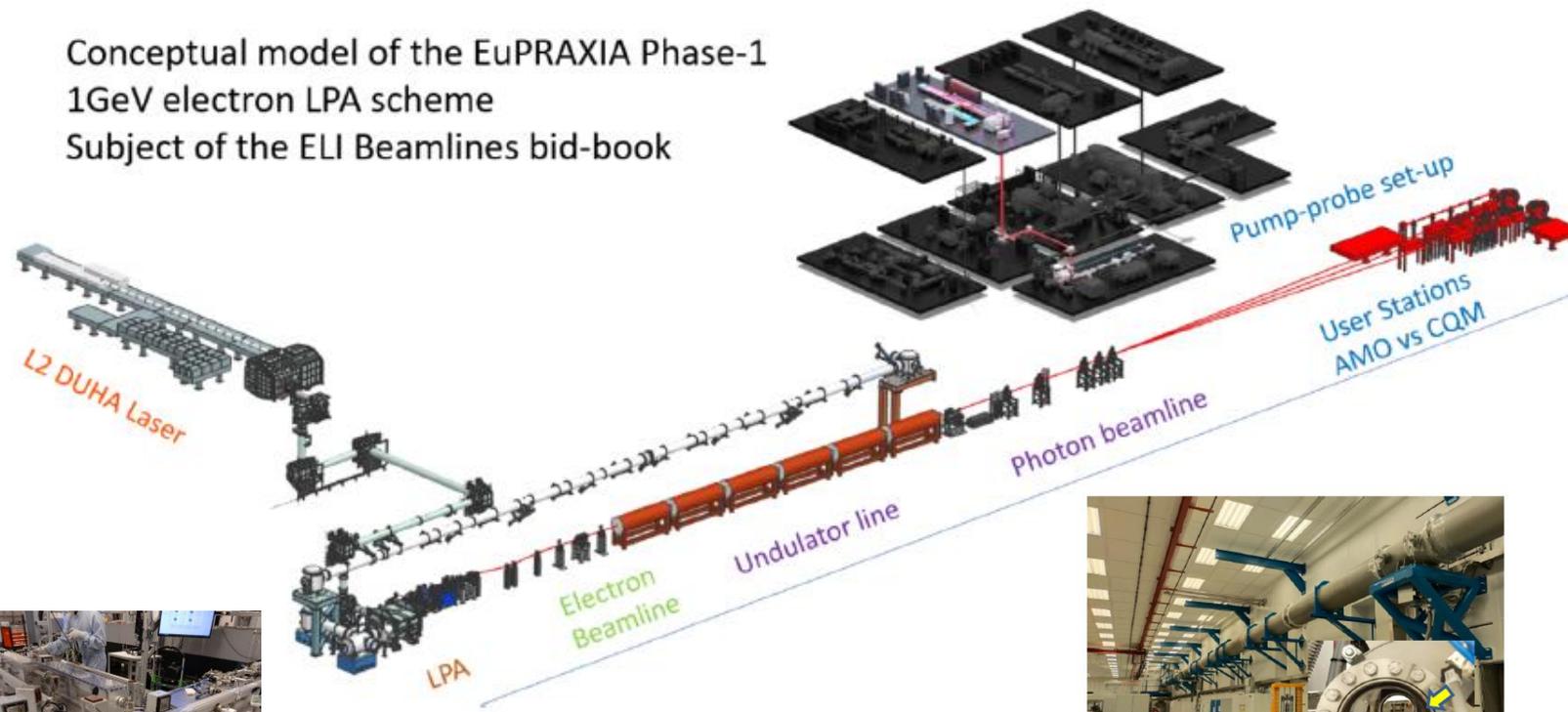
- Sample preparation, including Bio safety level 2
 - Wet processes, crystallization, cold room
- Supporting spectroscopy methods
- Optical/light microscopy
- Electron microscopy
- Imaging ellipsometry
- ...

LUIS beamline in E5 driven by L2-DUHA (R&D) @ BL

High quality LWFA electron beams for FEL



Conceptual model of the EuPRAXIA Phase-1
1GeV electron LPA scheme
Subject of the ELI Beamlines bid-book

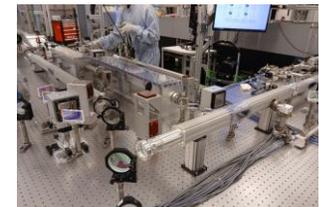


LUIS undulator-based (LWFA) beamline

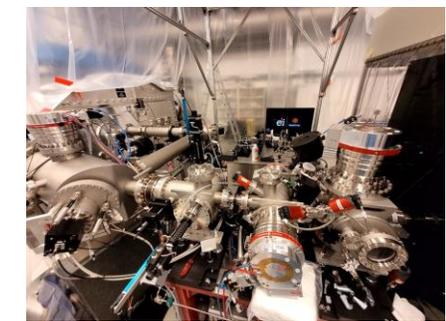
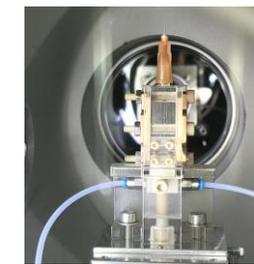
- i. R&D platform for high-quality LWFA acceleration and undulator radiation
- ii. Biomolecular imaging with fs, EUV-FEL ultrashort pulses
- iii. Imaging with “water window” FEL

L2-DUHA Laser

- 3J / 25fs (> 100TW) @ 20-50Hz (100Hz)
- Pump laser uses diode-pumped Yb:YAG slabs
- OPCPA short-pulse chain
- Auxiliary MID-IR (2.2 μm) beam @ 2kHz



Gas-filled capillary in the LUIS interaction chamber





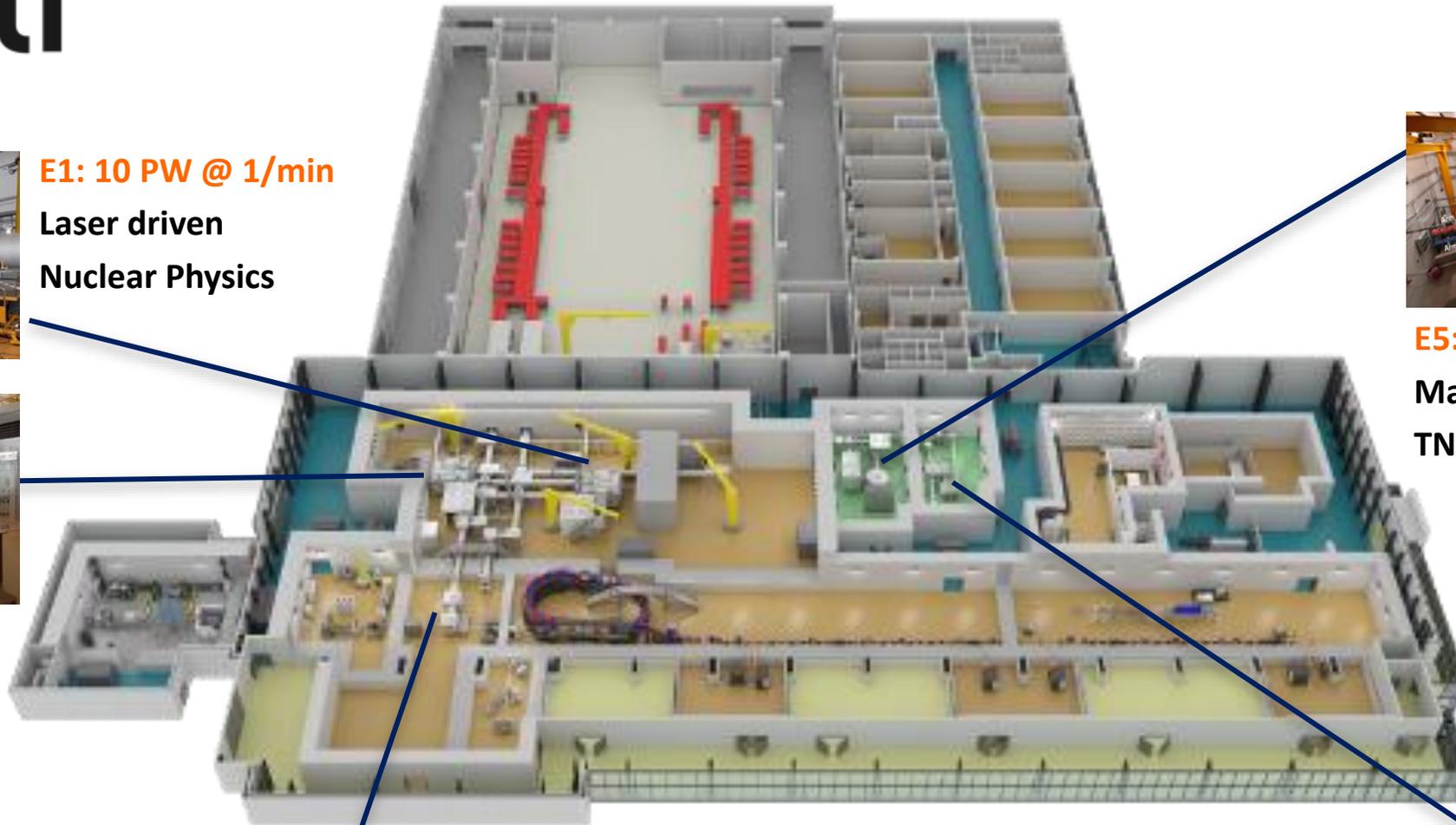
High-power laser facilities @ ELI-NP



E1: 10 PW @ 1/min
Laser driven
Nuclear Physics



E6: 10 PW @ 1/min
High Field QED



E5: 1 PW @ 1 Hz
Material Studies, LWFA,
TNSA, RPA



E7: 1 PW @ 1 Hz
High Field QED

E4: 0.1PW@10 Hz
Photon-photon int.,
LWFA, X-ray imaging



The annual User Meeting showcases ELI's scientific offer while engaging with the User Community to gain feedback on scientific and technical developments and what services are most useful to support researchers during the proposal submission process.

User Meeting & Scientific Community



SAVE THE DATE

ELI User Meeting

24-26 June 2026

 ELI BEAMLINES FACILITY,
DOLNÍ BŘEŽANY, CZECHIA





ELISS 2025

The annual ELI Summer School offers students (BS, MS, PhD, Post-docs) a comprehensive overview of the generation and application of intense laser pulses and laser-driven particle and radiation sources.



5
DAYS

30
SPEAKERS

11
HANDS-ON ACTIVITIES

111 STUDENTS
FROM 22 COUNTRIES

50
SUBMITTED POSTERS



SAVE THE DATE

ELI Summer School

31 August –
4 September 2026

 ELI ALPS FACILITY,
SZEGED, HUNGARY





Join the ELI mailing list

Sign up to receive the latest news and updates about ELI, including:

- ✓ ELI events & workshops
- ✓ Key scientific achievements & publications
- ✓ User calls
- ✓ Job opportunities

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By signing up you agree to the processing of your identification and/or sensitive personal data by ELI ERIC, according to the ELI ERIC GDPR Policy available at <https://eli-laser.eu/contacts/eli-eric/>



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Thank you



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INFRASTRUCTURE