Laserlab Europe access opportunities

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This project has received funding from the *European Union's Horizon 2020 research and innovation programme* under grant agreement no 654148

LASERLAB-EUROPE

National resources:
Contractors:
33 laser infrastructures from 16 countries

6 subcontractors
9 associate partners

→Participants from
22 European countries

Started in 2003

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LASERLAB-EUROPE

Strengthening the leading role of Europe in laser research through:

Transnational Access

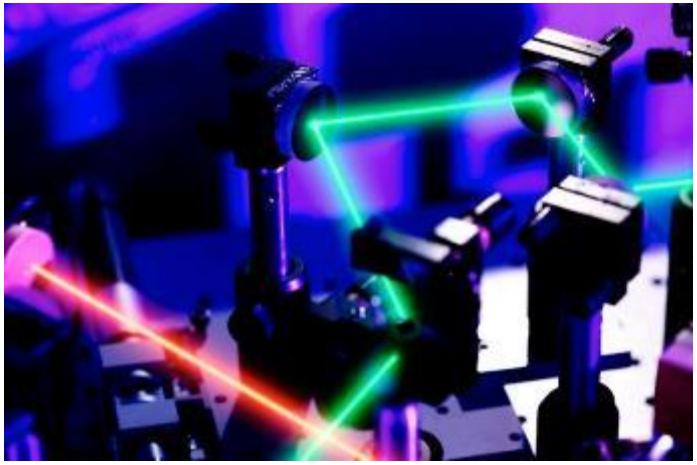
providing access to top-quality laser research facilities for scientists all over Europe and beyond

→ Apply through www.laserlab-europe.eu/transnational-access

Joint Research

See: www.laserlab-europe.eu/research

- Biomedical Optics for Life Science Applications - **BIOAPP**
- Photonic Techniques for Material Analysis, Nanoscience and Sensing - **PHOTMAT**
- Innovative Laser Technologies - **ILAT**
- Laser-driven High Energy Photon and Particle Sources towards Industrial and Societal Application - **LEPP**



Networking Activities

- fostering collaboration, best practices and exchanges
- planning the future of the field
- user training
- training and education for young researchers
- public outreach
- collaboration with industry and medical centres

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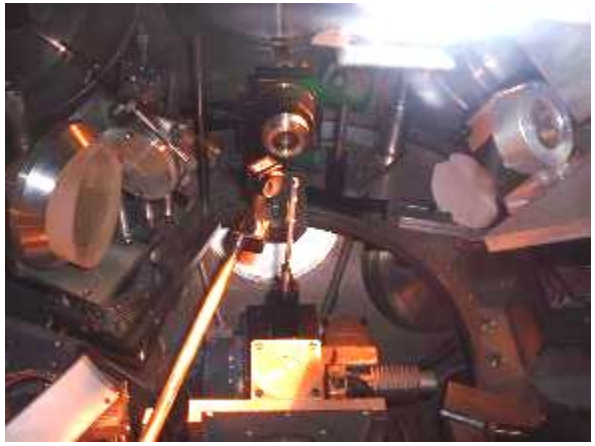
Using our facilities

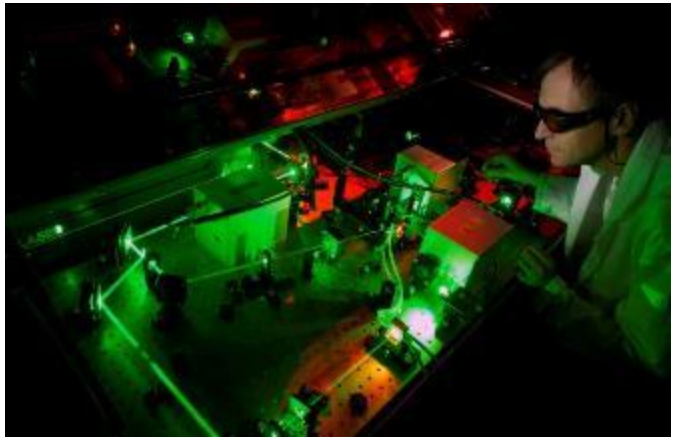
Laserlab-Europe offers unique research opportunities to scientists all over Europe.

Access is provided

- to world-class laser research facilities
- in a large variety of inter-disciplinary research, including life sciences,
- free of charge, including travel and accommodation.

Access is granted on the basis of scientific excellence of a research proposal, reviewed by an external and independent Selection Panel. Priority is given to new users.





If you would like to perform your own experiments at Laserlab-Europe facilities, please see www.laserlab-europe.eu.

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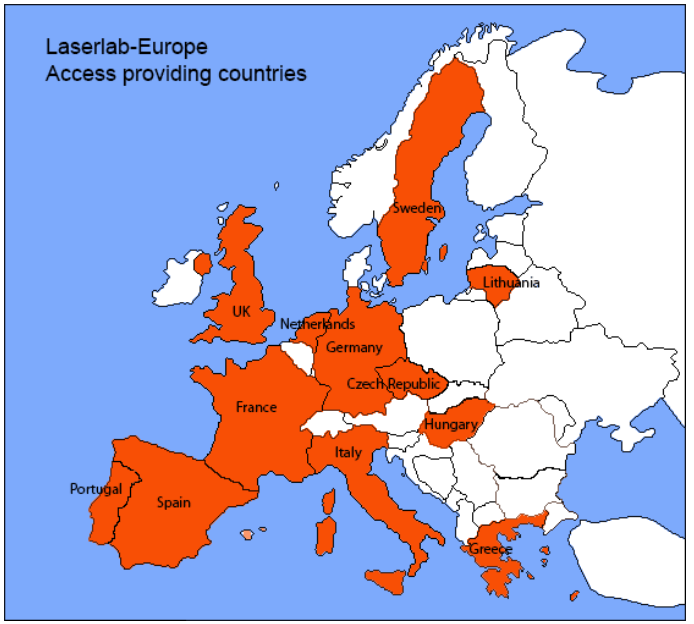
Access to the Laserlab facilities

Transnational Access



Access

- offered to 22 research infrastructures
- in 12 European countries
- Covering a large range of complementary facilities and specific capabilities, incl. two FELs

~ 750 experiment days / year

~ 75 projects / year

~ 175 visitors / year

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Access Research Topics

Laserlab Europe

Research Topics	CELIA	CLL	CLF	CUSBO	DP-USZ	FELIX	FERMI	FORTH	FSU-IOQ	GSI	ICFO	LASERIx	LLAMS	LENS	LLC	LOA	LP3	LULI	MBI	PALS	SLIC	VULRC
Atomic and Molecular Spectroscopy and Chemical Dynamics	■	■	■	■	■	■	■	■	■		■		■	■	■	■	■		■	■	■	■
Biophysics and Optical Life Sciences		■	■	■	■						■		■	■	■		■		■		■	■
Intense Laser and Particle Beams Interactions									■	■												
Laser Cooling, Trapping and BEC													■	■								
Laser-Particle Acceleration and Applications			■						■	■					■	■		■	■	■	■	
Laser-Plasma Physics, Fusion Science and Applications			■		■				■	■		■			■			■	■	■	■	
Laser Remote Sensing, Analytical Chemistry and Combustion Diagnostics													■		■		■					
Materials Processing				■	■		■	■			■		■			■	■	■		■		
Multiphoton Processes, including High-Order Harmonics, with Applications	■		■	■	■		■	■	■		■	■	■	■	■	■			■	■	■	
Quantum Electronics and Novel Laser Development	■		■	■	■				■		■		■			■	■		■			■
Spectroscopy under High Pressure Conditions		■												■								
Time-Resolved X-Ray Science	■		■				■	■	■		■	■			■	■			■			
Ultrafast Dynamics of Molecules, Liquids and Semiconductor Materials	■	■	■	■		■	■	■	■		■		■	■	■		■		■		■	
X-Ray Laser Physics			■						■	■		■				■		■	■	■		

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High Intensity Laser Laboratory (HILL)

head: Sandor SZATMARI

http://exp.physx.u-szeged.hu/hill/

VUV, XUV generation
100 µJ, < 500 fs, @ 83 nm

Sub-ps, terawatt excimer laser
80 mJ, 600 fs (100 fs), @ 248 nm

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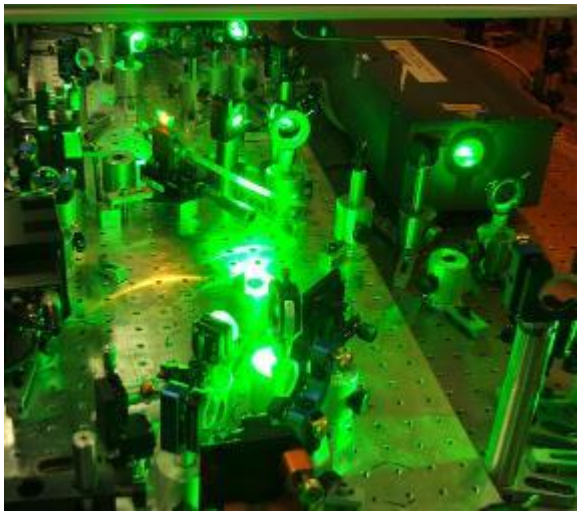
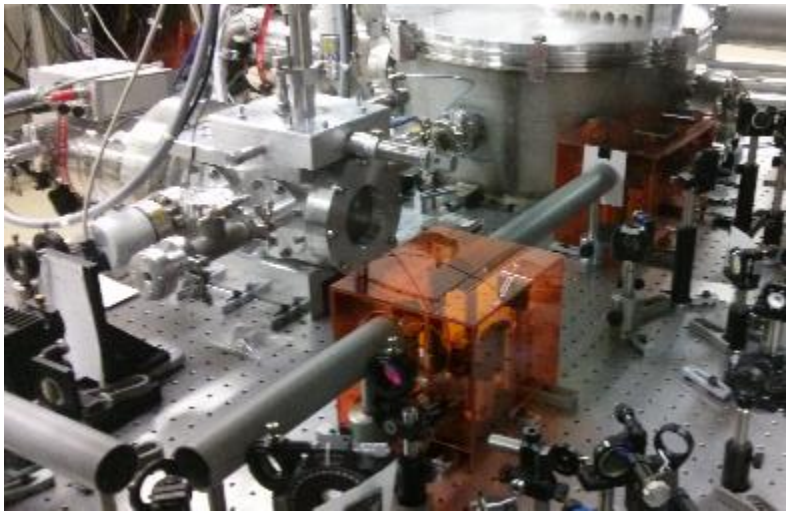
Univ. Szeged TEWATI Laser Laboratory
Head: Karoly Osvay

Laserlab Europe

CEP-stabilized, <6 fs seed pulses
800 nm: 1.5 mJ, 20 fs, **200 Hz**
800 nm: 100mJ, <25fs, 10Hz (5TW)
400 nm: 0.5 mJ, 30 fs, **200Hz**
266 nm: 50 μJ, 25 fs, **200Hz**
HHG chamber with TOF detector

http://www.tewati.eu





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New Opportunities

New Access providers

- **Coimbra LaserLab CLL**, Portugal, specialised in life-science applications
- Two Free Electron Lasers:
  - **FELIX**, the Netherlands, for infrared experiments
  - **FERMI**, Italy, for UV and soft x-ray experiments

Laser Lab Coimbra
Chemistry

FELIX
Free Electron Lasers for Infrared eXperiments

Elettra Sincrotrone Trieste

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Coimbra Laser Lab, Coimbra, Portugal
Head: Luis G. Arnaut

CLL is dedicated to the use of lasers in physical, life and health sciences.

- Transient Absorbtion and Photoacoustics Lab
- Molecular Cryospectroscopy and Biospectroscopy Lab
- Laboratory for Fluorescence

Typical applications

- Fs transient absorption with UV/VIS/NIR detection with 140 fs to 8 ns resolution
- Picosecond single photon counting from 3 ps to 1 μs resolution
- Nanosecond photoacoustic calorimetry with 10 ns resolution
- Photochemistry in matrices with 0.2 cm^{-1} bandwidth excitation in the 220 – 1800 nm range and temperature control down to 6.5 K.
- Access to phototherapy and photodiagnostics in a collection of cancer and normal cell lines
- IR and Raman chemical imaging

http://www.uc.pt/en/uid/laserlab

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EC-funded transnational access

Who is eligible?

'User groups', i.e. teams of one or more researchers (users), are eligible if they fulfill the following conditions:

- Both the user group leader and the majority of the users must work in a country other than the country where the facility is located;
- Only research teams that are allowed to publish the results of their project in the open press may benefit from the access, unless the users are working for SMEs.

New: Access applications from countries outside the EU are eligible

→ up to 20% of the total access may be granted to users from third countries

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Transnational Access in Laserlab-Europe

Coordinated implementation of the access opportunities
and selection of the submitted proposals

Unique consortium-wide selection procedure:

- joint and common access offer from all infrastructures
- joint permanent call for proposals
  www.laserlab-europe.eu/transnational-access
- application online on a single website
- fully electronic proposal processing
- selection by an independent external Selection Panel
- large pool of referees (> 100) covering as much as possible all domains of laser science
- each proposal evaluated by 2 experts
- once accepted, experiment to be scheduled within the next 18 months

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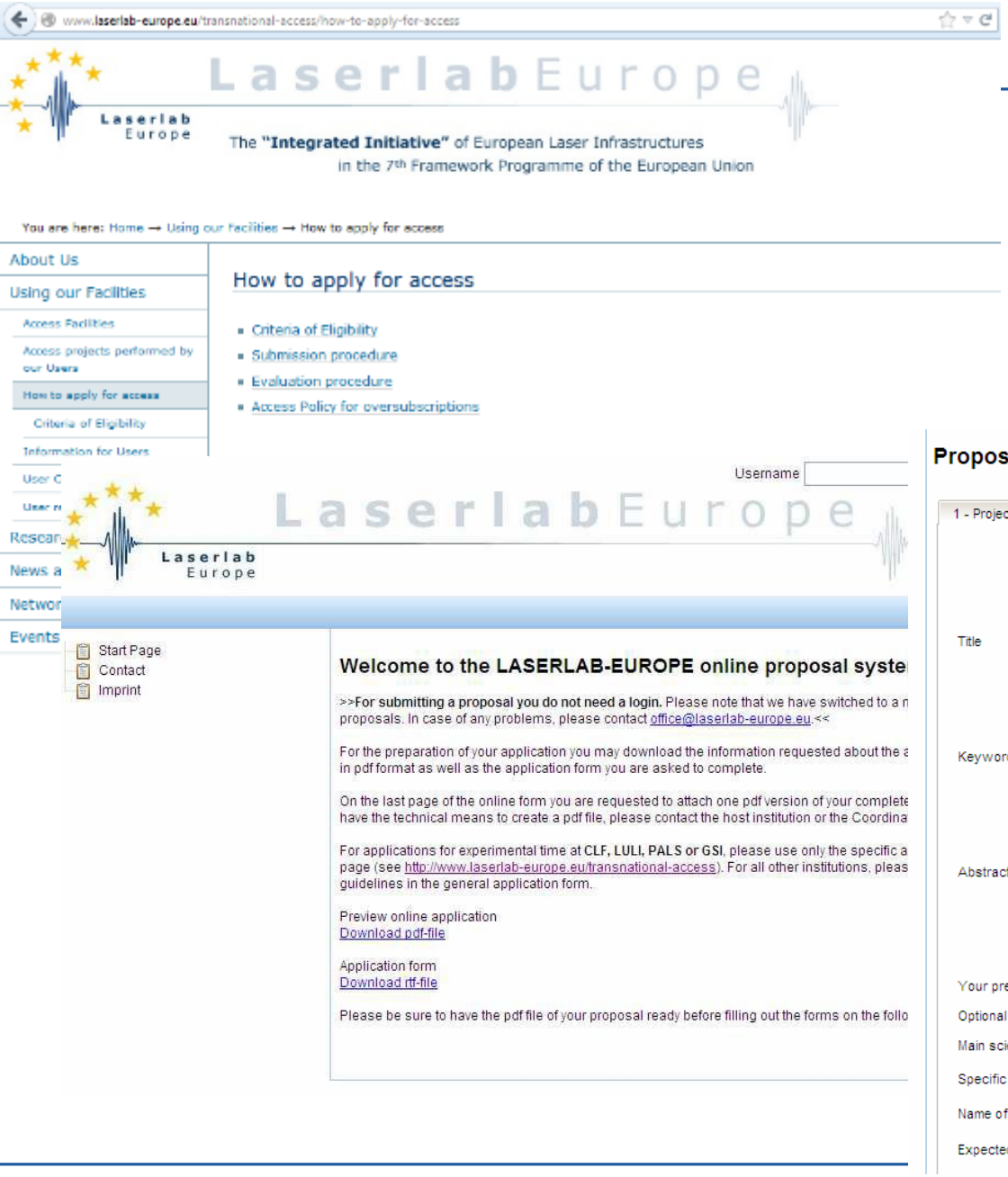
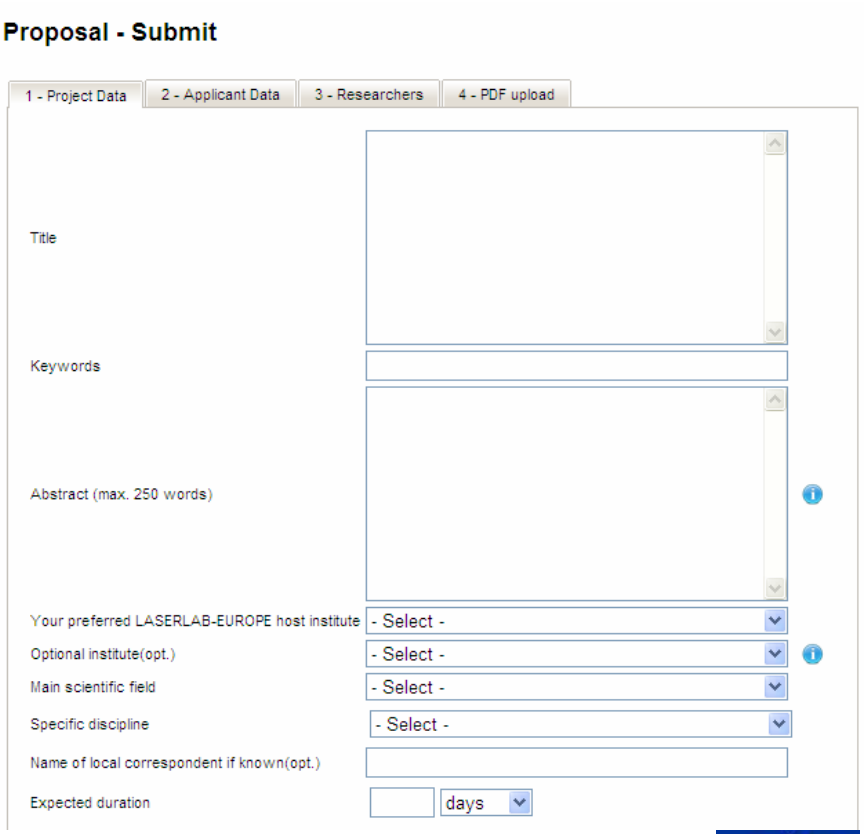
Online proposal submission and management





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Access Board

Objective: provide the best service to users by reallocating access days to the partners who experience the highest user pressure

Main duties

- propose implementation of the Laserlab access programme, taking into account:
  - the overall objectives of the access programme
  - changes in user demands
  - irregularities in access quality or changes in infrastructures' abilities
  - reallocation desiderata

- act as a mediator between users and facilities (if necessary)

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Large involvement of the user representatives in Laserlab

User representatives

- act as interface between the User community and Laserlab-Europe
- providing advice to both sides
- helping to maintain and improve the relations between them.

Rosa Weigand (Chair)
Complutense University
Madrid, Spain
Email

Marco Borghesi
Queen's University of
Belfast, UK
Email

Helder Crespo
University of Porto,
Portugal
Email

Ingo Fischer
University Wuerzburg,
Germany
Email

Istvan Földes
KFKI Research Institute
for Particle and Nuclear
Physics (RMKI)
Budapest, Hungary
Email

Jouko Korppi-Tommola
University Jyväskylä,
Finland
Email

Oldrich Renner
Institute of Physics
AS of the Czech Rep
Email

Amelle Zair
Imperial College London,
UK
Email

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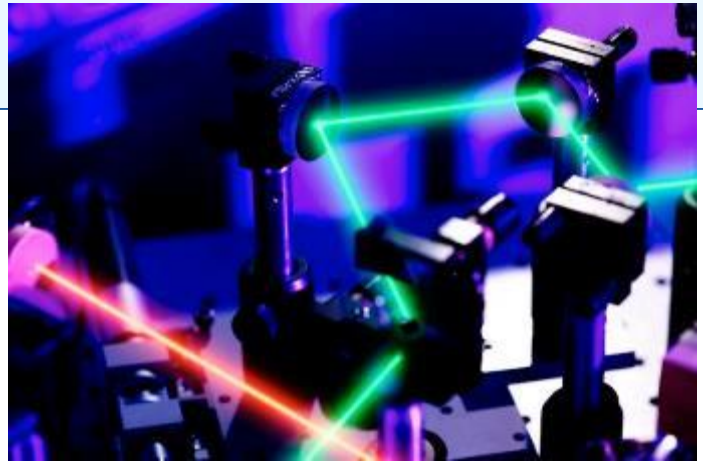

★ Networking Activities

- fostering collaboration, best practices and exchanges
- planning the future of the field
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Joint Research Activities

Addressing the broad range of important new developments in laser research:

- **BIOAPP:** Biomedical Optics for Life Science Applications
- **ILAT:** Innovative Laser Technologies
- **PHOTMAT:** Photonic Techniques for Material Analysis, Nanoscience and Sensing
- **LEPP:** Laser-driven High Energy Photon and Particle Sources towards Industrial and Societal Application

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BIOAPP: Biomedical Optics for Life Science Applications

Biomedical optics is an emerging research field involving photonics, optics, imaging, bioengineering, materials science, with many translational and technology transfer aspects.

BIOAPP will pursue key developments in innovative workstations and methodologies, ranging from the investigation of single bio-molecules and single cells to in-vivo microscopy on living animals to the development of biomaterials and diagnosis tools for human diseases.

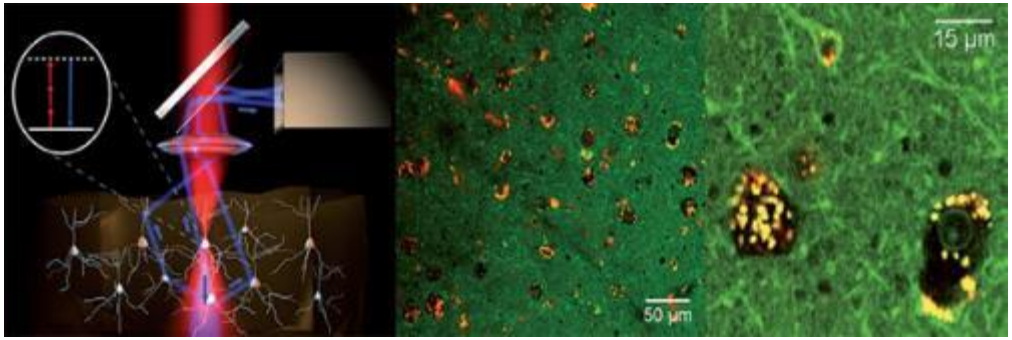
Main activities :

(i) Bioimaging and biosensing;

(ii) Bio-materials;

(iii) Translational research.

Collaboration with biologist and medical communities, industries and hospitals will boost the development of specific devices and will allow to test the developed diagnostic and therapeutic tools.



Third Harmonic Generation (THG) microscopy of human brain tissue

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ILAT: Innovative Laser Technologies

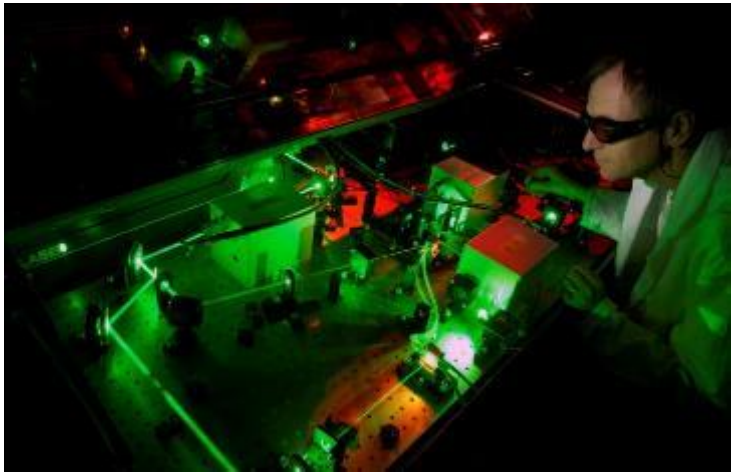
Advanced laser technology is the basis for a huge amount of scientific explorations and plays an ever increasing role in industry due to laser based applications.

ILAT has three main objectives:

(i) solve crucial laser physics bottlenecks in order to make available to Laserlab-Europe's future Users a new generation of laser sources with improved performances;

(ii) involve industrial partners;

(iii) provide sizeable synergies with ESFRI infrastructures in terms of both strategic laser technology development and training of a new generation of laser physics experts.



Laser alignment in one of Laserlab-Europe's labs

By improvements of high peak power laser driver performances in terms of increasing stability, efficiency, energy, repetition rate, power and reliability, a next generation of radiation sources in the THz-Mid-IR and XUV-X rays will be made available for an increasing number of complex and sophisticated applications.

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PHOTMAT: Photonic Techniques for Material Analysis, Nanoscience and Sensing

Photonic techniques play a pivotal role in material analysis, in the development of the next generation of materials, in the advancement of nanosciences and in environmental sensing. The challenges and complexity of problems faced by modern sciences critically call for major advancement in photonic analytical capability.

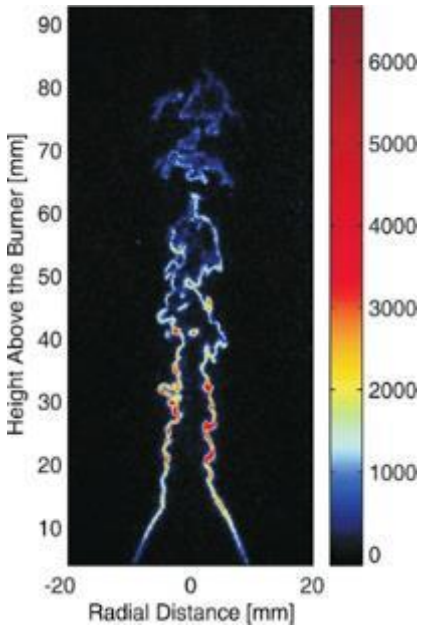
PHOTMAT aims at providing such capability for future frontier research by integrating state of the art and newly developed photonic sources into high performance stations providing advanced analytical capabilities in temporal, spatial and compositional domains at the cutting edge and beyond.

The areas of primary focus are

(i) advanced material characterisation and

(ii) environmental sensing.

Joint developments will permit to carry out advanced *multi-technique* experimental campaigns to unravel complex analytical problems.



Visualisation of CH in a turbulent flame using laser spectroscopy

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LEPP: Laser-driven High Energy Photon and Particle Sources towards Industrial and Societal Application

The interaction of intense lasers with targets, ranging from gas to solid density, can generate sources of energetic particles with unique properties that have opened new avenues for research and hold the promise of tremendous societal and technological impact.

The aim of **LEPP** is

- to further develop the techniques required for production of high quality beams and
- to explore the use of these beams in targeted high impact applications in medicine, biology and material science.

The work will take advantage of the Laserlab-Europe local networks of companies, SMEs, and hospitals. Strong synergies with the three pillars of ELI are foreseen and expected in terms of development of strategic technologies relevant for secondary source applications to radiotherapy and material science.

Experimental set-up for laser-proton acceleration

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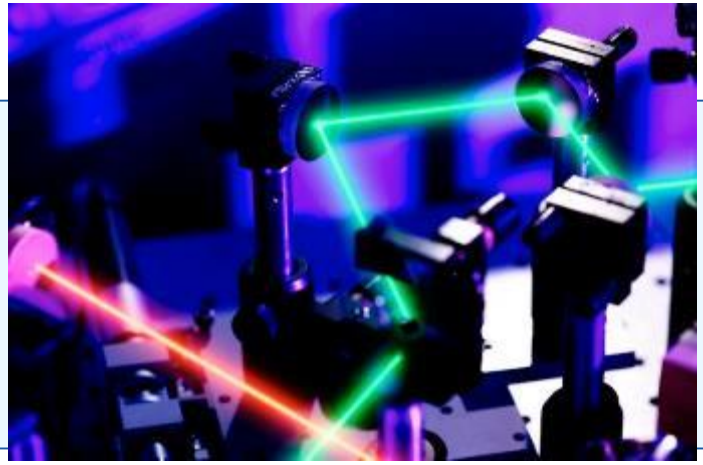

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Networking activities

- Joint Publicity and Outreach
- Scientific and Technological Exchanges
  - “Bridge” Workshops: scientific and technical bridges with other communities
  - Thematic networks
- User training and human resources development
  - Training schools for young researchers
  - Staff exchange for technical staff and scientists
- Access Management and Users Connections
  - Laserlab Access Board and Access Policy
  - User Meetings
  - Online Access Proposal Management System
- Foresight workshops
- Network of National Contact Points
- International Relations, e.g. with non-European Laser Networks
- Innovation Management and Industrial Relations

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Publicity and Dissemination

Laserlab newsletter

Information Posters

Outreach

Visit us on facebook.com/laserlabeurope

www.laserlab-europe.eu

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Scientific and Technological Exchanges

- "Bridge" Workshops
  - Cross-disciplinary workshops with ELI, XFEL, …
- Thematic Networks:
  - Network on Experiments and Operation (NEO)
    - Sharing/development of best practices
    - Management of large scale research digital data
  - Network on Extreme Intensity Laser Systems (NEILS)
    - Forum for common issues in operation, instrumentation, metrology, safety and further development
  - Network on Experimentation and Best Practices in Biology and Life Science (NEBS)
    - share best practices and know-how in life science experiments

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User Training

- Training schools for young researchers

2-4 September 2015, User Training Workshop on Light-Based Technologies, Trnava, Slovakia

- Staff exchange for technical staff and scientists

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Laserlab cooperation with international training schools and summer schools

- Training School on Laser Applications for Biology and Biomolecular Systems: an authentic hands-on experience
  3-7 July 2017, Coimbra, Portugal
- Laserlab Training School in High-Power Laser Experiments
  21 November - 2 December 2016
  CLF Rutherford Appleton Laboratories, UK
- 5th Venice International School on Lasers in Materials Science - SLIMS,
  10-17 July 2016, Venice, Italy
- OPCPA Training Course,
  Bordeaux, France, 19-21 January 2015
- Advanced X-ray spatial and temporal metrology (with COST action MP1203),
  Dubrovnik, Croatia, 29 Sept - 2 Oct 2014
- LA3NET 3rd School on Laser Applications,
  Salamanca, Spain, 29 September - 3 October 2014

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Access Management and User Relations

- Annual User Meetings
  - 2017 User Meeting: 27-29 August 2017, Vilnius, Lithuania
  - 2016 User Meeting: 29-30 September 2016, Crete, Greece
  - 2015 User Meeting Coimbra

- Strong interaction with User representatives

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Foresight Activities

Objective: anticipate future strategic scientific, technological and innovation-related challenges

- **Foresight workshops**
  - Planned: Workshop on future laser-based technologies
  - Past example: “Lasers for Life”, Royal Society, London, UK, 2014

- **Sustainability of LASERLAB-EUROPE**

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National Contact Points

Building a user community	Database of national contacts Establishing national networks Direct contact with potential users
Local promotion	Training schools, summer schools User meetings Nat'l / regional meetings, events
International promotion	Distributing LLE material at int'l conferences Organize int'l conferences
Outreach / education	Information on webpage, brochures Press-releases, articles Presentations at exhibitions, science events

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- **Exploitation and innovation management**
  - Support for industrial Users and cooperation partners
  - Industrial Advisory Committee
  - Workshops promoting exploitation and innovation
    - e.g. workshop on standardization (2016/17)

Ultrafast Innovations GmbH (UFI, MPQ spin-off) mirrors

Femtolasers' rainbow oscillator with CEP4 module

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HTTP://WWW.LASERLAB-EUROPE.EU

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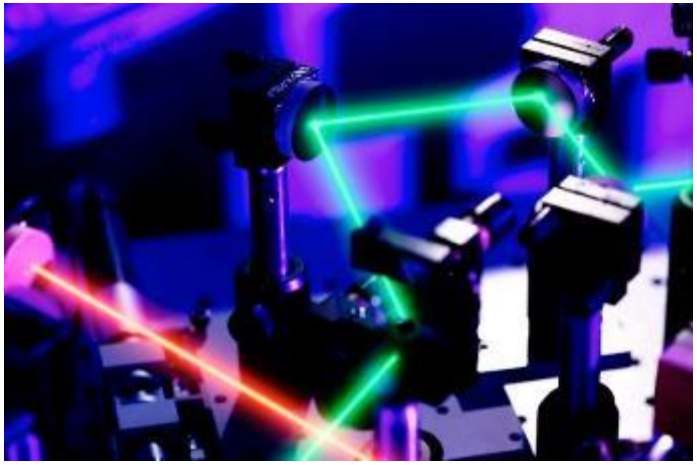

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