eli beamlines

Newsletter
November 2017

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The unique laser system has arrived from the USA to the Czech Republic

HELL:
The high energy electron platform at ELI Beamline

Progress on the ELI Beamlines L4 10 PW laser system construction

EDITORIAL

Dear readers,

right now you are leafing through the new, already 15th issue of Newsletter ELI Beamlines. It is an honor for me to speak to you as a director of Institute of Physics for the first time. I really appreciate this feat and I am glad I can continue in a great job which has been done by the previous director Jan Řídký.

It has been already two years from the official Grand Opening of ELI Beamlines. During this time we managed a lot but many tasks are ahead of us. As you can read in this issue of Newsletter, the laser system 3 was delivered from the USA to Dolní Břežany. Now, the scientists install and build the laser together and integrate it into the facility's laser beam transport and control systems. At the same time, the laser system 1 was delivered to the ELI Beamlines laser centre from the laboratories in Prague and laser system 4, which is developed in Texas, USA should come to the Czech Republic at the beginning of the next year. The largest vaccum compressor in the Czech republic is already on its place and the L1 compressor chamber as well.

Of course, I cannot forgot our experimental teams hard working on the scientific programs – in this Newsletter you get information about the High energy Electrons by Laser Light (HELL) platform.
Pay attention to other articles as well, besides other things, you learn more about our education and social activities.

I wish you a pleasant time while reading and enjoy the coming Advent time.

Michael Prouza
Director of the Institute of Physics CAS

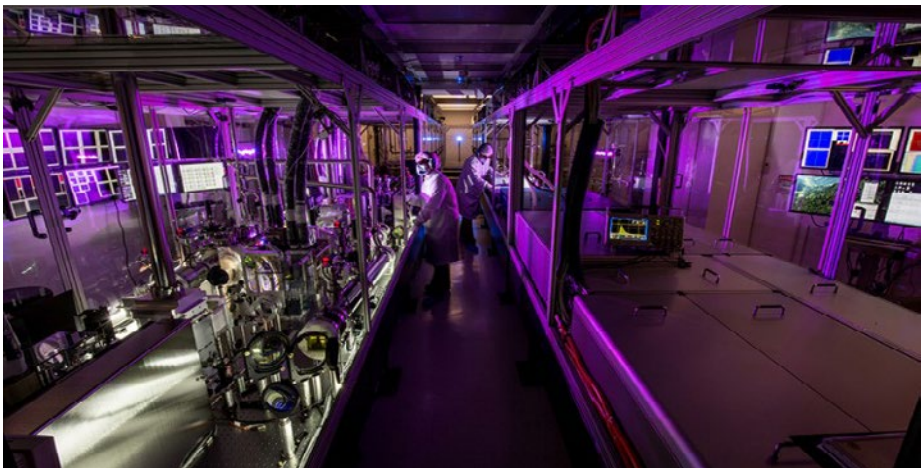
CONTENTS

2	EDITORIAL	*Michael Prouza, director of the Institut of Physics*
3	CONTENT	
4	TOPIC	The unique laser system has arrived from the USA to the Czech Republic
6	NEWS	New projects of ELI Beamlines
7	RESEARCH	HELL: The high energy electron platform at ELI Beamlines
9		Progress on the ELI Beamlines L4 10 PW laser system construction
11		L1 is moving to Dolní Břežany
12	GALLERY	Talent Academy 2017
13		Week of Science and Technology
14	INTERVIEW	Pavel Bastl
16	TELEGRAPHICALLY	The time resolved Ellipsometry project at ELI Beamlines, L1 compressor chamber, The largest vacuum compressor in the Czech Republic belongs to ELI Beamlines, Czech Senators visited ELI Beamlines, Canadian Minister at ELI Beamlines, Night of Scientists, Chamber of Commerce at ELI Beamlines
18	STATISTICS	

The unique laser system has arrived from the USA to the Czech Republic

The unique laser system for ELI Beamlines was developing at the american national laboratory Lawrence Livermore National Laboratory (LLNL) more than four years. Now, it is ready and was delivered into the laser centre ELI in Dolní Břežany. By delivering of this unique technology, which is the most expensive of all four ELI Beamlines laser systems, one of the key milestones was achieved when the laser center was launched.

A ceremonial meeting relating to the delivery of the laser system from the USA to ELI Beamlines was organized in summer 2017. It was a great event which was attendet not only by representatives of the Ministry of Education, Youth and Sport, Academy of Sciences or Institute of Physics but also by the Deputy Prime Minister of the Czech Republic's Government for the Science, Research and Innovation Pavel Bělobrádek. The director of the Institute of Physics Michael Prouza and the chief scientist of



Laser system (Photo by Lawrence Livermore National Laboratory).

Pavel Bělobrádek at ELI Beamlines.

Jakub Novák

Junior Researcher at ELI Beamlines

What was exactly your job on the development of laser system 3?
There were two main objectives each of us had while staying at LLNL. First, to get extensive training on the HAPLS laser system and to become familiar with its all subsystems. Second, to help with the development and commissioning of the laser. My job in particular was oriented on the unique HAPLS pump laser. It is based on helium cooled neodymium glass amplifiers pumped with extremely high power laser diode arrays. We were aligning the amplifier, troubleshooting it, ramping up its energy. We successfully generated a second harmonic out of it. Then we adjusted the amplifier output to homogenously pump the final broadband Ti:Sapphire amplifier of HAPLS.

How did you like working at Livermore?
Working in Livermore was an extraordinary experience. It took me a while to get used to local very high standards in safety and security, but it was really exciting to collaborate with highly motivated professionals of this renowned laboratory and to learn how they deal with all the challenges during the development. Also, the support to the project from the large long established institution (like service, engineering, technical analysis) was very well functioning. On a personal level, all American colleagues were very friendly, always willing to help or explain things which were new to me, and often we had a lot of fun. Therefore, I am looking forward to working together here in Dolní Břežany during the installation of L3 laser.

How would you describe L3 with one word?
Working.

Lucia Koubíková

Junior Researcher at ELI Beamlines

What was exactly your job on the development of laser system 3?
I got trained at LLNL as a lead operator for the pump system of the L3 laser – I was responsible for day-to-day maintenance as well as safe operations at high energy.

How did you like working at Livermore?
It has definitely been a great experience and a privilege to be able to work with some of the most experienced people in laser design & development in the world. And of course, it was more than nice to spend 15 months in California with all the amazing nature, great weather and friendly people around.

How would you describe L3 with one word?
Cutting-edge.

ELI Beamlines Bedřich Rus explained them the scientific mission and importance of this laser system and guided them through the centre. The laser for ELI Beamlines represents a new generation of application-enabling diode-pumped, high-energy and high-peak-power laser systems with innovative technologies. It sets a world record for diode-pumped petawatt lasers, with energy reaching 16 joules (J) and a 28 femtosecond (fs) pulse duration (equivalent to ~0.5 petawatt/pulse) at a 3.3 hertz (Hz) repetition rate (3.3 times per second).

Delivery of the laser system

The laser system will serve in many areas of basic and applied research. Its most significant applications include compact laser accelerated particle acceleration for new medical methods or short-wave X-ray generation for high resolution spatial and temporal resolution microscopy for material and medical research. This laser system will take millions of times the resolution that we know from today's hospitals, or we will be able to capture and directly track the process of chemical reactions in cells.
Now the laser will be built again and integrated into the facility's laser beam transport and control systems, then brought up to full design specification - delivery of pulses with peak power exceeding 1 petawatt (quadrillion watts) firing at 10 Hz, breaking its own record and making it the world's highest average power petawatt system. It will be available by 2018 to the international science user community to conduct the first experiments using the laser. ■

Delivery of the laser system

Josef Cupal

Junior Researcher at ELI Beamlines

What was exactly your job on the development of laser system 3?
As a member of the Short Pulse team, I was mostly working on commissioning of the Beta amplifier, which is the final amplifier boosting the energy of the output laser pulse before it gets compressed in the main compressor. In this amplifier, the high energy of the Pump laser output pulses transforms into the light which will then be used for the experiments. It is a place where the results of the work of both Pump team and Short Pulse team come together. Other than commissioning of the Beta amplifier, my job was also to learn how to operate and maintain all the different parts of the Short Pulse beam line.

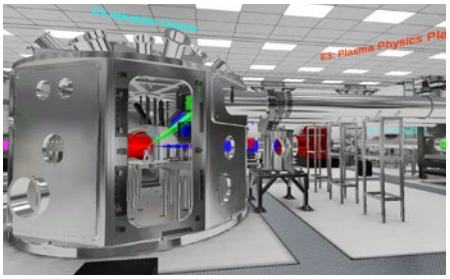
How did you like working at Livermore?
I really enjoyed working there. Not only because we had a great team there, but also because I started working in ELI right after I finished my Master's degree, so it is my first job (if I don't count selling beer, popcorn and sausages at hockey games). Going to Livermore was therefore a great opportunity for me to see how work is organized outside ELI. LLNL has a great reputation worldwide and after spending over a year there, I can see why. Their success comes not only from their approach to organizing work, but also from building an enormous community of people, establishing contacts with companies around the world, and collecting over 60 years of experience. In that perspective, ELI is still a very young project. We do have smart people and people with experience, but it will still take a lot of work and effort to live up to the potential this project has.

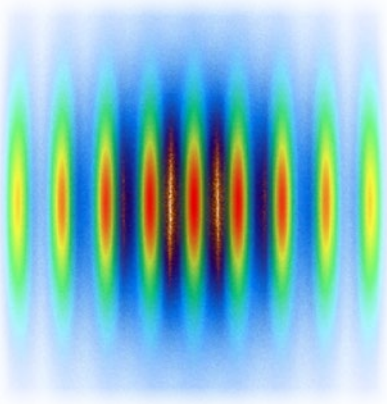
How would you describe L3 with one word?
One word for the L3 laser system? I don't think that's possible. Maybe in German, where they put ten words together and it is technically one word, but it's still made of ten words.

New projects of ELI Beamlines

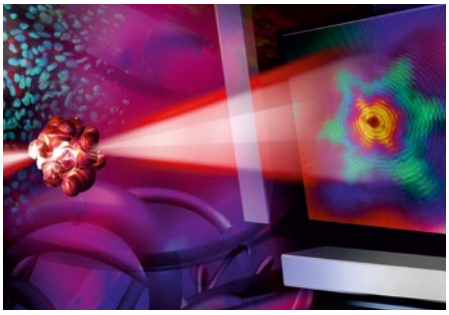
The research projects ELIBIO, HIFI and ELITAS were approved by the Czech Ministry of Education, Youth and Sports and are funded from the Call „Support to Excellent Research Teams“ and the Call „Research Infrastruktures" within the Operational Programme Research, Development and Education EU. Additionally, all of projects have really excellent scientists with many years of experience in major international scientific institutions.

The ELIBIO project explores new frontiers in light and optics to create breakthrough science in biology, chemistry and physics. We will establish an Interdisciplinary Centre of Excellence at ELI Beamlines for life sciences together with BIOCEV and the foreign partners, for example the European XFEL in Hamburg and the LCLS at Stanford. An essential goal of the project is to understand photon-material interactions in extremely intense X-ray fields where new physics can be expected. The experiments should explore fundamental questions in the physics of photoemission and electron dynamics in the relativistic regime with X-rays. The new knowledge in studies on structure, function and dynamics in cells, organelles, and biomolecules will be used to perform experiments that were impossible so far. We will develop new methods and technologies to enable such measurements and answer key questions in health and disease. The research team of ELIBIO is formed at the interface between two complementary research centers, ELI Beamlines oriented to photon physics and BIOCEV oriented to biomedical and biotechnological research. The project team is headed by Prof. Janos Hajdu making strategic decisions as for research direction and scope of experimental work. Prof. Hajdu has a rich scientific career. He worked as a professor of photon science at Stanford University in the USA, a professor of molecular biophysics at the University of Uppsala in Sweden or as advisor to the director of the European XFEL in Germany.



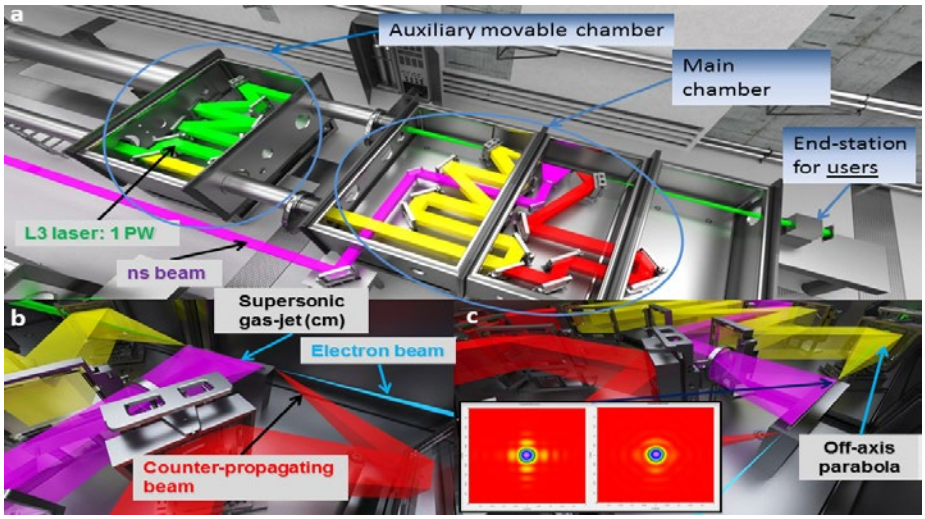


The HIFI (High Field Iinitiative) project is a theoretical support and technological upgrade of the most intense laser in the world, the 10 PW laser at ELI Beamlines, for the preparation of worldwide unique high-field flagship experiments. The theory program explores a fundamentally new regime of laser matter interaction and gives a solid theoretical base which will lead to realization of completely new high field experiments. The project leader will be Prof. Sergey Bulanov, a researcher at JAEA (Japan Atomic Energy Agency) in Japan and a member of the Russian Academy of Sciences.



Upcoming high-power laser facilities such as ELI Beamlines face new challenges as far as predictive simulations are concerned. These challenges exist for technology as much as for physics. ELITAS (Extreme Light Infrastructure Tools for Advanced Simulation) is also strongly linked with the effort already undertaken to establish a local high-performance computing center in ELI Beamlines in order to support the planning and operation of experiments and technological development. In addition the visualization program is linked to the already successfully implemented virtual beamline (VBL) activities in ELI Beamlines.
The latest date of completion of physical implementation of ELIBIO and HIFI projects is October 31st, 2022. The latest date of completion of physical implementation of ELITAS project is December 31st, 2019 and is funded by a total amount of cca 19 mil. CZK. ■

HELL: The high energy electron platform at ELI Beamlines



3D visualization of the HELL platform under implementation at ELI Beamlines. a) A 1PW/10Hz (30J in 30fs) laser pulse enters into the auxiliary vacuum chamber (green laser in the upper-left corner), then the first portion is focused with a high F/number parabola into the interaction chamber where it drives the plasma-accelerator. A second portion (yellow beam) reaches the interaction chamber for independent injection schemes or pre-plasma generation; finally a third portion (red beam) can be used to counter-propagate on the accelerated electron bunches. b) Alternative view of the interaction area inside the main chamber. c) Another angle of view with focal spot profiles of the L3 beam.

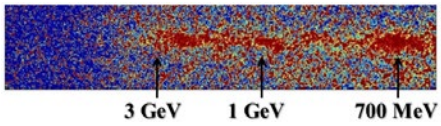
The High energy Electrons by Laser Light (HELL [1]) platform takes its name from the fact that it will produce the most energetic particles in ELI Beamlines by means of the Laser Wake Field Acceleration (LWFA) mechanism. In order to enable the most advanced schemes for the improvement of electron bunch parameters, a combination of the most powerful lasers of the project will be used to power up the plasma and accelerate bunches of electrons up to multi-GeV energy, implementing different injection schemes. Such electron beams can be used in a counter-propagation scheme with additional laser pulses at moderate intensity to produce gamma rays, or at high intensity for fundamental investigations. Due to their unique properties, the ELI Beamlines electron group, in parallel with platform development, has been investigating how to also use these beams for applications.

Thanks to scientific meetings, workshops (HELL DUR 2014 [2], RAD 2015 [3], ELIMEDICS 2016 [4]) and participation in international conferences (ELI Beamlines Scientific Challenges 2015 [5], the HEDS conference at OPIC 2017 in Yokohama [6], SPIE conferences 2015/2017 in Prague [7] and others) several possible applications have been identified, such as use for cancer therapy and electron-radiography of very big objects. This activity is very productive as evidenced by the best student award at the 3rd RAD international conference in 2015, the invitation to present at a CERN workshop for medical applications [8], and, above all, the patented invention of an innovative device to cure cancer using electrons and lasers (the first international patent of the ELI Beamlines project).

EXPERIMENTAL COOPERATION AROUND THE WORLD

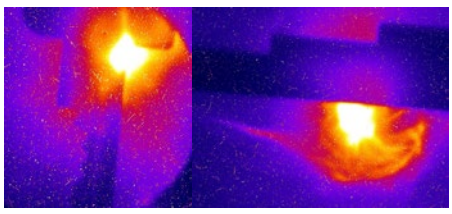
The HELL team has been running experiments in several facilities around the world, establishing collaborations with different laboratories. Here below is a summary of the most important experiments performed abroad. In the next newsletter there will be a focus on the established collaborations.

In recent years (2012-2014) the HELL team participated in various joint experiments at the APRI- GIST facility in Gwangju, South Korea. The goal of the experiments was to accelerate GeV-class electron beams using a Peta-Watt (PW) laser system. As is shown in the experimental image below electron beams with energy up to 3 GeV were accelerated.



Electron spectra obtained in the APRI-GIST campaign in Korea.

In 2015 the HELL Team collaborated with the group of Prof. Malka at LOA in Paris on techniques to produce stable electron beams for imaging of thick objects, and medical applications. Below are shown some experimental images obtained with a 180 MeV electron beam fired on a 2.5 cm iron object and on an iron key of few mm.



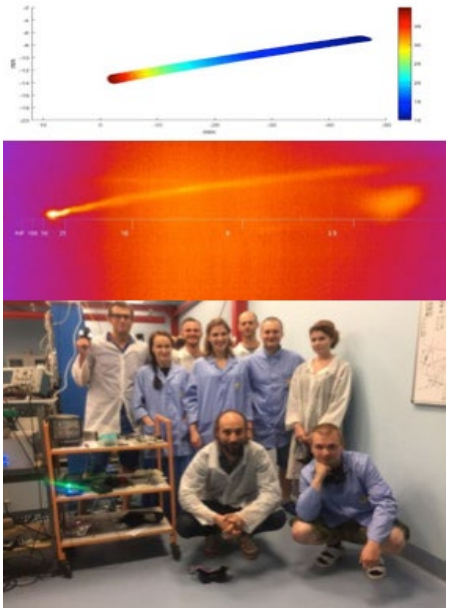
Example of electron radiography of thick iron objects.

It is possible to see how there is signal coming from inside the objects giving information about the internal structure. This technique is currently being implemented at a dedicated HELL User-Station.

Since 2016 the HELL team has been collaborating with the group of Dr. Rosinski at the Instytut Fizyki Plazmy I Laserowej Mikrosyntezy (IFPILM), in Warsaw. Electron acceleration up to few tens of MeV (typical energy required for most of the applications) has been achieved for the first time in Poland with a TW-level fs laser, and high electron beam stability has been achieved.
Analysis of all data is still ongoing but preliminary indications show that a sub-mrad beam pointing stability was achieved in a special laser-matter interaction configuration inside the gas-jet and a lower pointing was observed at higher energies when extending the interaction length. This is far better than state of the art experiments, but still one order of magnitude bigger than the laser beam pointing, measured to be around 5 μrad (FWHM). Stabilization of (high energy) electron beam pointing is a crucial issue for many applications. For example a sub-mrad level of stability is already a good compromise for many applications such as electron-radiography or radiotherapy studies, but still far from the requirements of advanced schemes such as multi-stage electron acceleration, external injection or multi-color schemes, that will be available in the HELL platform setup. ■

THE GROUP

HELL actual team, from left:
Tadzio Levato, Team Leader, PhD in experimental laser-plasma interaction, Pisa University Galileo Galilei School (2009). tadzio.levato@eli-beams.eu
Gabriele Maria Grittani, PhD-Student at Czech Technical University, Faculty of Nuclear Sciences and Physical Engineering (exp. 2017), works on medical applications of LWFA. gabrielemaria.grittani@eli-beams.eu
Nevrkla Michal, post doc, PhD in Applied Physics, Czech Technical University, Faculty of Nuclear Sciences and Physical Engineering (2014), works on gas targets. michal.nevrkla@eli-beams.eu
Carlo Maria Lazzarini, junior researcher, graduated in Applied Physics at Pisa University, his focus is laser-matter interaction for production of stable electron beams and diagnostics. carlomaria.lazzarini@eli-beams.eu
Fahad Nawaz, post doc, PhD in Applied Physics, Czech Technical University, Faculty of Nuclear Sciences and Physical Engineering (2016), works on laser beam transport and experiments. muhammad.nawaz@eli-beams.eu
Gregory Vieux, acts as a link researcher between ELI beamlines and University of Strathclyde, to facilitate collaborative work on LWFA experiments for secondary sources. gregory.vieux@eli-beams.eu



Top: Simulations of a typical electron spectra reaching 50 MeV. A very good agreement is shown with experimental data.
Middle: Measured electron spectra on a scintillating screen. A near monochromatic bunch is present with a continuous long tail up to low energy.
Bottom: Experimental team, standing from left to right: Carlo Maria Lazzarini, Zofia Kalinowska, Gabriele Maria Grittani, Agnieszka Zaras-Szydlowska, Michael Nevrkla, Marcin Rosinski, Joanna Korec; in front: Tadzio Levato and Tomasz Chodukowski.

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[9] Leemans, W. P., Gonsalves, a. J., Mao, H.-S., Nakamura, K., Benedetti, C., Schroeder, C. B., Tóth, C., Daniels, J., Mittelberger, D. E., et al., "Multi-GeV Electron Beams from Capillary-Discharge-Guided Subpetawatt Laser Pulses in the Self-Trapping Regime," Phys. Rev. Lett. 245002 (December) , 1–5 (2014).

Progress on the ELI Beamlines L4 10 PW laser system construction

The L4 laser will be a 10 PW system delivering 1.5 kJ femtosecond pulses once a minute. It will be the most energetic laser in ELI - Beamlines and will also provide the highest peak power pulses. National Energetics (USA) in consortium with EKSPLA (Lithuania) are responsible for the construction and delivery of this laser to Prague.

The OPCPA based front-end with a new enclosure

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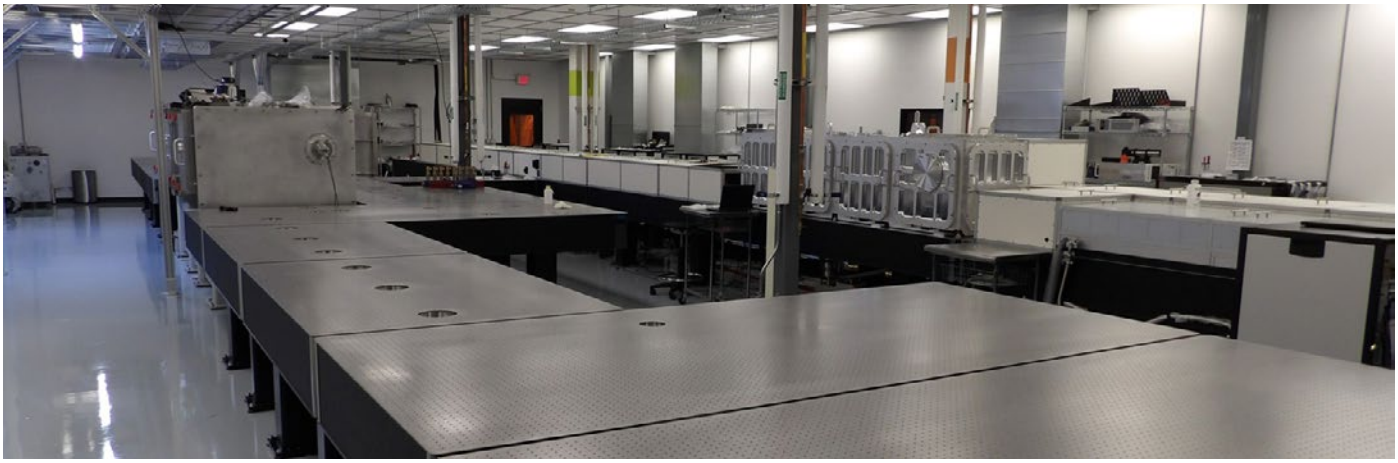
The assembly of the system is proceeding at a rapid pace. The picosecond front-end and its sophisticated pulse contrast cleaner have been completed and tested, along with pre-assembly of the nanosecond OPCPA amplification chain. Diagnostics and thorough testing of the pump lasers associated with this part of the system were also completed last year. Significant progress has been made in system control development including the installation of large motorized optical mounts and the preparation of their management software.

In parallel, the extensive testing of last stage glass amplifier modules has been performed. At the same time, in close collaboration with the ELI team, a partial ramping up of the nanosecond OPCPA using a seed from a temporary stretcher has been achieved. The optical tables, vacuum chambers, and a large portion of the vacuum technology have been installed in preparation for the assembly of the Nd:glass amplifiers. Both Nd:glass amplifier designs have completed prototyping and are entering full production. The Pulse Forming Networks (PFNs) have been demonstrated, and the entire Power Amplifier 1 (PA1) PFN is installed and ready for a full demonstration of the PA1 chain in the next few weeks.

With the delivery of the last components for the stretcher, the L4 construction is approaching an exciting phase when the OPCPA front-end will be operated at full power, and the pulses will be further amplified in the chain of the Nd:glass amplifiers in the next few months. ■

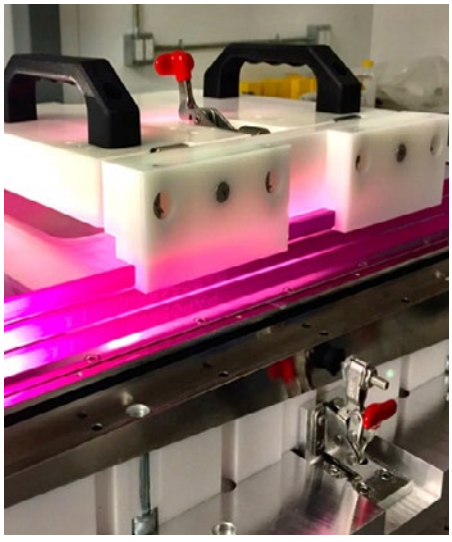


The L4 front-end, vacuum stretcher and ns OPCPA.

The preparation for the Power Amplifier assembly.

Prof. Erhard Gaul inspecting the PA1 Nd:glass slabs.

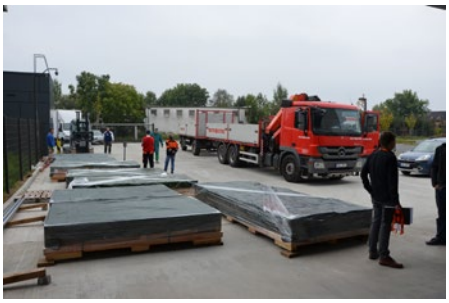
The assembly of Nd:glass Power Amplifier 1.



The assembly of the PA1 Nd:glass cassette.

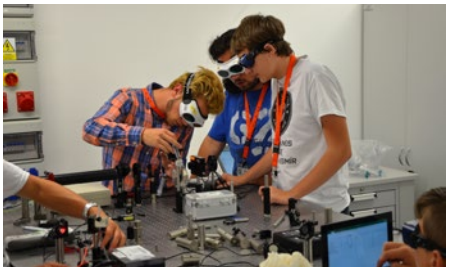
L1 laser system is moving to Dolní Břežany

After 5 years, the L1 laser is finally coming home. In Fall 2012, work started on the L1 front end in a storage closet in the Ustav Teorie Informace a Automatizace and it achieved its goal of 10 mJ, 1kHz operation in the Spring of 2016. Simultaneously, work was proceeding on the L1 vacuum compressor in a borrowed section of a HiLASE cleanroom. Over the past two months the UTIA lab has been disassembled and transported to Dolni Brezany. This effort was heavily supported by the ELI Logistics team. Currently the optical tables for the front end are now installed in the laser hall along with the surrounding table enclosures. Installation of electronics will begin as soon as the area has been cleaned. Plans are currently being finalized to move the L1 compressor vacuum chamber from the test space in HiLASE to the L1 laser hall in the very near future as well. The L1 team is looking forward to bringing the laser back online and pushing it to higher energies in the months to come. ■

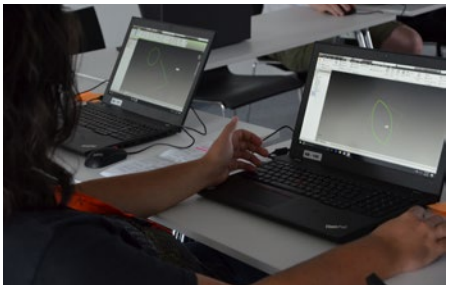


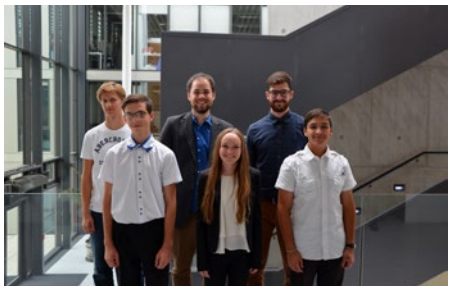
The first Czech high school graduates' National Talent Academy has been held at ELI Beamlines and HiLASE

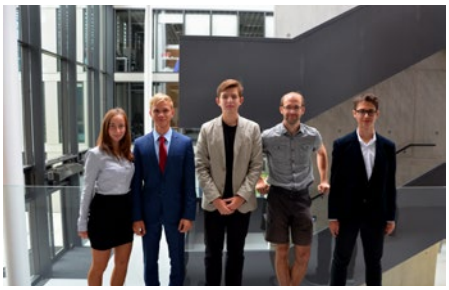
Twelve gifted high school graduates, selected from a country wide competition attended the first Talent Academy. The Academy, organized by ELI Beamlines, HiLASE and the science magazine Vesmír was held over three days at the beginning of September, at ELI Beamlines and HiLASE research centers in Dolní Břežany.
Selection for the Talent Academy 2017 was based on work submitted in the first half of June, when secondary school students throughout the Czech Republic filled in an entry questionnaire in which they answered a series of scientific questions and wrote an essay.
In August, an expert jury selected 12 of the best candidates and these students were invited to experience research life with exclusive access to the research facilities at ELI Beamlines and HiLASE.
The main objective for the students was to construct a liquid filter enabling the full filter to be made of solids. Students were aided by both lectures from the Physics Institute of the Academy of Sciences, under which both research centers fall, and supervision by researchers and engineers in the practical part of the program. They designed and modeled the filter on a special computer program, mixed the dye in a chemical laboratory, worked with a spectrophotometer, produced an inlet and outlet filter window in the optical shop, cleaned the optics, and designed the optimal setup on the optical desk in the laser laboratory.

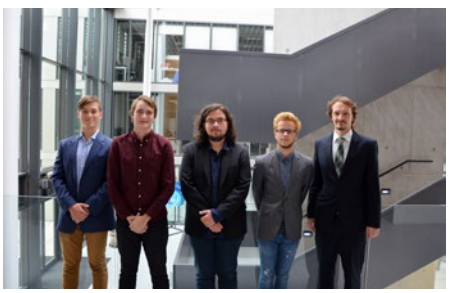


The event culminated in a mini-conference where the finalists summarized their findings and presented the results of their research. The conference was attended by representatives of both research centers and the deputy director of the Institute of Physics of the Academy of Sciences Antonín Fejfar. ■









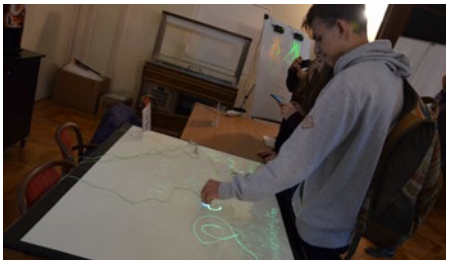
Week of Science and Technology

The first week in November was the Week of Sciences and Technology, the most extensive scientific festival in the Czech republic. Visitors had the opportunity to attend lectures, exhibitions, excursions, science cafés, the screenings of documentary films, visit scientific workplaces, laboratories and libraries and learn how science is conducted. Many activities were organized actually in the building of Academy of Sciences in Prague or in the regional seats of academy members. ELI Beamlines took part in the Day of Superlasers which was held in Prague. Bedrich Rus, the leader of laser technologies at ELI Beamlines, and Tomas Mocek, the head of HiLASE centre, were ambassadors for this day. They were available to talk about laser technologies with visitors. Besides this activity the ELI Beamlines facility opened its door to the public and offered an interesting program on laser technology. ■

Ambassador Bedrich Rus explaining the function of laser.

Institute of Scientific Instruments and its laser demonstration.

Laser demonstration.



Drawing with laser.

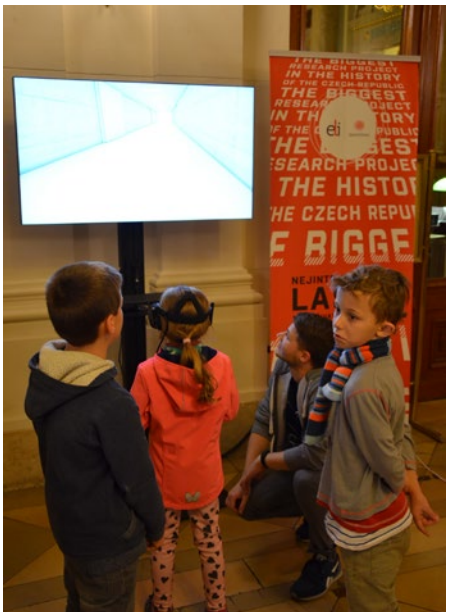
How to work in a laser laboratory.

Laser maze.

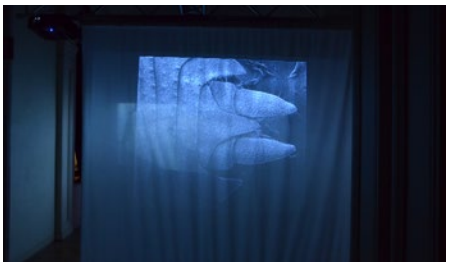
Laser maze on the table.

Stroboscopic effect showed on Šmoulinka figurine.

The House of Nanohorror.



Virtual reality.

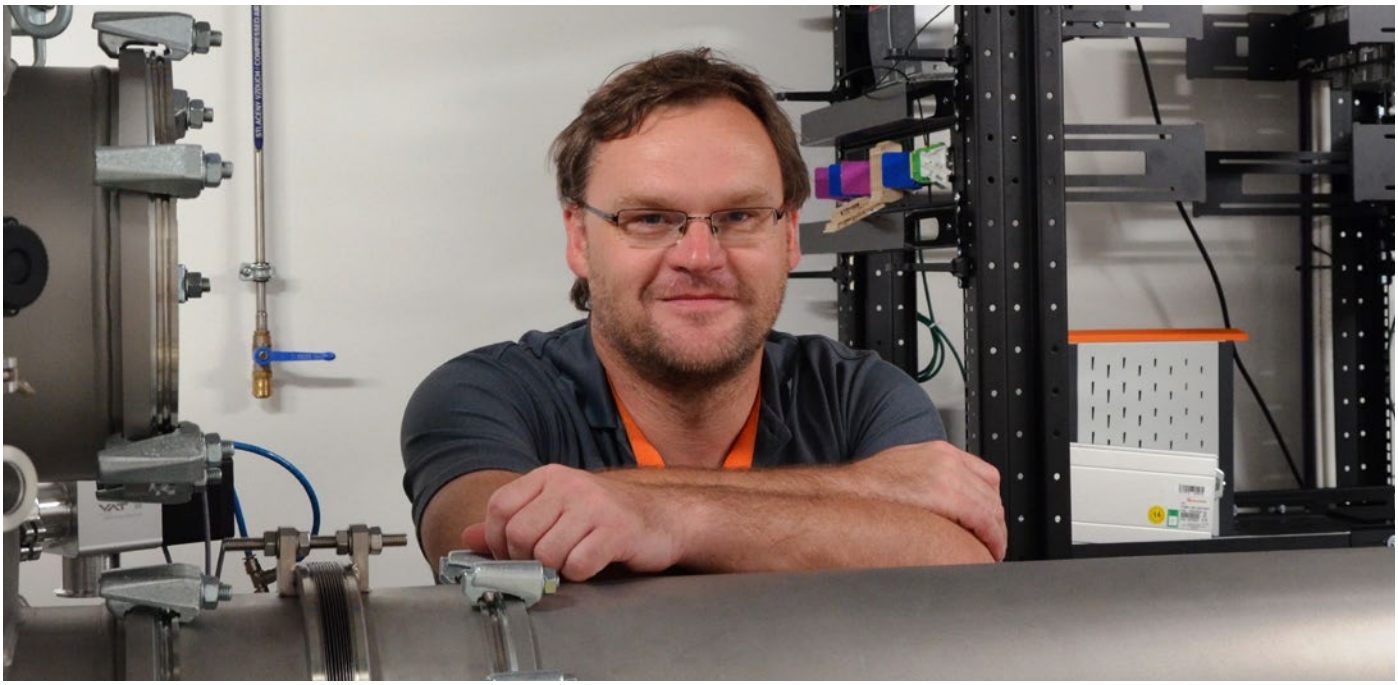


The House of Nanohorror.

Presents from ELI Beamlines and HiLASE.

ELI Beamlines gives me freedom

Pavel Bastl was born in September 1971 in Nymburk. He studied at the Faculty of Mechanical Engineering of Czech Technical University in Prague. He is interested in history and culture and he really likes his job – mechanics, control theory, mechatronics and programming.



How did you get to know about ELI Beamlines and what did you find attractive about it?
I cannot say exactly, but of course there was some information in the media about the ELI project, so everyone knows about such a unique project. Personally I'm interested in new technologies, I mean real technologies which, from my point of view which do not include new cell phones or similar toys. I can of course imagine that new technologies are connected with basic research as a product or as resources you should use for successful science. This is exactly why I found it attractive to work for such an infrastructure as ELI.

What is your position at ELI Beamlines?
I'm working in ELI Beamlines as a team leader of the control system. The control system itself is interdisciplinary area and this is the reason why our team it touched by all technological parts of ELI Beamlines. This I find really attractive.

What did you do before working in ELI Beamlines?
I was born first of course, then I studied in the Czech technical university with a focus on Control Systems, Mechatronics and Mechanics. First I finished my MSc. degree in CTU (Czech Technical University) and then I began as Ph.D. student in the same institution focusing on robotic control. During my Ph.D. studies I also began to work on real applications, so we have for example developed and deployed anti-sway control units for gantry cranes. I'm also influenced by electronics which was my hobby since my childhood. I would say that I really liked the university environment but on the other hand I wanted to experience real life and I decided to go to industry. Firstly I began in the Skoda Auto company where I was working in development department. Here I began to work with FEM analysis. Then I moved to small development company where I was working on electronic unit development, embedded software and HIL simulations. After few years I moved to British company where I was working in the same area of control systems for automotives.

How long are you here?
I've beenworking for ELI Beamlines since October 2013, which is actually three and a half years.

What do you like the most about your job?
The work in ELI Beamlines is giving me (or would say in our team) freedom. In fact the task we are working on is to build a control system for the facility. Fortunately we were not tied to which technologies we should use for its realization. Of course we began with visits to other European

(ESRF, CERN, Elettra etc.) and other research facilities (SLAC in USA, Synchrotron in Melbourne) which were sources of information and inspiration for us. We saw also facilities in operation and we joined the control system community in these facilities. This is very important because the community can help us with their experience and give us suggestions, we can consult about potential problems and so on. But we have also introduced new approaches to some fields such as high speed data acquisition based on HPC technologies and FPGA which we published in our presentations in the control system conferences and meetings since 2014. Now we have the opportunity to realize it even if only as a small scale implementation due to funding cuts. We choose to use the TANGO framework for distributed control system in ELI Beamlines and I think it was good choice not only for technical reasons but also from the social point of view as the TANGO community is strong and organizes annual meetings and other events. Of course it is good to discuss many technical things personally with community members.

What do you dislike?
Irresponsibility and sloppy work. Of course you can find such a people everywhere in your life. I have to say that I really like that I spent some time in the industry where you have to take responsibility for you work and time schedule, this influences personal responsibility a lot.

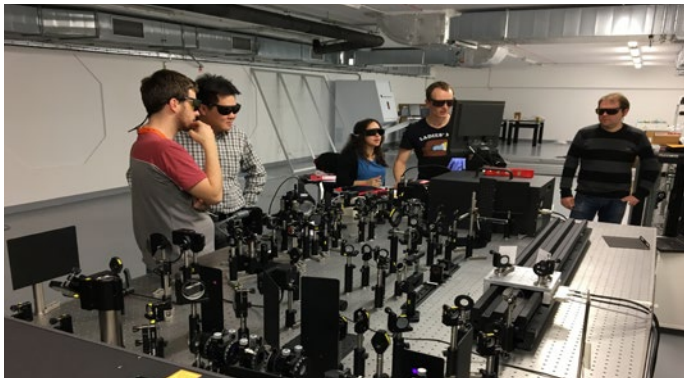
How do you cooperate with scientists? Are there any differences in communication with scientists and other professions?
I think there are no differences in communication with scientists but there are differences in communication with people who never worked in real companies. The ELI Beamlines is in some way a golden ship and I think it is sometimes amazing that this is not recognized by some people. And what is of course more important is the personality you are talking to rather than whether the person is a scientist or not.

When you have free time, what do you like doing best?
First of all I have to say that I like to do things as well as possible. This is true also in case of my work so I feel that I have to compensate it by other activities which are sports, martial arts and theater, as a consumer. I would mention that everyone becomes gardener after he reaches the age of 40 and there are no exceptions. It is really nice and restful view to well maintained garden and the nice time you can spend there! From the sports it is white water on kayak from early spring to autumn and cross-country and telemark skiing during the winter. Both are linked with traveling where you can meet other cultures and their cuisine. My personal opinion is that the Italian is one of the best!

What do you prefer: summer or winter, beer or wine, fire or water, blond hair or dark hair, city or village, chocolate or meat?
Yes, tabloid question as the last one! I would say that as a human I'm omnivore, so does it not matter if someone is blond, dark haired or a redheaded (you forgot) and it does not matter if we drink beer or wine, eat chocolate or meat. A friend of mine says: 'A winner is taking everything', here I disagree, all chocolate and even the alcohol has to have be of good quality. What I really dislike is hard liquor drunkenness so I do not drink hard liquor at all. Summer vs. winter, we have the opportunity to live in temperate climate so we can enjoy both summer and winter. This I see as a big advantage and I do not understand people going to the tropics during the winter time. Here you can see that the water is gift from heaven, one can ride on the water for the whole year and it does not matter in which phase the water is. Sometimes you can take both, ski and kayak when you are going to the mountains. You can just bake your sausage on the fire and sometimes spend nice time with a friends. City or village – woods, definitely! I think one should take life positively. ■

The time resolved Ellipsometry project at ELI Beamlines

The project for ultrafast ellipsometry with femtosecond time resolution at ELI Beamlines is attracting international users for method development. Selected users from the University of Leipzig, University of Magdeburg, New Mexico State University and Hamburg University are collaborating for the long term development of the time-resolved ellipsometry setup. When developed, this method will be available to the user community in order to facilitate new ways to study dynamical processes such as charge transfer and phase transitions and for the investigation of new materials. Initial scientific results are already being obtained and these will help to attract the scientific community once we go into operation.



An important step in the initiation of these collaborations was the first user workshop on time resolved ellipsometry, organized last year between CEITEC and ELI Beamlines. This year, the second workshop took place fully at ELI Beamlines between the 11th and 12th of October. ■

L1 compressor chamber

The L1 compressor chamber has arrived in the L1 hall. The chamber weighs just under 7 tons and houses 3 high power diffraction grating-based pulse compressors and second harmonic crystals. These compressors will be used to compress the L1 pump lasers to picosecond pulse durations and convert the infrared pulses to green for OPCPA pumping. Compression of the full output power of a 220 mJ, 1 kHz pump laser has already been demonstrated by ELI staff in the lab space provided by HiLASE. ■

The largest vacuum compressor in the Czech Republic belongs to ELI Beamlines

The vacuum compressor of PW laser pulses for the laser system L3 arrived in Dolní Břežany from Brno. It is the largest vacuum opto-mechanical unit ever designed and manufactured in the Czech Republic.
The company, Delong Instruments, which is focused on the development of advanced technologies and R&D, has been working together with scientists from the Physics Institute of the ASCR on the development of this optical compressor. It weighs more than ten tons and measures two and half meters in height and five meters in length, the output laser pulses will be compressed here to a length of 30 femtoseconds. ■

Czech Senators visited ELI Beamlines

A group of Senators from the Czech Parliament visited ELI Beamlines. The project manager Roman Hvězda presented the goals and research activities of ELI Beamlines and they discussed a support of science and research in the Czech Republic and possibilities of industrial use of laser technologies. After the discussion the senators had the opportunity to visit ELI laser halls. ■

Canadian Minister at ELI Beamlines

The Canadian Minister of Research and Innovation Reza Moridi along with his delegation were honoured guests at ELI Beamlines. They were welcomed and guided through the administrative and laser building by Georg Korn, the Head of Department of Experimental Programmes and System Engineering at ELI, and the manager for External Affairs Ivan Wilhelm. ■

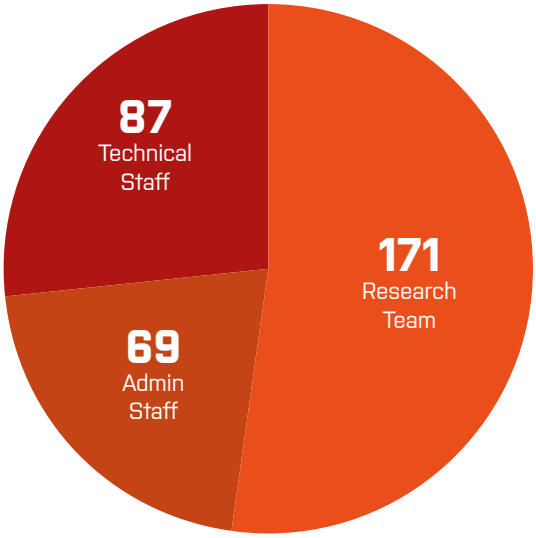
Night of Scientists

On October 6th, 2017 an event for the general public called the Night of Scientists was held at the ELI Beamlines centre. We welcomed visitors between 6 and 11 p.m. and prepared a rich program for them. They had the opportunity to attend seminars and presentations about laser technologies, visit laser and experimental halls, try out our virtual reality stations, handle a laser mirror and walk through the multimedia installation – monolit. Especially for this occasion, we projected and example of scientific videomapping onto the wall of the laser hall. ■

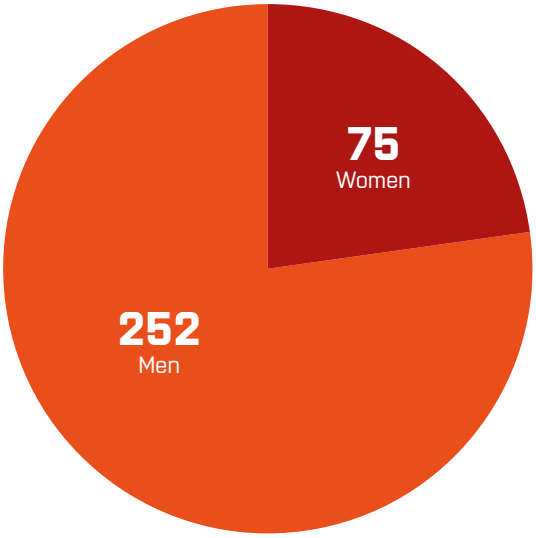
Chamber of Commerce at ELI Beamlines

On October 25th, 2017 the Head of Chamber of Commerce of the City of Prague Vladimír Dlouhý visited ELI Beamlines. He was guided by Roman Hvězda, the project manager, and Ivan Wilhelm, the manager for external affairs. They showed him around experimental and laser halls and introduced two laser systems which are here building together and installing. They discussed possible cooperation between ELI Beamlines and the Chamber of Commerce. ■

ELI 327 employees



Total Number of Employees



Total Number of Men / Women Employees

Foreign Employees and Countries

Bulgaria	1
China	1
France	5
Croatia	1
India	5
Ireland	1
Italy	14
Columbia	1
Lithuania	1
Hungary	1
Mexico	1
Germany	6
Costa Rica	1
Moldova	2
Nepal	2
Poland	4
Portugal	1
Austria	1
Russia	15
Slovakia	9
USA	6
Serbia	2
Turkei	1
Ukraine	3
Great Britain	5
Sweden	2

ELI Researchers | Technical support | Admin support