



Primary sources of ELI-ALPS

Karoly Osvay

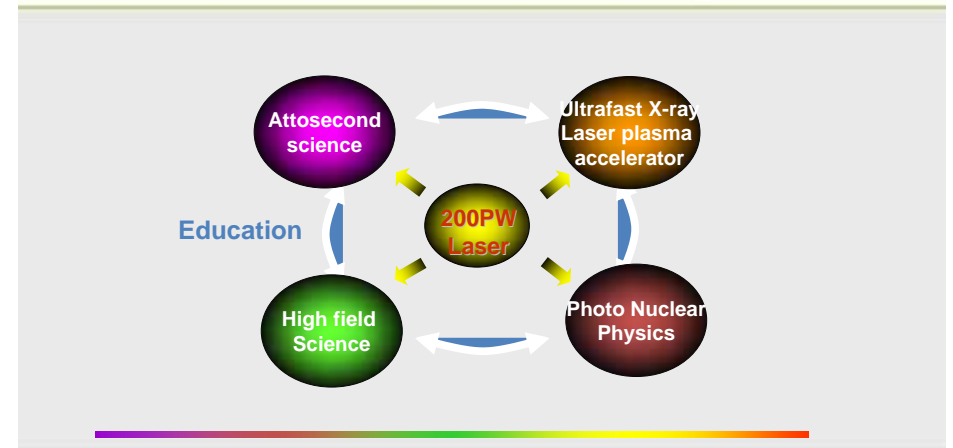
ELI-Hu Nonprofit Kft.
University of Szeged



15/11/2011



Scientific "pillars" of ELI



The projects are supported by the European Union.

Research facilities of ELI

Attosecond Facility	<p>Attosecond XUV/X-ray physics Applications in material sciences and biology</p> <p>Szeged HU</p>
Beamlines Facility	<p>High-brightness sources of X-rays & particles Particle acceleration, dense plasma physics, exotic physics</p> <p>Prague CZ</p>
Nuclear Physics Facility	<p>Laser-induced nuclear physics Photonuclear science and applications</p> <p>Magurele RO</p>
Extreme-intensity development	<p>Exawatt-class laser technology High-intensity laser technologies for frontier physical research</p> <p>Technology & site are to be determined after 2012</p>



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Major missions of ELI-ALPS defined by ELI-PP

- To generate X-UV and X-ray fs and atto pulses, for temporal investigation at the attosecond scale of electron dynamics in atoms, molecules, plasmas and solids.
ATTOSECOND Beamline & User Facility
- To contribute to the technological development towards 200PW HIGH INTENSITY beamline



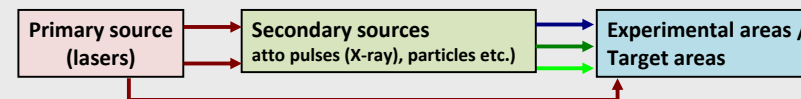
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International scientific team so far (will be extended further)



K. Awazu, P. Baum, J. Biegert, L. Cederbaum, J.-P. Chambaret, D. Charalambidis, A. Czitrovsky, G. Djotyan, M. Drescher, R. Ernstorfer, G. Faigel, I. Földes, E. Goulielmakis, J. Hajdu, J. Hebling, K. Hideghéthy, J. Honruba, U. Kleineberg, M. Kling, F. Krausz, P. Lambropoulos, R. Levine, R. López-Martens, F. Martin, J. Meyer-ter-Vehn, M. Nisoli, F. Pfeiffer, L. Poletto, F. Quere, F. Remacle, A. Rudenko, G. Sansone, M. Stockman, G. Szabó, S. Szatmári, T. Tajima, M. Tolley, C. Tóth, G. Tsakiris, P. Tzallas, S. Varró, L. Veisz, M. Vrakking, T. Wittmann, M. Wolf

General Scheme of the RI



The projects are supported by the European Union.

Strategy for finding the laser specs



Initial conditions: Will to implement the RI;
Shortage of time;
Serve the users / atto community

Step 1:

State of the art: leading edge *operating* systems
current *reliable* developments

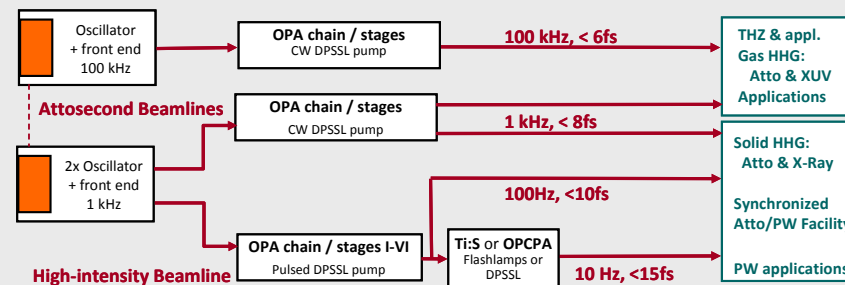
Four + 2 major parameters:

Repetition rate +1: CEP stability
Wavelength +1: existing diagnostics
Pulse energy
Pulse duration

Step 2:

Find possibly not more than 2 parameters which are easiest or most feasible to peak up by 2013 (via custom R &D).

Basic layout



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Specifications – main systems



Conservative, but still cutting edge lasers by 2015	Goals by 2020
ALPS High Repetition Rate (HR) beamline 100kHz, >1mJ, <6fs, VIS-NIR, CEP	>2mJ, <3fs
ALPS Single Cycle (SYLOS) beamline 1kHz, >100mJ, <8fs, VIS-NIR, CEP	1J, <5fs
ALPS High Field (HF) beamline Ti:S duty end: 5-10Hz, >40J, <20fs, NIR, (CEP) or OPCPA: 1-5Hz, 10J, <8fs, CEP	>10J, <5fs



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Auxillary systems



ALPS Mid-Infrared Source (MIRS)
10-100kHz, >100μJ, few cycle, @ 2-3μm

ALPS VIS-UV Sources (UVIS)
10Hz, 100mJ, 248nm / 475nm

Further NLO stages as secondary sources
User needs – ultrafast spectroscopy, etc.



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Strategy of implementation



- Specs and basic designs
- Minimize "in house" developments
- Make R&D contracts to place of expertise
(RIs and universities)
- Make industrial contracts
Custom made systems at the cutting edge
- Solve HR problems
(Spread graduates and postdocs to participate in key developments & products.)



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Considered systems & combinations

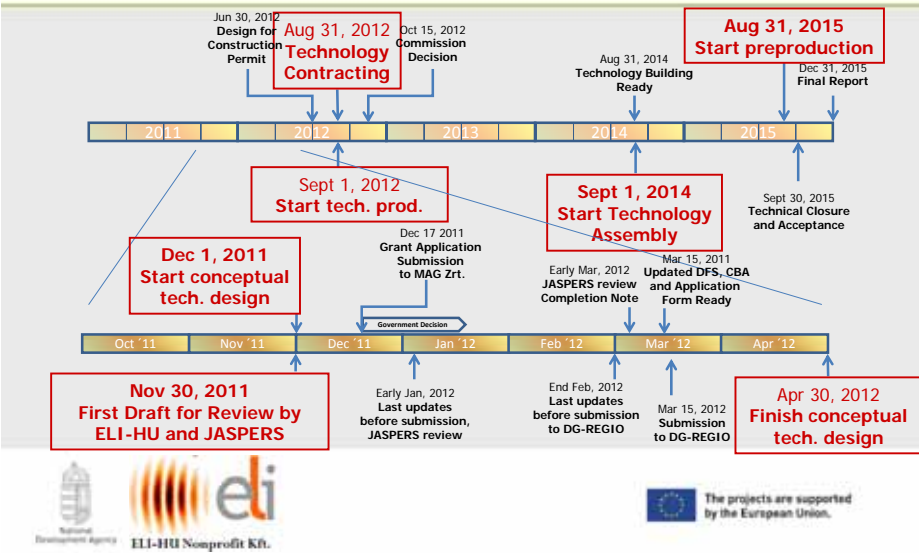


- ALPS HR beamline
ILT Aachen / DESY / FSU IAP
- ALPS Single Cycle beamline
FE: *LOA PCO / LWS 20 (/ PFS)* OPCPA + PUMP: *MBI / MPQ*
Hybrid: *LOA*
- ALPS High Field beamline
FE: *LOA PCO / LWS 20 (/ PFS)*
mid-OPCPA + PUMP: *MBI / FSU IQE / PFS*
Duty PUMP: *FSU IQE / RAL CLF / LLNL / LBNL*
- ALPS Mid-Infrared Source (MIRS)
ICFO / CELIA / MPQ

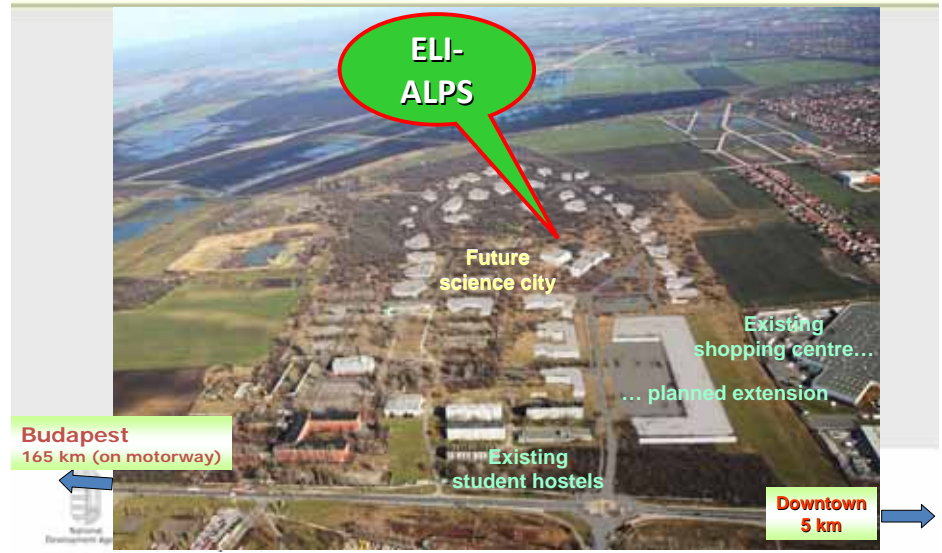


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Timeline of implementation - lasers and technologies



ELI-HU site and science park



Thanks for your attention!

www.eli-hungary.hu
www.eli-laser.eu

