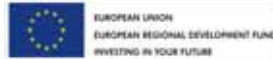


Implementation of the Integrated Proposal

Update on the contribution of ELI-ALPS

Lóránt Lehrner – ELI-HU Nonprofit Ltd.
LEI 2011 15 November 2011

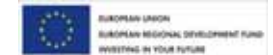
Project supported by:



4 scientific "pillars"

Four "Grand Challenges" in the scientific case of ELI:

- **Attosecond Laser Science:** temporal investigation of electron dynamics in atoms, molecules, plasmas and solids at attosecond scale
- **High Energy Beam Science:** development and usage of dedicated beam lines with ultra short pulses of high energy radiation and particles reaching almost the speed of light
- **Laser-Induced Photonuclear Physics:** nuclear physics methods to study laser-target interactions, new nuclear spectroscopy, new photonuclear physics, etc.
- **Ultra High Field Science:** investigation of laser-matter interaction in an energy range where relativistic laws could stop to be valid



What is ELI-ALPS?

- One of the three ELI pillars, the three pillars will be operated under a paneuropean consortium.
- Few-cycle laser pulses of some femtoseconds (10^{-15} sec)
- Ultrashort pulses aiming at the attosecond (10^{-18} sec) regime
- High intensity, petawatt (10^{15} watt) range beamline
- Sources in wide spectral range (THz...XUV)
- Manipulating waves of matter on the atomic scale
- High temporal and spatial resolution
- Highly controlled electromagnetic waves for studying interaction of light and matter
- Revolutionary new approaches in research and technology



ELI-ALPS concepts

Strategy

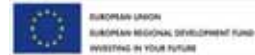
- Focus on Attoscience, ultra-short pulses for science and applications
- World leadership in its category
- Flexibility to adopt new research ideas and applications
- Technology development beyond state-of-the art

Facilities - broadening limits

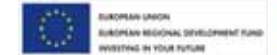
- Multiple beams forming a rich set of highly synchronized intense, ultra-short pulses of primary and secondary sources
- Wide spectral (THz ... XUV) and intensity range (PW-scale)
- Unprecedented time resolution (pushing the limits towards attoseconds)
- Very high repetition rates (up to 100 kHz)



- AT: Technical University of Vienna
- CA: National Research Council (NRC); University of Toronto
- CZ: Prague Asterix Laser System (PALS)
- DE: German Electron Synchrotron (DESY), Hamburg; Friedrich Schiller University of Jena (FSU), Jena; Göttingen Laser Laboratory, Göttingen; Heinrich Heine University of Düsseldorf (HHUD), Düsseldorf; Heidelberg University; Ludwig Maximilian University of Munich (LMU), Munich; Max Born Institute (MBI), Berlin; Technical University Munich, Munich; Max Planck Institute for Quantum Optics (MPO), Garching; University of Stuttgart; Fraunhofer Institute for Laser Technology (ILT, Aachen);
- ES: Institute of Photonic Sciences (ICFO), Barcelona;
- FR: Atomic Energies Commission (CEA); Institut de la Lumière Extrême (ILE) ENSTA; Saclay Institute of Matter and Radiation (IRAMIS); Waves and Acoustics Laboratory (LOA), Paris; Lasers, Plasmas et Procédés Photoniques (LP3), CNRS; University of Bordeaux; Laboratoire d'Optique Appliquée (LOA); Laboratory for Intense Lasers (LULI)
- GR: Foundation for Research and Technology Hellas
- HU: Atomic Energy Research Institute (AEKI); Institute of Nuclear Research of HAS (ATOMKI); University of Debrecen; Research Institute for Particle and Nuclear Physics (RMKI); Research Institute for Solid-State Physics and Optics (SZFKI/RISSPO); University of Pécs (PTE); Biological Research Centre (SzBK); University of Szeged (SZTE); Budapest Technical University;
- IL: Weizmann Institute of Science
- IT: University of Padova, Padova; Politecnico di Milano
- LT: Vilnius University
- PT: Instituto Superior Técnico (IST)
- RO: National Institute for R&D of Isotopic and Molecular Technologies; National Institute for Laser, Plasma & Radiation Physics (INFLEPR);
- RU: Lomonosov Moscow State University
- SE: Lund University; Uppsala University;
- SW: Bern University; Swiss Federal Institute of Technology (ETH);
- UK: Central Laser Facility (CLF), Rutherford Appleton Laboratory (RAL); Imperial College, London; Queen's University Belfast; University of Strathclyde, Glasgow;
- US: Lawrence Berkeley National Laboratory (LBNL), Berkeley; Lawrence Livermore National Laboratory (LLNL);



- **May 2008:** ministerial decision about taking part in ELI and the application for hosting ELI in HU
- **September 2008:** submission of the application
- **January 2009:** the Hungarian location of ELI will be in Szeged
- **2009:** elaboration of integrated proposal (HU, CZ, RO)
- **1 Oct. 2009:** decision of ELI Steering Committee about the three sites (Szeged, Prague, Bukarest)
- **5 March 2010:** Government decision about establishing the Project Company (ELI-HU Ltd.)
- **5 March 2010:** ELI-HU Ltd. came into existence



- **March 2010:** accepted application in GOP 1.5.1 (995 million HUF for planning and preparation of SA Project)
- **October 2010:** concept of ELI White Book (Attosec)
- **October 2010:** Architecture design is ready
- **November 2010:** accept of modification of the urban rehabilitation plan of Szeged
- **14 January 2011:** ELI in the New Széchenyi Plan
- **3 March 2011:** new Managing Director of ELI-HU Ltd.; exchanging of owners of the company; financial consolidation of the company



Preparation projects

Preparation Project phase I.

- Total budget 992 million HUF
- Non-refundable grant from GOP 1. priority
- Grant ratio 100%
- Grant contract was signed on April 13. 2011.
- 450 million HUF prepayment was transferred on April 25.

Preparation Project phase II.

- About 2,700 million HUF planned total budget
- Non-refundable grant from GOP 1. priority
- Grant ratio 100%
- Planned signing of the grant contract is the 4th quarter of 2011.



Preparatory project I. (03/01/11-30/06/12; ~4 M€)

Realization in progress

Preparatory phase project II. (01/12/11-31/12/12; ~12 M€)

Proposal under evaluation

Large project proposal preparation in progress

Technical design concepts being elaborated

Feasibility study, cost-benefit analysis, environment study...

Consultations with JASPERS

Area preparation has been started

Legal arrangements

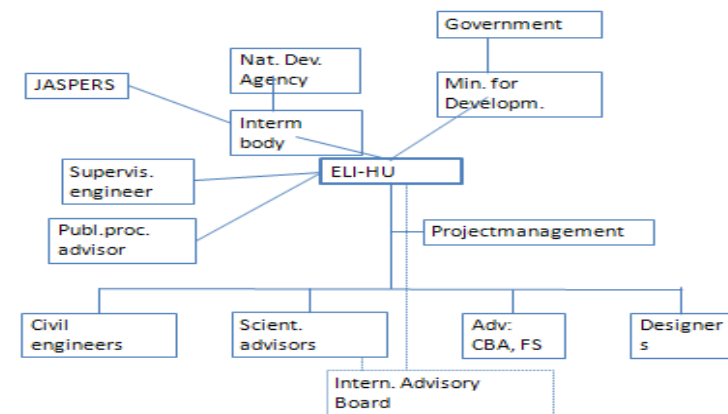
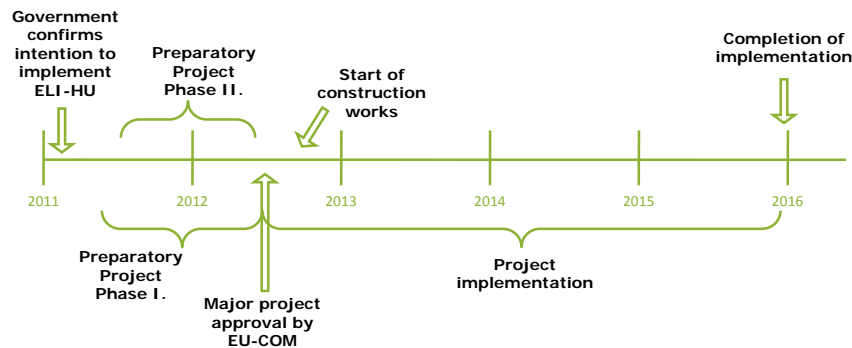
Initial steps of physical site preparation



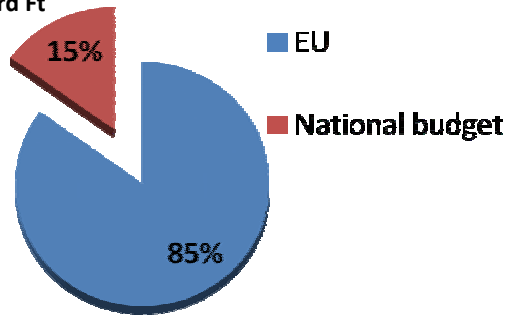
- Preparatory project (planning, preparation,...) (...31/12/2012)
- Preparation of ELI-HU large project proposal
 - Internal review procedure (from 15/12/2011)
 - Government decision (15/01/2012)
 - Submission to the EU (31/01/2012)
- Large project for construction (30/06/2012...end of 2015)
- International
 - Developing the ELI-Delivery Consortium
 - Preparation of international cooperations
- National preparation
 - hELios R&D and technology preparation
 - Education and training programmes coordinated by ELI-ALPS



Project planning



Construction phase – 2011-2015
 Total cost of the project: 63,6 Mrd Ft
 (244,7 M€)
 Hungarian budget (15%): 9,5 Mrd Ft



Szeged location

- Szeged, South-Great Plains Region
- State owned site, asset management by Szeged University
- 100 / 10 hectare brown-field site
- Close to the city center
- Close connection to motorway M5 and the country border
- Scientific significance of the Szeged University



- Offices: 1000m²
- Auditorium: for 150 people – 200m²
- Seminar rooms (8): 20m² ... 40m²
- Optical laboratories: 300m²

- Biology/chemistry/medical labs: 450m²
- Mechanical service room: 250m²
- Electric / IT service room / server: 250m²
- Laser work groups: 800m²
- Target areas: 1200m²

- + dining room, library etc.

