














List of Estonian Photonics Companies

No.	Name of company	Short description of company	Contact details	No. of empl	Turnover (M€)
1	 Difrotec OÜ	Difrotec specializes in point diffraction interferometer technology to measure surface roughness of concave and other surfaces.	Mariia Voznesenskaia, CEO, Riia 181b, 51014 Tartu, Estonia maria@difrotec.com , +372 590 16617 www.difrotec.com/		0.31
2	Estla OÜ	The company develops and produces accessories for lasers, lasers of different types and laser based instruments for science, medical applications, entertainment and industry. Compact excimer lasers up to 300 pps rep. rate and 20 W average power. Pulsed dye lasers for science, medicine and environmental monitoring. Equipment for laser beam control: collimators, beam expanders, light intensity attenuators, scanners, frequency doublers etc. Standard and custom high performance optical components of glass, quartz and crystals.	Dr. Evgeny Berik, CEO, Riia 185, 51014 Tartu, Estonia evgeny@estla.com , estla@estla.ee , +372 7 42 88 91 www.estla.com/	6	0.132
3	 Flir Systems Estonia OÜ	FLIR Systems is the world's largest commercial company specializing in the design and production of thermal imaging cameras, components and imaging sensors. The manufacturing facility in Estonia produces nearly 80 000 thermal camera units each year and is one of the largest FLIR manufacturing facilities in the world.	Tiit Tallo, director of facility Osmussaare 1 13811 Tallinn, Estonia tiit.tallo@flir.se +372 606 3900 www.flir.eu	>70	30.6
4	Hohenheide OÜ	In several measurement processes back-reflection from the device is necessary to reduce or to avoid at all. Hohenheide offers low back-reflection multi-element photodetectors, which can be used to obtain high-accuracy measurement results still maintaining important features like low reflection loss, large active area, good spatial responsivity and predictability of reflectance/transmittance.	Dr. Toomas Kübarsepp, Member of Board, Õlle maja, Krüüdneri küla, Valgjärve vald, 63408 Põlvamaa, Estonia toomas@hohenheide.ee , +372 740 9343 hohenheide.ee/	3	
5	IKO MS OÜ	IKO Medical Systems develops technologies and instruments for painless noninvasive diagnosis of diseases.	Dr. Victor Tomashov, CEO, Laki 26, 12915 Tallinn, Estonia info@ikoscience.ee , victor.tomashov@ikoscience.ee	3	
6	 IKO Science OÜ	IKO Science makes research, design and manufactures components and complete systems for detecting and analysis of static and dynamic signals in range from Ultra Violet to Infra Red, including ultra low signal intensity and low dynamics.	Dr. Victor Tomashov, CEO, Laki 26, 12915 Tallinn, Estonia info@ikoscience.ee , victor.tomashov@ikoscience.ee , www.ikoscience.ee/	5	0.002
7	 Interspectrum OÜ	Interspectrum has been designing and manufacturing optical and FTIR spectroscopy instruments since 1991. Interspectrum's instruments have been used in many applications and fields including analytical chemistry, material research, medical research, food science, applied physics, environmental and academic research. Interspectrum offers two main product groups, FTIR Instruments and FT-NIR Instruments. Both group of instruments include bench top, portable and modular type equipment.	Dr. Teofilus Tõnnisson, CEO, Torni 3, Tõravere, 61602 Tartumaa, Estonia info@interspectrum.ee , +372 7383 008 interspectrum.ee/	8	0.048
8	 Laser Diagnostic Instruments AS	Laser Diagnostic Instruments develops and manufactures optical sensors to monitor and analyze water quality. Our main product family is Remote Optical Watcher (ROW) for remote online monitoring of water quality & petroleum products' contamination utilizing the fluorescence properties of organic compounds. Our multitask spectrofluorometer Fluo-Imager with flow-through mode for continuous online monitoring or	Endel Siff, CEO, Koplianna str. 49, 11713 Tallinn, Estonia info@ldi.ee , +372 634 6050	13	0.29

		portable suitcase version are designed to be easily implemented in field testing, utilizing a direct measurement technique of Spectral Fluorescent Signatures (SFS) and pattern recognition for multi-parameters analysis.	www.lidi.ee/		
9	Ldi Innovation OÜ 	LDI Innovation is a Research & Development and Engineering Company operating with novel Photonics and Information and Communication technologies in industrial, environmental and security domains. The company develops and manufactures lasers and laser- and spectroscopy based instrumentation from excimer lasers and spectrofluorometers to hyperspectral lidars.	Dr. Sergey Babichenko, CEO, Lohu 12 12618 Tallinn info@ldi-innovation.eu , +372 6180760 ldi-innovation.eu/	11	0.772
10	Ldiamon AS 	Ldiamon AS is a research and development company specializing in optical sensors and measurement equipment development and manufacturing. Company main products are online sensors for medicine and environmental monitoring utilizing UV-light for absorbance and fluorescence measurements.	Dr. Christoph Nacke, Production Manager, Riia 185 51014 Tartu, Estonia christoph.nacke@ldiamon.eu , ldiamon@ldiamon.eu +372 745 5656, ldiamon.eu/	10	1.932
11	Omec OÜ	Photonic engineering activities and related technical consultations. Expertise in many technical photonics fields related to design of diffraction gratings, spectrophotometers, photonic sensors etc.	Enn Erme, CEO, Riia 185 51014 Tartu, Estonia enn.erne@gmail.com , +372 51 56 609	2	
12	Optofluid Technologies OÜ 	Optofluid Technologies is developing sensors for real-time and on-line dialysis quality monitoring. Technology is based on years of intensive research & development in the field of biofluid optics.	René Jõelet, CEO, Tulika 32, 10613 Tallinn, Estonia rene@optofluidtech.com , +372 50 38 836 optofluidtech.com/	3	0.1

List of Estonian Academic Photonics Laboratories

No.	Name of institute	Name of laboratory	Description of laboratory	Short description with key information regarding the activity of the team in photonics field	Contact details
1	<p>Tallinn University of Technology, Department of Materials Science, Faculty of Chemical and Materials Technology</p> 		The Department of Materials Science in Tallinn University of Technology undertakes high-quality and innovative research dedicated to developing, producing and characterizing materials, with a focus on micro- and nanostructured semiconductor materials for photovoltaic applications and molecularly imprinted polymers for biosensors.	Research in solar energy: photovoltaic applications, nanomaterials, etc.	Prof. Malle Krunk, Ehitajate tee 5, 19086 Tallinn, Estonia malle.krunk@ttu.ee , +372 620 3363 www.ttu.ee
2	<p>Tallinn University of Technology, Thomas Johann Seebeck Department of Electronics, Faculty of Information technology</p> 	Semiconductor electronics. Internet of electronics.	Department of Electronics' area of expertise is high-level scientific and engineering activities in the fields of semiconductor devices and integrated circuits, new solutions in nano – and medicine electronics, specific methods in signal processing as well as in bio-nano-info convergence and symbiosis.	Semiconductor electronics: numerical experiments for determination of critical characteristics for multidomain power LED models; characterization of photovoltaic devices based on numerical experiments; numerical simulation of semiconductor devices based on wide bandgap semiconductors and heterostructures; development of mathematical and physical models for simulating semiconductor nanostructures; numerical examination of wide bandgap materials based multidomain semiconductor structures. Internet of electronics: development of high-definition space/aeronautical camera data acquisition and attitude correction modules.	Prof. Toomas Rang, Ehitajate tee 5, 19086 Tallinn, Estonia toomas.rang@ttu.ee , +372 620 2154 www.ttu.ee
3	<p>University of Tartu, Institute of Physics</p> 	Gas Discharge Laboratory	Gas Discharge Laboratory studies physical and chemical processes taking place in gas discharge plasma as well as at the plasma-surface order. Plasma at medium and atmospheric pressures is excited by DC, pulsed and high frequency electric fields.	The plasma spectroscopy is the main experimental method which connects all direction of our studies. Results of absorption and emission spectroscopy combined with those of optic and electric measurements are the bases used for interpretation/modelling.	Dr. Indrek Jõgi, W.Ostwald str 1, 50411 Tartu, Estonia indrek.jogi@ut.ee , +372 737 5565 www.fi.ut.ee
4	<p>University of Tartu, Institute of Physics</p> 	Laboratory of Physics of Ionic Crystals	Basic research is carried out in the field of fundamental phenomena in wide-gap materials (WGM) and their application prospects (fast scintillation detectors, selective personal dosimeters, luminescent tubes and displays, materials for nuclear energetics, etc.). The main scientific goals are to investigate in details intrinsic electronic excitations (EE) and their transformation into luminescence of different types, phonon package or Frenkel and extended defects in pure and doped binary and complex oxides and halides. The features of EE, their relaxation dynamics, bulk and surface self-trapping and recombination, energy transfer processes are studied experimentally and theoretically in single crystals, optical ceramics, thin films, nanoporous and nanosized samples.	The key feature of our experimental approach is the application of various complementary to each other spectroscopy methods using a wide energy range of exciting photons (up to 2000 eV) or electrons (1-300 keV, steady beam or single pulses) and a wide temperature range of 2–1200 K. The research group possesses several up-to-date setups for time-resolved and stationary luminescence in one- and two-photon excitation regime, cathodoluminescence, EPR, polarisation spectroscopy, and for thermoactivation spectroscopy with various detection methods. The unique setup with double VUV monochromator allows to register emissions with quantum yield down to 10 ⁻⁵ . Radiation effects are studied in the samples irradiated by electrons, X-rays, UV-XUV photons, fast neutrons and swift ions (MeV-GeV). Synchrotron radiation (MAX-lab and HASYLAB), powerful fs-laser systems (centres in Saclay and Vilnius) and linear accelerators of swift ions (Darmstadt and Astana) are regularly used. A unique device for single crystal growth via arc-fusion method (up to 3000°C) and furnaces for the synthesis of ceramics and powders by various methods are at our disposal.	Prof. Aleksandr Lushchik W. Ostwald str 1. 50411 Tartu, Estonia aleksandr.lushchik@ut.ee +372 737 4619 www.fi.ut.ee
5	<p>University of Tartu, Institute of Physics</p> 	Laboratory of Laser Spectroscopy	The Laboratory of Laser Spectroscopy is specialized on the investigation and functionalization of novel materials using modern optical and spectroscopic techniques. Current research is focused on the development and characterization of applied	The laboratory has theoretical background and experimental capabilities in the following fields: Steady-state and time-resolved photoluminescence spectroscopy; Luminescence phenomena in pure and doped inorganic (nano-) materials (oxides, fluorides, phosphates, etc); Raman and luminescence microspectroscopy; Optical measurements at	Dr. Ilmo Sildos, W.Ostwald str 1, 50411 Tartu, Estonia ilmo.sildos@ut.ee , +372 737 4613 www.fi.ut.ee

nanomaterials for optical sensors, photonics and biomarkers.

cryogenic temperatures; Electrical and optical sensor measurement; Preparation of optical and sensor materials using pulsed laser deposition and soft chemistry methods; (Spectrally resolved) thermoluminescence measurements; Computer modeling of optical materials.

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University of Tartu, Institute of Physics



UNIVERSITY OF TARTU
institute of physics

Laboratory of Physical Optics

The laboratory deals with nondiffracting, nonspreading and accelerating light pulses and their generation, characterization and applications – subjects in optics that have gained widespread attention since the first decade of the century.

Prof. Peeter Saari,
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www.fi.ut.ee

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University of Tartu, Institute of Physics,



UNIVERSITY OF TARTU
institute of physics

Laboratory of Biophysics

The Laboratory of Biophysics studies phenomena which lie on the borderline of biology and physics. More specifically, we are investigating how different protein complexes function, what is the interrelationship between the dynamical protein structure and their function, and how the external conditions such as temperature and pressure modify the properties of proteins.

Our main focus lies on the proteins that facilitate photosynthesis. A good example is the peripheral light-harvesting 2 (LH2) complex from the photosynthetic purple bacterium Rhodospseudomonas acidophila. This complex has developed a special manifold of energy states for very efficient harvesting of solar photons and transferring the light excitation energy along extensive biomembranes. For experimental studies, we utilize wide range of optical spectroscopies, which cover a broad set of wavelengths from ultraviolet to near-infrared. Among the laser spectroscopy techniques are differential fluorescence line-narrowing spectroscopy and picosecond time-resolved fluorescence spectroscopy (originally named picosecond spectrochronography), both of which were pioneered by the members of our lab.





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List of Lithuanian Photonics Companies





No.	Name of company	Short description of company	Contact details	No. of empl	Turnover (M€)
1	<p>Altechna</p> 	<p>Altechna is a reliable supplier of laser optics, polarization optics, laser and nonlinear crystals, lasers and laser accessories, custom optics, metrology and consulting services for scientific research laboratories.</p> <p>The company also delivers microscopy solutions, laser technology solutions as well as innovative and complex solutions for representatives of science and industry. To ensure customers with excellent quality solutions – Altechna has developed its Laser Optics Quality Inspection Laboratory. The certified quality management system ISO 9001 confirms that Altechna provides quality goods and services oriented to the needs and requirements of the customers.</p> <p>Altechna products include:</p> <ul style="list-style-type: none"> • Laser optics • Polarization optics • Laser & nonlinear crystals • Lasers & laser accessories • Custom optics and optical systems • Metrology and other services <p>Main activities:</p> <ul style="list-style-type: none"> • Trade and manufacture of laser related components • Design of optical systems • Innovative solutions for academic and industrial customers 	<p>Marius Pilkauskas, director Mokslininkų St. 6A, LT-08412 Vilnius, Lithuania info@altechna.com +370 5 2725738 www.altechna.com</p>	80	5-10
2	<p>Aštuonetas</p>	<p>Aštuonetas offers the services of laser marking, microwelding and cutting. The company develops in-house laser marking software and equipment. The customers of the company include advertisement producers, manufacturers of optomechanical and electronic equipment, printers, jewelry producers, organizers of events and shows etc.</p>	<p>Jonas Oberauskas A. Goštauto St. 12, LT-01108, Vilnius, Lithuania lazgrav@astuonetas.lt +370 5262 1049 www.astuonetas.lt</p>	7	0.1-0.2
3	<p>Brolis Semiconductors</p> 	<p>Brolis Semiconductors is a developer and manufacturer of optoelectronic components for the mid-infrared range. The manufacturing is based on AlGaInAsSb material platform and uses molecular beam epitaxy as growth method. The maximum capacity of epitaxy is 14 x 50 mm, 7 x 75 mm or 4 x 100 mm wafers in one growth cycle. The company manufactures and develops semiconductor lasers and detectors based on GaSb for 2000-4000 nm range. The products are used in spectroscopy, gas sensors, medicine, defense and environment protection. The manufacturing facilities of Brolis Semiconductors are compliant with ISO 6 and ISO 7 cleanroom standards. In 2013, the activities of the company have been certified to comply with ISO 9001:2008 quality management standards.</p>	<p>Dominykas Vizbaras Molėtų Rd. 73, LT-14259, Vilnius, Lithuania info@brolis-semicon.com + 370 52199592 www.brolis-semicon.com</p>	11	0.3-0.5
4	<p>Direct Machining Control</p> 	<p>Direct Machining Control provides software for preparation of laser machining processes and control of laser machines.</p>	<p>Tadas Kildušis Mokslininkų g. 2A 08412, Vilnius, Lithuania info@directmachining.com +370 614 97 699 http://directmachining.com/</p>		0.05-0.1
5	<p>Eksma</p> 	<p>Eksma is an umbrella company of a group that has been working in high technologies for over 30 years. Eksma Group includes two companies involved in laser technologies, Ekspla and Optolita (Eksma Optics). The start of Eksma Group was in 1983, when the Experimental Plant of Laser and Electronic Equipment was established at the Institute of Physics of the Academy of Sciences. In 1988, Eksma was the first company in Lithuania, rented out by the state to its employees. Eksma is</p>	<p>Petras Balkevičius Mokslininkų St. 11, LT-08412, Vilnius, Lithuania eksma@eksma.lt +370 5 272 9714</p>	8	0.2-0.3

		a shareholder of the joint Lithuanian-Russian company Sibirskij Monokristall-Eksma specializing in the growth of nonlinear and laser crystals. In addition to laser business, the company is involved in the sales, installation and support of medical and laboratory equipment (Eksma is one of the large shareholders of JSC Bioeksma).	www.eksma.lt		
6	 <p>EKSMA Optics</p>	<p><i>EKSMA Optics</i> is a manufacturer of precision laser components, used in lasers, laser systems and in other photonic instruments. Utilizing more than 30 years of expertise in the laser and optics fields The Company has proven experience providing custom solutions and also offering a wide range of catalogue products for the fast off-the-shelf delivery.</p> <p><i>EKSMA Optics</i> annually exports its products to more than 50 countries around the world. Product range includes laser optics, nonlinear and laser crystals, DKDP, BBO and KTP Pockels cells and high voltage drivers, spherical and aspherical lenses, optical systems, opto-mechanical mounts, motorized stages, optical tables and ultrafast electro-optical pulse picking systems. The Company owns advanced IBS coatings facility, flat optics and crystals polishing facility, spherical and aspherical lenses CNC manufacturing facility, clean room facilities for electro-optical components assembling and quality control facilities.</p> <p><i>EKSMA Optics</i> is an ISO 9001:2008 certified company.</p>	<p>Dainius Tumosa Mokslininkų St. 11, LT-08412, Vilnius, Lithuania, info@eksmaoptics.com +370 5 272 9900 www.eksmaoptics.com</p>	50	8.5
7	 <p>Ekspla</p>	<p>Ekspla is a manufacturer focusing on high-performance advanced solutions. Drawing on 30 years of experience and close partnership with the scientific community, it designs, develops and manufactures solid-state lasers, laser systems and accessories for R&D and industrial applications; complete spectroscopy systems; ultrafast fiber lasers; high energy laser systems; and laser optoelectronics. Strong R&D team enables customizing and supplying products from single unit to OEM series. In-house design and manufacturing ensures operative development and manufacturing of new products. Products are available from several standard units for R&D applications to series customized solutions for OEM (Original Equipment Manufacturers). The in-house design and manufacturing ensures effective development and launch of new products. High peak power laser systems, short pulse generation and amplification, tuneable nonlinear OPO/OPG/OPA and nonlinear spectroscopy are among Ekspla core competencies. The company is one of the few in the world that make SFG spectrometers for material surfaces investigation. Ekspla exports 90 % of its production to more than 60 countries worldwide. Customers include the most famous universities across Europe, the USA and Australia, CERN, Cambridge University, Lawrence Livermore National Laboratory, NASA, RIKEN Nishina Center in Japan and the Chinese Academy of Sciences. EKSPLA has become proficient in carrying out EU projects, both international (FP7, EuroStars, Eureka) and national (in the framework of structural funds). The cooperation involving numerous partners taught new knowledge and skills, and widened EKSPLA's scope. In 2011, EKSPLA became the first company from Central and Eastern Europe to win the Prism Award for Photonics Innovation (known as the Oscar of the photonics industry). In 2012, Ekspla was named the Business IQ of the Year at the Swedish Business Awards ceremony. Every two years the national Innovations Prize is received either for some exceptional new product or awarded to the entire company.</p>	<p>Kęstutis Jasiūnas Savanorių Av. 231, LT-02300 Vilnius, Lithuania sales@ekspla.com +370 5 264 9629 www.ekspla.com</p>	120	5-10
8	 <p>Elas</p>	<p>Elas designs and manufactures specialized laser micro machining systems with nano-, pico- and Femtosecond lasers for scientific and industrial applications. The company is involved in the research of laser based material micro-machining of materials. The processing technologies are developed and adapted for industrial production. The company's equipment is applied in a number of micromachining processes: surface structuring, direct writing, cutting, drilling, and ablation. The majority of developed systems is exported. Elas' clients are world famous universities, research centers and industrial companies.</p>	<p>Saulius Mikalauskas Savanorių Av. 231, LT-02300, Vilnius info@e-lasers.com +370 655 14467 www.e-lasers.com</p>	9	0.2-0.3
9	 <p>Evana Technologies</p>	<p>The business of Evana Technologies is the commercialization of light and laser technologies and the manufacture of systems employing these technologies for industry.</p>	<p>Egidijus Vanagas Mokslininkų St. 2A, LT-08412, Vilnius +370 69999471 www.evanatech.com</p>	5	0.1-0.2





10	<p>FEMTIKA</p> 	<p>Femtika was established in 2013 as a spin-off from Vilnius University, Laser Research Center, by a team of experts with a portfolio of many years of research and development of 3D laser precision micro processing. The main activities of the company are the design and production of custom 3D laser precision micro processing systems and the fabrication of 3D micro- and nano- structures using the femtosecond laser for applications in different fields, such as tissue regeneration, photonics, micro optics, micro fluidics, mTAS, etc.</p>	<p>Saulėtekio Al. 15, LT-10224 Vilnius, info@femtika.lt +370 687 99992 www.femtika.lt</p>	0.05-0.1
11	<p>Geola Digital</p> 	<p>World-wide holography leader, Geola is the inventor of digital holographic printing using pulsed lasers, hologram copying with laser radiation slit method and other methods and instruments used in modern imaging and security holography. In addition, the company has developed customized pulsed lasers for holography. Since the lasers for holography have exceptionally good lasing properties, they can also be used for research purposes. Lasers manufactured by Geola are employed at such R&D centers as Rutherford Appleton Laboratory, Indira Gandhi Atomic Research Centre and others. Geola is the only company in the world manufacturing pulsed RGB lasers with coherence length of more than 3 m. It is the supplier of pulsed holography studios, digital holographic printers for security and poster-sized image hologram printing, equipment for hologram copying using pulsed lasers. Geola is one of the two companies in the world printing poster-sized digital holograms, including holographic maps. Geola is the only company in the world producing security holograms with deep 3D image.</p>	<p>Stanislovas Zacharovas Naugarduko St. 41, LT-03227, Vilnius, Lithuania info@geola.com +370 5 213 2737 www.geola.com</p>	12 0.5-1
12	<p>Holtida</p> 	<p>Development of advanced security labels! The original holographic labels for security and product authentication.</p>	<p>Rasa Žostautienė K. Baršausko st. 59-214, LT-51423 Kaunas, Lithuania info@holtida.lt +370 688 01252 http://holtida.lt/</p>	3 0.005
13	<p>Integrated Optics</p> 	<p>Integrated Optics is a manufacturer of ultra compact CW laser sources as well as miniaturized pulsed lasers. Proprietary technology allows tight integration of optics and electronics. The MatchBox series of lasers consists of direct diode and DPSS lasers covering over 25 different wavelengths. These continuous wave lasers are most compact on the market and feature superior power stability, low noise and most of them have narrow-spectrum versions, including a single frequency option. Compact MatchBox lasers are used in numerous life science applications, such as Raman spectroscopy, fluorescence imaging, food sorting as well as diagnostics.</p>	<p>Evaldas Pabrėža Šiaurės Miestelio Technologijų Parkas, J. Galvydžio St. 5, LT-08236, Vilnius, Lithuania info@integratedoptics.com +370 602 24642 www.integratedoptics.com</p>	15 0.1-0.2
14	<p>Lidaris</p> 	<p>Lidaris Ltd. is the provider of world-class optics characterization services, focusing on Laser-Induced Damage Threshold (LIDT), Total Integrated Scattering (TIS) and Absorption testing. The company is also offering R&D services based on original hardware and software solutions dedicated to quality improvement of high power optics. Lidaris was founded as a start-up of Vilnius University Laser Research Center after more than 10 years of intense research in the field of laser damage phenomena. The core of Lidaris staff consists of scientists and PhD students: mainly graduates of Vilnius University in Lithuania (EU). The company is operating highly sophisticated measurement systems dedicated to accurate LIDT, TIS and absorbance testing in accordance with currently existing international (ISO) standards. Lidaris is acting in the global market: its export share exceeds 95 %. Lidaris is proud to serve the most famous optics companies - the leaders of today's laser market, including manufacturers and suppliers of optics and laser systems.</p>	<p>Dr. Andrius Melninkaitis Saulėtekio Al. 10, LT-10223, Vilnius info@lidaris.com +370 609 09233 www.lidaris.com</p>	5 0.1-0.2
15	<p>Lifodas</p> 	<p>Lifodas is the manufacturer of fiber optical components and portable test and measurement instruments for fiber optics, including optical reflectometers, testers, attenuators, light sources, power meters.</p>	<p>Piotr Levin Naugarduko St. 41, LT-03227, Vilnius, Lithuania sales@fods.com +370 5 233 3568 www.fods.com</p>	79 5-10
16	<p>Light Conversion</p> 	<p>Light Conversion is the leading manufacturer and global leader of tunable wavelength femtosecond laser systems. Femtosecond optical parametric amplifiers produced at Light Conversion take up to 80 % of the world market. The main products of the company are TOPAS and ORPHEUS series optical parametric amplifiers, diode-pumped femtosecond laser system PHAROS, time-resolved</p>	<p>Algirdas Juozapavičius Keramikų St. 2B, LT-10233, Vilnius company@lightcon.com</p>	115 20-30

		absorption and fluorescent spectrometers. In 2014, the company had more than 1 600 optical parametric amplifiers and over 150 PHAROS systems installed worldwide. Light Conversion exports about 95 % of production. Its customers include industrial companies and research institutions in more than 40 countries. The largest part of the production is exported to Germany, Japan, the USA, China, and Great Britain. Currently, the company has 24 representatives in the European, North American and Asian countries dedicated to product sales and service. Light Conversion is one of the fastest growing companies in Lithuania. In 2010, Light Conversion was awarded the prize as the Best Company in Knowledge Economy.	+ 370 5 2491830 www.lightcon.com		
17		The main activity of Luvitera is the development of innovative technologies and products for terahertz photonics, imaging and spectroscopy, both for scientific laboratories and industry. Luvitera produces broadband and wavelength-selective microbolometer arrays, to measure spatial terahertz beam profiles of various terahertz sources. The company offers an antenna-coupled titanium microbolometers and scanners as sensitive room temperature terahertz detectors and imagers. The company's components can be integrated into customized security and diagnostic systems.	Marius Vinciūnas A. Goštauto St. 11, LT-01108 Vilnius, Lithuania info@luvitera.com +370 680 51674 www.luvitera.com	2	0.02-0.03
18	Modernios E – Technologijos 	The company develops novel materials, produces custom shape, size and color PV modules and provides energy efficiency services for your custom business needs. The aim of the company is to produce equipment and components for the energy, thermal storage, electronics and other technological innovation adoptive industries.	Juras Ulbikas, director Vismaliukų g. 34, LT-10243 Vilnius, Lithuania info@met.lt +370 5 2500 616 http://met.lt/	36	0.05-0.1
19	Optida Co. Ltd. 	OPTIDA is the largest optical coating company in Lithuania. Company is continuously developing and manufacturing broad range of optical components as well as custom coatings suitable for various laser systems and optical devices. Optida has close collaboration with Lithuanian applied research institutions like Department of Optical Coatings at Institute of Physics, Laser Research Center at Vilnius University and Lithuanian laser companies. Optical coatings are one of the most important parts which helps implement technologies manipulating the light: reflect, split into multiple beams, reduce reflection loses, combine few light beams, split polarizations, compensate group delay dispersion, etc. Optida offers various optical coatings and development services for optical components according to custom requirements of scientists and engineers. Optida researchers and engineers take a part in coating technology researches, cooperating with various research institutions and improving existing or integrating new technologies	Mindaugas Bružas Savanorių Av. 231, LT-02300, Vilnius, Lithuania sales@optida.lt +370 5 262 1508 www.optida.lt	53	1-2
20	Optinės Dangos 	Optinės Dangos offers a wide range of unique optical coatings that match the highest quality standards. The company's products are used in lasers and other optical systems that are applied in a number of areas. Optinės Dangos uses in-house developed technologies allowing the company's products to achieve unprecedented reliability, innovativeness and meet very high technical requirements.	Kęstutis Niaura A. Goštauto St. 12, LT-01104, Vilnius info@opticalcoatings.lt +370 672 30574 www.opticalcoatings.lt	4	0.01-0.02
21	Optogama 	Designing, developing and commercialising custom laser related solutions. Applications include laser micromachining, LIBS, laser range finding and solutions for life sciences and metrology.	Tadas Lipinskas Mokslininku str. 2A, 08412 Vilnius, Lithuania sales@optogama.com +370 5 219 4884 http://www.optogama.com/	6	0.5-1
22	Optonas	The activities of Optonas are the production of thin-film interference, metallic, dielectric and semiconductor coatings for laser optics and other optical components. The company is developing novel thin-film coating technologies. The products of the company are high-quality coatings featuring high robustness and resilience under long-term laser illumination, mechanical impacts and varying ambient conditions. Unique coatings for infrared, visible and ultraviolet spectral ranges are developed.	Gintas Jakubėnas Mokslininkų St. 11, LT-08412, Vilnius www.optonas.com	3	0.2-0.3




23		<p>Optoteka is the developer and manufacturer of precision optical components from optical glasses and crystals. Such components are used in the manufacturing of optical equipment for research, industry, medicine, lighting, etc. Component production is based on the unique in-house technologies, created in 1993, which is constantly being developed. This enables manufacturing extremely high quality products. In addition to the main production, the company is the manufacturer of mechanical components for lasers. The company exports 40 % of its production. The ultrathin scatter-free optical crystals and linear optical elements are widely known in more than 30 countries worldwide. The company has a number of regular customers, and maintains long-term close collaborations.</p>	<p>Remigijus Rimkevičius Kalvarijų St. 125, LT-08221, Vilnius, Lithuania open@optoteka.lt +370 5 277 7661 www.optoteka.lt</p>	30	
24		<p>Optronika is the producer of RGB laser projectors for industry and advertisements, unique shutters for laser micromachining, chillers for research equipment, optical analyzers of cleaning quality and freezing point of liquids and other spectrometric equipment. Currently, Optronika is participating in a cluster project developing a new generation laser-based orthopedic devices and energy-efficient building solutions. The company also manufactures laboratory and education equipment for research institutions. The company is also the largest provider of laser advertisement and illumination services for events, exhibitions, and concerts.</p>	<p>Mindaugas Stankevičius Kalikštiškės, Maišiagala Township, LT-14247, Vilnius Distr., Lithuania www.optronika.lt</p>	6	0.05-0.1
25		<p>Laser marking systems, sheet metal cutting systems, laser welding systems, laser systems for light industries.</p>	<p>Algirdas Rukšėnas Mokslininku str. 11 LT-08412, Vilnius, Lithuania info@orientaltechnology.eu +370 687 76829</p>	2	0.005
26		<p>Precizika is part of the Solet Group. The Group offers reliable and technologically integrated photovoltaic (PV) technology, as well as a vast range of relevant solar energy solutions – products and services – from a single experienced and professional source. The Solet Group provides services that range from solar panel manufacturing to engineering design and installation of solar power plants. It offers thorough consulting and maintenance in solar energy project development, as well as professional estimation of returns on investment, testing and scientific development</p>	<p>Tomas Barakauskas, director Žirmūnų g. 139, LT-09120 Vilnius, Lithuania office@precizika.lt +370 5 2363680 http://www.precizika.lt/ http://www.solet.lt/</p>	75	5-10
27		<p>Quantum Light Instruments Ltd (QLI) is a startup focused on the delivery of diode-pumped solid-state lasers for analytical instruments. Our product range starts with compact air-cooled pulsed Q-switched lasers and ends with advanced solutions featuring controlled pulse waveform or coherence length. QLI also offers equipment for laser beam quality diagnostics and active control.</p>	<p>Andrius Rinkevičius Address: Mokslininkų St. 6A, LT-08412, Vilnius, Lithuania. Website: www.qlinstruments.com</p>	3	0.1-0.2
28		<p>Holds the entire value chain of vertically integrated manufacturing processes of photovoltaics - from multi-si solar cells to new generation PV modules right up to the advanced technology BIPV projects.</p>	<p>Martynas Čereška, director of Soli Tek Cells Julius Denafas, director of Soli Tek R&D Mokslininku str. 6A LT-08412, Lithuania info@solitek.eu +370 5 263 8774 http://www.solitek.eu/</p>	34, 35	5-10
29		<p>Sprana is a new high-tech company of applied spectroscopy providing solutions for online monitoring and analysis of industrial processes (streams). The main focus is the quantitative analysis and characterization (i.e. estimation of the particle size distribution) of light scattering media using advanced UV-Vis-NIR spectroscopic methods and techniques. Research and development of new analytical instrumentation/solutions (process analyzers) along with multivariate calibration models is one of the key work areas.</p>	<p>Raimundas Steponavičius Address: Mokslininkų St. 6A, LT-08412 Vilnius info@sprana.eu +370 685 30 552 www.sprana.eu</p>	7	0.005-0.01

<p>30</p>	<p>Standa</p> 	<p>Standa is one of the largest European companies designing and manufacturing high-precision mechanical components for photonics. The company also develops and manufactures sub-nanosecond microlasers for research, and integrates them in biological, chemical and medical spectroscopic equipment. Standa produces high-precision mechanical and optomechanical devices (nanometric precision motorized and manual positioners of optical components, translation and rotation stages, fine adjustment screws, micrometer screws), optical honeycomb tables, vibration isolation equipment (e.g. for atomic force microscopes), light power and energy meters. The company exports over 90 % of production to more than 60 countries worldwide. Its products are widely used in the research labs of Lithuanian universities and research institutes.</p>	<p>Michail Berba Address: Švitrigailos St. 4–39, LT-03222, Vilnius, Lithuania sales@standa.lt +370 5 2651474 www.standa.lt</p>	<p>120</p>	<p>5-10</p>
<p>31</p>	<p>Teravil</p> 	<p>Teravil is a developer and manufacturer of the terahertz (THz) range spectroscopic systems and components. Company's competence lies in developing and manufacturing of THz radiation spectroscopy systems based on solid state or fiber lasers and photoconductive antennas. Currently, the company manufactures and sells THz radiation sources and receivers, for use with 800 nm and 1000 nm wavelength lasers, and complete THz spectroscopy systems based on these devices. Nearly 100 % of the production is exported.</p>	<p>Gediminas Molis A. Goštauto St. 11, LT-01108, Vilnius info@teravil.lt +370 685 46938 www.teravil.lt</p>	<p>6</p>	<p>0.1-0.2</p>
<p>32</p>	<p>ViaSolis</p> 	<p>Via Solis manufactures photovoltaic (PV), a new generation of glass-glass solar modules and offers the building integrated solar power plant (BIPV) and other PV systems solutions.</p>	<p>Tomas Brikmanis, director A. Jakšto g. 7, 08412 Vilnius, Lithuania info@viasolis.lt +370 5 2658811 http://www.viasolis.lt/</p>	<p>32</p>	<p>1-2</p>
<p>33</p>	<p>Workshop of Photonics</p> 	<p>Workshop of Photonics is a brand of the company Altechna R&D. Workshop of Photonics develops instruments and solutions for laser micromachining tasks. The company specializes in the production of laser systems and accessories as well as in laser processing services: from feasibility studies to customized optical modules and from electronic devices to laser machines. Services are targeted to both industrial and academic customers. Company's key competencies lie in:</p> <ul style="list-style-type: none"> • Feasibility studies on femtosecond laser micromachining • Development of custom femtosecond laser systems and optical modules • Small scale production (job shop) in the area of laser micromachining • Laser system automation software • Custom components for laser based systems and devices <p>The products made by Workshop of Photonics are used in industry (to increase the effectiveness and precision of manufacturing and other processes), in medicine (to improve devices), and in the scientific field (to carry out various tasks). Workshop of Photonics is exporting 90 % of their production.</p>	<p>Eugenijus Kurtinaitis Mokslininkų St. 6A, LT-08412 Vilnius, Lithuania info@wophotonics.com +370 5 272 5738 www.wophotonics.com</p>	<p>15</p>	<p>1-2</p>

List of Lithuanian Academic Photonics Laboratories and Research Institutions

No.	Name of institution	Name of laboratory	Short description of institution and laboratory	Contact details
1	Applied Research Institute for Prospective Technologies 		<p>This is a private non-profit research institute established under FP5 Centres of Excellence project for Candidate Countries "First Step" as industrial research centre with specific knowledge in photovoltaic technologies. From the very beginning institute is focusing its activities on industry relevant research supporting SMEs and manufacturing industries in Lithuania and EU countries. Successful implementation of research projects with strong industry involvement triggered interest of private investors to work with ProTech as a performer of industry level reasearch and technology developer.</p> <p>Today, ProTech is recognised applied research centre focusing it's activities at green energy generation and application technologies, particularly, photovoltaics, energy efficient buildings and environment-friendly materials. ProTech adminstrates a national Photovoltaic Technology Cluster and runs it's open-access R&D facilities.</p>	Algirdas Jonas Galdikas Vismaliukų g. 34, LT-10243 Vilnius, Lithuania +370 5 2500 616 http://protechnology.lt/
2	Center for Physical Sciences and Technology (CPST) 	Department of Laser Technologies (DLT)	<p>DLT consists of the laboratories of Laser Microfabrication Technologies, Fiber Lasers, Solid-State Lasers, Optical Coatings, and Nanophotonics. The major directions of research include the development of optical components, fiber and solid-state lasers and applications thereof in material processing. The results of research are embodied in complicated dielectric optical coatings, high pulse energy fiber lasers and high power pulsed solid-state lasers for custom technological applications. The interactions between laser radiation and materials are investigated in search of new laser micromachining methods. Part of research is also directed at the modeling, creation, and characterization of nanophotonic structures, waveguides and metamaterials for light control. CPST DLT offers its services for customized development and implementation of laser-based micromachining technologies, develops specialized solid-state and fiber lasers, offers design services, and small-scale production of dielectric optical coatings; also, it performs modeling of waveguides and photonic crystal structures and light propagation therein.</p>	Dr. Gediminas Račiukaitis Savanorių Av. 231, Vilnius, Lithuania graciukaitis@ar.fi.lt +370 5 261 9759 www.ftmc.lt
3	Center for Physical Sciences and Technology (CPST) 	Department of Molecular Compound Physics (DMCP)	<p>DMCP consists of the laboratories of Ultrafast Spectroscopy and Biophysical Research. Research at DMCP is focused on better understanding of photoinduced electronic phenomena in different organic and hybrid systems, for applications in organic optoelectronics.</p> <p>Ultrafast spectroscopic methods are widely applied in the investigations of excitation dynamics in molecular compounds, determining optical and electric properties of molecular materials. For better understanding of photoelectric properties of molecular devices, optical techniques are combined with electrical methods.</p> <p>Ultrafast spectroscopic techniques are applied in the research of primary events in photosynthesis, which are described using high-level theory; excitation dynamics and charge separation models are developed. CARS and multi-photon fluorescence microscopies are developed in the department in order to visualize details of biological and other molecular objects with sub-micron resolution.</p>	Prof. Leonas Valkūnas Savanorių Av. 231, Vilnius, Lithuania leonas.valkunas@ff.vu.lt +370 5 261 9759 www.ftmc.lt
4	Center for Physical Sciences and Technology (CPST) 	Department of Optoelectronics (DO)	<p>The Department of Optoelectronics includes the laboratories of Ultrafast Optoelectronics, Optoelectronic Technologies, Terahertz Photonics and Semiconductor Optics. The main goal of the DO is the development of scientific and technological infrastructure for business and society in order to develop novel optoelectronic devices and optoelectronic systems, and maintaining the competence required for employing these technologies. The focus of the labs is centered on the growth of dilute bismide layers and structures for terahertz and infrared detectors and emitters using molecular beam epitaxy. The lab has developed the first compact THz imaging arrays operating at room temperature that are suitable for security and diagnostic systems. As a consequence, terahertz spectroscopy of carbon nanostructures and their composites has emerged. Another field is the research of nanostructured composite systems – hybrid synthetic photonic opals, pored semiconductors containing magnetic nanoparticles, quasicrystals and quantum semiconductor structures, employing the techniques of spectral ellipsometry and various modulation spectroscopies.</p>	Prof. Arūnas Krotkus Savanorių Av. 231, Vilnius, Lithuania krotkus@pfi.lt +370 5 261 9759 www.ftmc.lt
5	Kaunas University of Technology	Faculty of Mechanical Engineering and Design	<p>The department pursues research activities related with the applications of lasers in production processes. Direction of research include the effects of laser irradiation in the thermal processing and microstructuring of engineering materials, laser applications in fast production systems, and integration of laser technologies in production systems. The department collaborates with Lappeenranta University of Technology in Finland,</p>	Dr. Kazimieras Juzėnas Kęstučio St. 27, LT-44312, Kaunas, Lithuania kazimieras.juzenas@ktu.lt

 kaunas university of technology	Department of Production Engineering	Ilmenau University of Technology in Germany, and Tallinn University of Technology in Estonia.	+370 37 300 418 www.ktu.lt
6 Kaunas University of Technology  kaunas university of technology	Institute of Materials Science Department of Surface and Thin Film Research Laboratory of Optical Technologies (together with KTU Center for International Studies)	The department and laboratory is involved in the applications of laser technologies and optical spectroscopy. Techniques based on laser interference are used for the formation and analysis of periodic microstructures, the methods of holographic interferometry are used for the investigation of deformations in micro and macrosystems. The methods of digital holography are developed and their potential applications in the document security markings are investigated. Optical sensors for real-time measuring of refractive index in liquids are developed and applied in the analysis of biological processes. The laboratory collaborates with the University of Ancona (Italy), University of Southern Denmark and other scientific centers abroad.	Dr. Mindaugas Andrulevičius Savanorių Av. 271, Kaunas, Lithuania mindaugas.andrulevicius@ktu.lt +370 37 313 432 www.fe.ktu.lt
7 National Cancer Institute 	Laboratory of Biomedical Physics	Research of interactions between laser radiation and biological objects began at Vilnius University Laser Research Centre in the 1970s. In 1989, the Lithuanian Oncology Center has started applying photodynamic cancer therapy employing lasers. More than 700 patients received treatment. The Biomedical Physics Laboratory was founded in 2004. It continues research of interactions between laser radiation and biological objects, including techniques and methods of optical biopsy, photosensitized cancer therapy, biomedical imaging, nanobiophotonics and nanomedicine. The laboratory maintains close collaboration with the University of Oslo and the Norwegian Radium Hospital in Norway, Munich Grosshadern Clinic and Leibniz-Institute of Photonic Technology (Jena) in Germany, Swinburne University of Technology in Australia, Biodesign Institute at Arizona State University in the USA.	Prof. Ričardas Rotomskis Baublio St. 3B, Vilnius, Lithuania ricardas.rotomskis@ff.vu.lt +370 5 219 0908 www.nvi.lt
8 The General Jonas Žemaitis Military Academy of Lithuania 	Department of Engineering Management	The department was founded in 1994. One of the directions of research pursued here is the detection of explosives and pollutants using laser-based methods. The scientists of the department are developing selective methods and sensitive equipment for detecting pollutants on army training grounds and the environs, using modern laser techniques. The department also investigates critical phenomena (material destruction) and related changes in transparent media, resulting from intense laser irradiation. The research uses cutting-edge laser technologies and mathematical modeling methods. Close collaboration is maintained with the Institute of Physics, Institute of Biochemistry and company Ekspla.	Prof. Aušrius Juozapavičius Šilo St. 5A, Vilnius, Lithuania ausrius.juozapavicius@lka.lt +370 5 210 3565 www.lka.lt
9 Vilnius Gediminas Technical University 	Faculty of Mechanics Department of Mechanical Engineering Research Laboratory of Vibroacoustics and Diagnostics Research Laboratory of Vibroacoustics and Diagnostics	The Vibroacoustic Research and Diagnostics Science Laboratory (VRDSL) was established at Vilnius Gediminas Technical University, Faculty of Mechanics, Department of Machine Engineering 16th of November 1993. VRDSL performs vibrodiagnostics and monitoring of different mechanical systems: compressor stations, gas pumping stations, pump-houses, air blowing, electro motors, motors of internal combustion, turbines, turbo motors, turbo generators, technological equipment (machine tools etc.), carloads, locomotives, mechanical devices, printing-polygraph machines, automobiles and their assembly units. The commonly arising problems of detection, analysis and damping of noise sources are solved, and other electro-acoustic research tasks are performed. In addition, the laboratory performs research of tribological losses in the sector of energy transformation, transport, and general machine production, defines wear reasons, recommends the solution for durability increase and necessary lubricant additives, and other energy saving methods; measures light levels and selects location of luminaires in work places, performs the balancing of revolving parts in workplaces. Vibrations and errors of precision linear and angular comparators are analyzed using laser-based methods. The laboratory also investigates noise and oscillations and the methods allowing to reduce them; performs vibroacoustic assessment and diagnostics of industrial objects and mechatronical systems; testing of vibrostands; balancing of rotors; investigations of tribological systems (i.e. materials of lubrication, friction, wear, tribological pairs); jobs of design and manufacturing of machines and equipment, scientific expertise's, researches of machine functioning quality.	Prof. Vladas Vekteris Basanavičiaus St. 28, Vilnius, Lithuania vladas.vekteris@vgtu.lt +370 5 274 4734 www.mgk.me.vgtu.lt





<p>10</p>	<p>Vilnius University, Faculty of Physics</p> 	<p>Department of Quantum Electronics, Laser Research Center</p>	<p>Research in quantum electronics was started at Vilnius University in 1969 when few young doctors educated in lasers and nonlinear optics at Moscow Lomonosov University came back to Vilnius University. In 1974 the Department of Astronomy and Quantum Electronics (QED) was founded at the Faculty of Physics; the Laser Research Center (LRC) established in 1983 has significantly expanded the experimental infrastructure available for research. Since its foundation, the department has graduated more than 550 students in laser physics, and more than 50 young researchers have completed their PhD research. Currently, the department employs around 40 permanent staff, among which 10 doctors with habilitation qualification and 20 PhDs. Each year, the department hosts around 20 graduate students and more than 40 students follow MSc programs. At modern labs, covering more than 2 000 square meters, research groups are investigating the phenomena of ultrashort pulse optics, biophotonics, laser nanophotonics, laser-induced breakdown and optics testing, parametric light phenomena, ultrafast spectroscopy and femtosecond technology. QED/LRC has been a member of the European Integrated Laser Infrastructure LaserLab since its inception in 2004, providing transnational access for the researchers from all around the EU. The scientists are involved in joint research activities with the colleagues from the best European scientific centers. New opportunities for the modernization of infrastructure for science and studies were opened by the European Structural Fund projects, such as the creation of the transnational access lasers complex Naglis, the National Center for Physical Science and Technology (laser macro and micromachining, characterization of optical coatings, fiber lasers), and the National integrated program LaMeTech Infrastructure. In addition to the infrastructure development and purchases of cutting-edge equipment, continuous efforts are made to enhance the collaboration with the Lithuanian laser industry and development of high technologies.</p>	<p>Prof. Valdas Sirutkaitis Saulėtekio Al. 9, Bldg. III, Vilnius, Lithuania valdas.sirutkaitis@ff.vu.lt +370 5 236 6000 http://www.ff.vu.lt/lt/</p>
<p>11</p>	<p>Vilnius University, Faculty of Physics</p> 	<p>Semiconductor Physics Department and Institute of Applied Research</p>	<p>The study of optical properties of semiconductors by using lasers was started at the Semiconductor Physics Department back in the late 1960s and has now evolved into extended investigation of semiconductors and semiconductor heterostructures for electronic and optoelectronic applications. Temporally and spatially resolved luminescence spectroscopy and nonlinear optical techniques are employed as tools to study the interaction between light and semiconductor materials. Research results enable the development of novel solid-state light sources – light-emitting diodes and laser diodes emitting in a wide spectral range, currently expanding into UV region. Research is also focused on the application of solid-state light sources for the detection of hazardous agents, in medicine and transport, disinfection, plant cultivation, customized lighting solutions. Most of the major projects currently being implemented in the total amount of over EUR 1 million per year involve laser light sources as tools to study or fabricate semiconductor devices or materials. Annually, three to four PhD theses are completed.</p>	<p>Prof. Gintautas Tamulaitis Saulėtekio Al. 9, Bldg. III, Vilnius, Lithuania gintautas.tamulaitis@ff.vu.lt +370 5 236 6000 http://www.ff.vu.lt/lt/</p>
<p>12</p>	<p>Vytautas Magnus University</p> 	<p>Department of Physics Group of Modeling of Nonlinear Optical Phenomena</p>	<p>The group works on the theoretical modeling of the propagation of short laser pulses in the media with quadratic and cubic nonlinearity and thermal effects on laser active media. Numerical modeling methods for these phenomena are developed and applied in solving research problems. The modeling is performed in collaboration with the researchers from the Nonlinear Optics and Spectroscopy and Applied Research laboratories of the Institute of Physics. The group collaborates with Ekspla and the Center for Ultrafast Optical Science at the University of Michigan (USA).</p>	<p>Ass. Prof. Valdas Girdauskas Vileikos St. 8, Kaunas, Lithuania +370 37 327 910 www.fizika.vdu.lt</p>

List of Latvian Photonics Companies

No.	Name of company	Short description of company	Contact details	No. of empl	Turnover (M€)
1	AGL Technologies 	<p>AGL Technologies offers thin film coatings on different materials of various sizes and shapes for a variety of applications. AGL is your partner from development to production. Engineers with 20 years of experience in R&D and thin film production at your service. Optical coatings, Smart textiles, Photo catalytic coatings, Custom coatings, Surface analysis.</p>	<p>Andris Āzens, CTO AGL Technologies Pulka 3/3, Riga LV-1007, Latvia info@agltechnologies.eu +371 28445967 www.agltechnologies.eu</p>	2	0.09
2	Baltic Scientific Instruments, Ltd 	<p>Radiation detectors, nuclear electronics and radiation measurements. The company Baltic Scientific Instruments (BSI) specializes in the development and serial production of the spectrometric devices based on semiconductor silicon, high-pure germanium and cadmium-zinc-tellurium detectors. Our products are applied in nuclear energetic and ecology, geology and mineral resource industry, medicine and space research activities, customs control, and other spheres. All products are available including detectors, electronics and software.</p>	<p>Vladimir Gostilo, CEO, 26 Ganību Dambis Riga LV-1005 info@ldi.ee, +371 67383947 www.bsi.lv</p>	66	2.6
3	Ceram Optek, SIA 	<p>What makes CeramOptec stand out from other optical fiber manufacturers? It's not just our high quality fibers. Our proprietary manufacturing process. Or that you'll find our products performing in multiple applications across a broad range of industries. The CeramOptec difference is our ability to deliver effective fiber optic solutions to our customers — even if they have never used fibers before.</p> <p>One secret to our success is an experienced management team and client-centric corporate structure. Both allow us to focus on finding the best possible solutions to our client's needs. Quality, cost-efficiency, innovation, and performance: these are the hallmarks of CeramOptec.</p>	<p>Jevgēnijs Smirnovs, CEO Domes 1a, Līvāni, Līvānu n., LV-5316 Latvia sales@ceramoptec.com +371 65343646 www.ceramoptec.com</p>	119	20
4	DARDEDZE HOLOGRAFIJA, SIA 	<p>"DARDEDZE HOLOGRAFIJA" was established in 1995 with the mission of manufacturing holograms, which help to secure documents and goods from attempted fraud. We first developed hologram technology with the help of Solid-state Physics University Optic laboratory. Currently, "DARDEDZE HOLOGRAFIJA" works and develops two major production lines – holographic security solutions and offset printing. Amongst offset printers we are one of the leading printing houses in Latvia</p>	<p>Guntis Vucens, CEO Maza Rencenu str 12, Riga, LV-1073, Latvia dh@dardedze.lv +371 67076700 www.dardedze.lv</p>	130	5.6
5	Difraks Sol. SIA 	<p>Our company is taking leading position in production of the security holograms in the Baltic region and the exporter to the European Union countries and throughout the world. We offer a complete cycle of the holograms production - from design to the stock-produced item, providing the highest quality and satisfying all customers' demands.</p>	<p>Sergejs Gerbreders, CEO Parades 1-132, Daugavpils LV-5401, Latvia difraks@difraks.lv +371 29 48 22 27 www.difraks.lv</p>	9	0.24
6	EuroLCDs SIA 	<p>The business aim of EuroLCDs is to fill the niche in the market that demands products based on bistable LCD technologies and various shutter type LCD products for both emerging 3D visualization applications and different industrial applications.</p>	<p>Ainars Ozols, CEO, VATP-2, Ventspils LV-3602, Latvia lcd@eurolcds.com, +371 63 600 300 www.eurolcds.com</p>	62	1.7
7	Eventech Ltd	<p>„Eventech” Ltd is a spin-off company from Institute of Electronics and Computer Science of Latvia, established in 2011, specializing in development and manufacturing of high-performance and high-precision signal processing electronics. Our scientific team has more than 40-year experience in high-precision event timing system design and development for specific applications, for example, Satellite</p>	<p>Katrina Krivenko, COO Dzerbenes street 14, Riga, LV-1006, Latvia info@eventechsite.com</p>	4	0.23

	<p>Laser Ranging (SLR). Our product is a computer-based instrument that measures the time of the event and intervals between the events. Distinguishing feature of the product is extremely high precision (up to 2-3 picoseconds) combined with high measurement rate (up to 20 MHz) and affordable price comparing to other similar high-tech instruments.</p>	<p>+371 29118068 www.eventechsite.com</p>
<p>8</p> 	<p>Optoelectronic components supplies, lumilights and indicating devices for commercial use, advertising and information displaying systems.</p>	<p>Fush Electronics Brivibas 152, Riga, LV-1012, Latvia sales@fush.lv +371 7364151 www.fush.lv</p> <p>3 0.13</p>
<p>9</p> 	<p>Manufacture of instruments and appliances for measuring, testing and navigation (26.51) GeoStar Ltd. was established in 1997 to provide Latvian surveyors with modern and high-quality geodetic instruments. In addition to geodetic instruments also offer communications locators, moisture meters, GPS sensors and other equipment. GeoStar representing manufacturers whose web page you can find a section - Links GeoStar provides instruments warranty service and post-warranty service. Created service center and equipped with the necessary hardware with trained staff.</p>	<p>Māris Knoks, CEO GeoStar SIA Mārupes 20, Rīga, LV-1002, Latvia Phone:+371 67089191 www.geostar.lv Info@geostar.lv</p> <p>8 0.972</p>
<p>10</p> 	<p>Groglass is one of the world's leading developers and manufacturers of anti-reflective and other high-performance coatings on glass and acrylic for various industries: high-end electronic and static displays, picture framing, museum showcases, architecture and other applications.</p>	<p>Sasha Kelberg, CEO Katlakalna 4b, Rīga, LV-1073, Latvia sales@groglass.com +371 67502910 www.groglass.com</p> <p>111 16</p>
<p>11</p> 	<p>HansaMatrix is a fast-growing, high-technology company offering product design, industrialization and complete manufacturing services in data networking, Internet of Things, industrial segments and other high added value business segments. In addition to complete manufacturing services of OEM products, our company offers an ODM business model to both start-up and established companies that seek product development partnerships. HansaMatrix opened its first manufacturing plant in June, 2001 with only seven employees. The Ventspils manufacturing plant was opened in December, 2007. Since then our company has grown substantially into one of the leading Baltic – Nordic manufacturers. We now have several product development teams and run two manufacturing plants employing over 350 people in engineering, managerial and production jobs including subcontractors. Both manufacturing plants have been developed as substitute manufacturing facilities employing the latest identical production technologies. Back in 2005, HansaMatrix was the first contract manufacturer in the EU that deployed the FUJI NXT manufacturing platform, which later was accepted as the standard for high-complexity manufacturing. Similarly, our competence can be applied to our 2015 investment in the newest FUJI sFAB odd shape component assembling robot. Our company product development and manufacturing operation has been certified as per ISO9001; its medical products - as per ISO 13485; its mining and oil industry products – as per ATEX; and payment terminal products meet the MasterCard quality requirements.</p>	<p>Ilmars Osmanis, CEO HansaMatrix Customer Relations Lielirbes iela 17a-10, Riga, LV-1046, Latvia Phone: +371 6780 0003 Fax: +371 6504 9087 E-mail: sales@hansamatrix.com</p> <p>350 13,466</p>
<p>12</p> 	<p>Inventors of advanced optical system, with very focussed optical beam that can be used for different special purposes in space and military ie. different kinds of surveillance systems equipment, laser beam radar monitoring systems, satellite laser ranging system, free space optical long range and high speed data communication. Company is also a provider of training simulators ie. computer controlled shooting training systems, a tactical field simulator, designed for fully interoperable and flexible collective training in natural environments: 1. using the rocket launchers CG and AT-4 in the training field for the squad of 4 army men, 2. using modern weapon HK G36 assault rifles,</p>	<p>Andris Treijs, CEO Nomales iela 6-25, Riga LV-1002, Latvia andris.treijs@heephotonic.eu +371 67613098 http://www.heephotonic.eu/</p> <p>2 0.03</p>






		multimedia shooting range equipment for combat training, using electronic target which is set into the screen and determines the hit of bullet marks after each shot.			
13	 <p>ISP Optics Latvia Ltd</p>	<p>ISP Optics Corporation is a vertically integrated manufacturer offering a full range of the infrared products from high performance MWIR and LWIR Lens Assemblies to catalog and custom infrared optical elements. Our infrared IR Lens Assembly product line includes continuous zoom, dual FOV and fixed focal length lenses for cooled and un-cooled cameras including designs targeted for light weight and compact models. ISP Optics manufactures in-house precision optical components including spherical, aspherical and diffractive coated IR lenses. In addition to our built-to-print optical elements product line, we also offer custom opto-mechanical assemblies, coatings and diamond turning services along with IR catalog optics. We manufacture optics from various infrared crystals such as: Ge, Si, ZnS, ZnSe, CaF2, GaAs, BaF2, Amtir, GASIR, IG5 and others.</p> <p>Our manufacturing processes utilize CNC Grinding, Diamond Turning, Continuous and Conventional Polishing, Optical Contacting, advanced coating and design technologies to deliver consistent top quality solutions that serve the growing industry demands with an unwavering commitment to our world-wide customers.</p>	<p>Ēriks Bēdiķis, CEO 24A Ganību Dambis Street Rīga, Latvia LV-1005 sales@isptoptics.eu +371 67323779 www.isptoptics.eu</p>	65	6.8
14	 <p>Kepp EU</p>	<p>Silicon metallurgy – equipment creation, manufacturing of innovative materials. We actively and successfully develop silicon technologies since the late 1970s. Our research in technologies of float zone (FZ) melting (high-frequency heating 2MHz) and growth of silicon from melt by the Czochralski method yielded in more than 20 certificates of authorship (analog of patent), and in a similar number of articles and reports.</p>	<p>Anatolijs Kravcovs. CEO Carnikavas street 5, Rīga Latvia info@keppeu.lv +371 67394989 www.keppeu.lv</p>	13	0.46
15	 <p>Light Guide Optics International Ltd</p>	<p>Established in 2004, Z-Light is the leading European manufacturer and supplier of fibres, fibre bundles, cables and laser delivery systems used for sophisticated scientific, industrial and medical applications. We offer a full range of silica multimode optical fibres with excellent transmission in the UV-vis-IR region. Also, we provide full service starting from new product design to finished products and integrated optics solution.</p> <p>Our factory is equipped with the most state-of-the-art technologies and all manufacturing processes are in strict compliance with the EU quality and safety standards.</p> <p>At Z-Light we use innovation to create products and services which meet or even exceed our customers' expectations. Our team is always ready to implement solutions tailored for each customer no matter how sophisticated they are!</p>	<p>Daumants Pfafrods, CEO Līvānu nov., Līvāni, Cēlniecības iela 8, LV-5316, Latvia info@z-light.lv +371 65307175 www.z-light.lv</p>	102	9.6
16	 <p>Optek Ltd</p>	<p>Optek has developed and manufactures various equipment for photonics research – tunable diode lasers, avalanche photodiodes, PID lockboxes for laser stabilization, optimized Fabry-Perrot cavities, etc. Most recent developments are laser stabilization system allowing to obtain the laser linewidth of 1 Hz and Cavity Ring-Down Spectroscopy (CRDS) system operating at 266 nm wavelength for detection of acetone in human breath (ppm levels).</p> <p>Some insight into scientific novelty of the work of OPTEK on Fabry-Perrot cavities can be found in recent SCI papers: DOI: 10.1515/lpts-2015-0014 DOI: 10.1515/lpts-2015-0015</p> <p>Currently we are developing cost effective thin film thickness measurement software, which is based on data, obtained by low cost spectrometers.</p> <p>Optek represents and sells the following photonics manufacturer's products: Comsol - simulation software of real world multiphysics systems, Cobolt - high quality diode lasers, Rofin - CO2 lasers, Ophir - laser power/energy meters and laser beam profilers, Thorlabs, Hamamatsu, Gaussian software, etc.</p>	<p>Kaspars Blušs, CEO Lizuma 1-310, Rīga, LV-1006, Latvia info@optek.lv +371 2978 1582 www.optek.lv</p>	2	0.32
17	 <p>Optron Ltd</p>	<p>OPTRON Ltd. was founded in 1992, as a multi-profile telecommunication company. Now the company is the largest private telecommunication company in Latvia, possessing the biggest in Rīga technologically unique specialized underground cable duct with more than 300 kilometers of the fiber-optical cables laid out and a high-speed duplicated telecommunication platform for data transmission. On the basis of these resources OPTRON provides full range of services of data transmission, access to Internet, a telephony, leased lines, virtual private networks (VPN), Wi-Fi access and offers specialized project solutions to meet the specific customer requirements. All the services are provided in strict compliance with SLA, securing quality, reliability and in-time reaction on customer's requests.</p>	<p>Ruslan Uzhgalov, sales representative A. Deglava str. 73, LV-1082 Rīga, Latvia info@optron.lv +371 67159440 www.optron.lv</p>	19	1.9

		<p>The company has own production division, manufacturing optical connecting cords (patchcords, pigtailed), based on factory technology of seal of fiber. Process of manufacturing comes to the end with complete control of optical parameters and issue of the passport on each product.</p> <p>The company also renders services in sale of a wide range of materials, network elements, tools, accessories, technological devices, and also the wide range of the equipment from world leading manufacturers for testing and measurement telecommunication network's parameters.</p>		
18	<p>Sensotech</p> 	<p>The company's activity sector is in manufacturing of computer, electronic and optical products and communication equipment. Sensotech provides services and consulting business plans for the development of EU projects in completing the forms, external market research and customer attraction etc.</p>	<p>Austris Galindoms, CEO Pļavu iela 17, Liepāja, LV- 3411, Latvia info@b-phone.eu +371 26032981 sensotech.lv</p>	2 0.13
19	<p>Sidrabe AS</p> 	<p>SIDRABE has been designing and manufacturing vacuum coating systems and developing unique thin film technologies for more than 50 years.</p> <p>We offer:</p> <ul style="list-style-type: none"> •Development and implementation of thin film technologies •Customized vacuum coating systems •Optimized and cost effective product solutions •Contract R&D •Contract design engineering. <p>A variety of processes have been implemented successfully in SIDRABE equipment for many applications:</p> <ul style="list-style-type: none"> •Coating of polymer films and metal foils •Coating of metal strips •Coating of large-size flat glass •Coating of large-size astronomical mirrors •Coating of artificial diamond and various powders •Protective and decorative coating of 3D articles •Substrate pre-treatment using ion sources •Vacuum lamination •Vacuum drying of webs 	<p>Matiss Misels-Piesins, Business development 17 Krustpils Str. Rīga, Latvia LV-1073 sidrabe@sidrabe.eu +371 67249806 www.sidrabe.com/</p>	79 4.75
20	<p>StarSpace</p> 	<p>StarSpace is a private observatory open to the public</p>	<p>SIA StarSpace Ogres nov., Suntažu pag., Kaltiņi, LV-5060, Latvia info@starspace.lv www.starspace.lv</p>	2 0.056
21	<p>Vizulo SIA</p> 	<p>Various LED solutions in lighting: developing client orientated products; delivering light planning calculations; assembling LED lighting products; organizing wholesales and end sales to large scale municipal and commercial clients; taking care of electrical installation – as general contractor (in special cases); monitoring electrical consumption and CO2 reduction for our major projects; taking care of warranty period; selling components after warranty period.</p> <p>Electronics manufacturing services: design and development; assembly – box build; SMT line; gasketing and coating; wire cutting; crimping; tampo printing.</p>	<p>Janis Zeltiņš, CEO Ganību dambis 7a Rīga, LV-1045 office@vizulo.com +371 67383024 www.vizulo.com</p>	20 2.8

List of Latvian Academic Photonics Laboratories, Organizations and Research Centers

No.	Name of institute	Name of laboratory	Description of laboratory	Short description with key information regarding the activity of the team in photonics field	Contact details
1	University of Latvia, Faculty of Physics and Mathematics 	Laser Centre	The Laser Centre was established as an open facility, with an idea to provide access to interested external researchers willing to use its infrastructures. It has become de facto the leading and largest laser laboratory in Latvia, with its researchers actively working in the areas of atomic, molecular, and chemical physics, astrophysics, as well as various kinds of applications of laser techniques. The scope of this research is reflected in regular publications in international scientific journals (like Phys. Rev. Lett., Phys. Rev. A, J. Chem. Phys., J. Phys. B etc.).	Research in the Laser Centre is structured topically in its four laboratories: <ul style="list-style-type: none"> – Atomic and Molecular Physics Laboratory (Prof. M. Auzinsh) – Molecule Optical Polarization Laboratory (Prof. R. Ferber) – Laser-manipulation laboratory (Dr. A. Ekers) – Laboratory of Astrospectroscopy (Dr. L. Zacs) 	Prof. Ruvins Ferbers Laser Centre University of Latvia Zellu Str. 8 LV-1002 Riga Latvia E-mail: ferber@latnet.lv Webpage: www.lasercentre.lv
2	Daugavpils University G.Liberts' Innovative Microscopy Centre 		G.Liberts' Innovative Microscopy Centre, Daugavpils University was founded in 2004 by uniting scientific laboratories of the Department of Physics. The centre is doing scientific research in different areas (functional nanostructured materials, holography, biophysics, etc.); it also cooperates with biologists and doctors. Here students produce their term papers, dissertations and other kinds of scientific work.		Prof. Edmunds Tamanis Daugavpils university, Vienības iela 13, Daugavpils, LV5401 edmunds.tamanis@du.lv Phone: +371-25921174 http://du.lv/en/research/institute-s-and-centres/g-liberts-innovative-microscopy-centre/
3	FOTONIKA National Photonics and Space Technology Centre 		The National Photonics and Space Technology Centre of the University of Latvia is an emerging national research center whose formal designation is in process. The core of the Center is the FOTONIKA-LV association of University of Latvia research institutes comprised of the Institute of Atomic Physics and Spectroscopy, the Institute of Astronomy and the Institute of Geodesy and Geoinformatics. FOTONIKA-LV was founded April 2010 to build economies of scale to take on large-scale projects. In 2011 FOTONIKA-LV won its first larger project the FOTONIKA-LV FP7-REGPOT-2011-1 project 285912 with total budget €4,198,520.00. The project was successfully completed in 2015 and received an excellent review. The FOTONIKA-LV project included significant outreach to industry in Latvia, particularly to the emerging cluster of photonics and space technology firms in Latvia whose turnover in 2015 exceeded €105 million. Steps are underway to have the National Photonics and Space Technology Center formally recognized as a research organization with the structure of the University of Latvia comprised of the initial institutes of the FOTONIKA-LV association plus other research groups and strong links with other centers at other institutions in Latvia. At present, space technology and space related research is fragmented among several research organizations including the institutes that comprise FOTONIKA-LV (Institute of Astronomy of the University of Latvia, The Institute of Atomic Physics and Spectroscopy, and the Institute of Geodesy and Geoinformatics) as well as the Ventspils International Radio Astronomy Centre (VIRAC) and researchers in research centers associated with the Riga Technical University, Riga Stradins University, the Physics Institute, the Institute of Wood Chemistry and other research organizations. The formal establishment of the National Photonics and Space Technology Center will establish a lead space science and space technology research center in Latvia that coordinates work at a national level.		Arnolds Ūbelis, Scientific Secretary, FOTONIKA-LV National Photonics and Space Technology Centre University of Latvia Šķūņu iela 4 Rīga, LV-1050 Latvia www.fotonika-lv.eu info@fotonika-lv.eu
4	Riga Photonics Centre 		Riga Photonics Centre is an association of research organizations, educational institutions, government functions and individuals involved with photonics in Latvia and more broadly the Baltic Sea Region. Photonics can be defined as the study and practice of controlling photons to meet human needs. Photons are quanta of light. As such photonics is involved in all devices that use light across the full spectrum including optical devices, lasers, fiber optics, spectroscopy, telescopes, microscopes and numerous other technologies and devices. Photonics is involved in research as well as in manufacturing as well as in everyday devices such as mobile telephones. Photonics frames fields such as quantum sciences, space sciences and related technologies and is an important component of research conducted in Latvia, Lithuania and Estonia comprising approximately 45% of research output in peer reviewed journals from the three Baltic Sea states. The Centre organizes workshops, outreach programs, seminars and conferences to promote photonics in Latvia.		Rīgas Fotonikas Centrs / Riga Photonics Centre Šķūņu iela 4, Riga LV-1050, Latvia www.rigaphotonicscentre.org info@rigaphotonicscentre.org
5	Riga Technical university Faculty of Electronics and Telecommunications 	Laboratory of	The main research directions of the IT are connected with the interaction between charge carriers and electromagnetic field, materials, elements, schemes, equipment's and devices, whose	Research priorities of the laboratory of high-speed fiber optic transmission systems: -The development of high reliability subsystems	Prof. Girts Ivanovs Azenes iela 12, Riga, LV- 1048, Latvia

	<p>Institute of Telecommunications</p>  <p>RĪGAS TEHNISKĀ UNIVERSITĀTE</p>	<p>high-speed fiber optic transmission systems</p>	<p>operation is based on this interaction and which are intended for electromagnetic energy, electric and other signal conversion, information accumulation, processing and transmission in following directions:</p> <ul style="list-style-type: none"> •Realization of the newest generation of fiber optical and microwaves transmission systems and the components; •Research and development of cyber physical system's technologies using the innovative high-speed optical transmission system and microwave technologies; •Mathematical modelling of telecommunication networks and systems, optimization of their resources and operation; the investigation of applications of artificial intelligence to network control and management. 	<p>and component's for optical signal processing, optical filtering, modulation format conversion for high-speed (R>10 Gbit/s) wavelength division multiplexing (WDM) systems;</p> <ul style="list-style-type: none"> -The development of methodology for nonlinear optical effects assessment and their application's in WDM communication systems; -Spectral and energy efficiency on WDM networks optical layer; -The implementation of new FTTH (Fiber to the Home) in the next generation PON's (Passive Optical Networks) and AON's (Active Optical Networks).. 	<p>girts.ivanovs@rtu.lv +371 67089204 http://www.ti.rtu.lv</p>
6	<p>Riga Technical University Faculty of Material Science and Applied Chemistry, Institute of Technical Physics</p>  <p>RĪGAS TEHNISKĀ UNIVERSITĀTE</p>	<p>Laboratory of Material Optics</p>	<p>The laboratory develops new organic materials for holographic information recording and nonlinear optics in collaboration with chemists of Faculty of Material Science and Applied Chemistry.</p>	<p>The laboratory has theoretical background and experimental capabilities to apply and develop holographic grating spectroscopy methods to study photoinduced processes in materials and to determine their characteristics.</p>	<p>Prof. Andris Ozols Paula Valdena iela 7, LV-1007, Riga, Latvia. Andris.Ozols@rtu.lv +37129449921 www.rtu.lv www.lza.lv</p>
7	<p>University of Latvia, Institute of Atomic Physics and Spectroscopy</p> 	<p>Biophotonics Laboratory</p>	<p>Biophotonics Laboratory develops new methods and technologies for optical diagnostics and monitoring, focusing on non-invasive and non-contact in-vivo skin assessment. The new technologies are implemented in self-made prototype devices which are tested in laboratory and clinical environment. Several devices have found routine clinical applications.</p>	<p>Three main research directions currently are:</p> <ul style="list-style-type: none"> - fluorescence technologies for oncology - multi-spectral imaging for dermatology - PPGI - video-imaging for anesthesiology 	<p>Prof. Janis Spigulis Skunu 4 LV-1050, Riga, Latvia janis.spigulis@lu.lv +371 67228249 http://www.asi.lv/New/fog-page.htm</p>
8	<p>University of Latvia, Institute of Atomic Physics and Spectroscopy</p> 		<ol style="list-style-type: none"> 1. Interaction of atoms with strong laser fields (theory). 2. High-resolution spectroscopy of plasma and light sources. Spectroscopic control of pollution with heavy metals. 3. Bio-photonics: application in medical diagnostics and monitoring. 4. UV and VUV spectroscopy in atomic physics and photochemistry of atmosphere 		<p>Inga Širante, Deputy Director 4 Šķūņu iela, Rīga, LV-1050 www.asi.lv asi@lu.lv +371-67225493</p>
9	<p>University of Latvia, Institute of Atomic Physics and Spectroscopy</p> 	<p>High-resolution spectroscopy and light source technology laboratory</p>	<p>Research fields: Low-temperature plasma investigations, high-resolution spectroscopy, light source technology, plasma/surface interaction, inductively coupled discharge, capacitatively coupled discharge, plasma nanotechnology</p>	<p>Applications: heavy metal and benzene pollution control, surface plasma processing, radio-frequency electrodeless spectral lamp production, etc.</p>	<p>Dr. Atis Skudra Skunu 4 LV-1050, Riga, Latvia askudra@latnet.lv +371 67225907 http://www.atomic-physics.lv/group.htm</p>
10	<p>University of Latvia, Institute of Atomic Physics and Spectroscopy</p>	<p>Laboratory of atomic and atmospheric physics and photochemistry</p>	<p>Experimental studies in atomic and ion physics, photochemistry, sources of UV - VUV atomic spectra, atmospheric pollution and photochemistry, technologies for sustainable development: high temperature flash photolysis of sulphur, selenium, tellurium vapour, vapours of tin and lead salts,</p> <ul style="list-style-type: none"> • recombination and photorecombination of sulphur, 	<p>Measurements of atomic spectra and constants, pollution and photochemical processes in atmosphere, methods of spectroscopy and flash photolysis</p>	<p>Dr. Arnolds Ubelis Skunu 4 LV-1050, Riga, Latvia arnolds@latnet.lv +371 29498659 http://www.asi.lv/New/atmphys</p>

		<p>selenium and tellurium atoms in the ground and metastable states</p> <ul style="list-style-type: none"> • secondary photolysis and photochemical processes in the vapours of tin and lead salts • lifetime and branching ratio studies of energy states of sulphur, selenium, tellurium, arsenic and phosphorus atoms by UV, VUV and laser spectroscopy; • studies of various negative ions • processes of photochemistry in polluted atmosphere • interdisciplinary studies of environmental problems 	<p>htm</p>
11	<p>University of Latvia, Institute of Atomic Physics and Spectroscopy</p>  <p>Quantum Optics Laboratory</p>	<p>Research focused on optical frequency metrology with a femtosecond optical frequency comb, improvement of optical and radio frequency standards, development of ultra-stable optical resonators for laser stabilization</p>	<p>Applications in satellite laser ranging, metrology, environmental control, clinical diagnostics, etc.</p> <p>Dr. Janis Alnis Skunu 4 LV-1050, Riga, Latvia janis.alnis@lu.lv +371 67228249 http://www.asi.lv/New/Quantum%20Optics%20Lab%20Riga.pdf</p>
12	<p>University of Latvia, Institute of Astronomy</p> 	<p>The Institute of Astronomy performs research on stars and interstellar medium, microwave sources at Sun and asteroids in the Solar System. It updates and maintains General Catalogue of Galactic Carbon Stars. The Institute runs a satellite laser ranging system (SLR, which has been in substantial part designed on the site) and a permanent GPS station. SLR and GPS stations, working with high accuracy, are involved in international service, define the origin of the Latvian national geodetic coordinate system and tie it to international reference frames. The Institute provides design of small optical systems, and software support and construction of laser ranging equipment for its own use, and also for international collaborators.</p> <p>The Institute shows a good level of scientific research, especially in the field of navigation which is an area important both for Latvia and the international community. It should increase its internal visibility by stronger use of its potential (good infrastructure and skilled scientists) for extending research portfolio to more up-to-date research topics. Current international exchange and activity in attracting national funds are not satisfactory. The REGPOT 'FOTONIKA-LV' project and Latvia's accession to the European Space Agency create perspectives for further development of the Institute.</p>	<p>Prof. Ilgmārs Eglītis, director Rīga, Raiņa bulv. 19 +371-67034580 astra@latnet.lv http://www.lu.lv/par/strukt/instituti/lu-astronomijas-instituts/</p>
13	<p>University of Latvia, Institute of Geodesy and Geoinformatics</p> 	<p>The Institute of Geodesy and Geoinformatics of the University of Latvia (LU GGI) represents continuation of the Institute of Geodesy (1924-1944). It was established in 1994 on basis of part of former Astronomical Observatory of the University of Latvia and has inherited from it several directions of research. Presently GGI is performing research in 3 main directions:</p> <ol style="list-style-type: none"> 1. astrometric instrument design for satellite laser ranging (SLR), optical tracking of Near-Earth objects (NEO) and vertical deflection measurements. GGI has accomplished 2 ERAF projects in this area and currently is involved in a ESF project, the goal of which is design of a new universal optical tracking instrument for simultaneous SLR and positional observations of NEO. 2. Construction and application of satellite laser ranging systems for geodynamic research. 2. Global Navigation Satellite Systems; Design of digital zenith telescope for studies of gravity field structure. Geodetic reference networks. Geodynamics for studies of environmental changes. 3. Geoinformatics. GIS data bases. Spatial analyse of urban environment. Digital 3D models (terrain, building and land cover) 	<p>19 Raina blv., Riga, LV-1586, Latvia ggi@lu.lv http://www.lu.lv/eng/general/administrative/institutes/scientific/geodesy/ +371 67034436</p>
14	<p>University of Latvia, Institute of Solid State Physics</p>  <p>Laboratory of Amorphous Materials Spectroscopy</p>	<p>Fundamental and applied research of wide-bandgap amorphous and crystalline materials, mainly based on pure or doped SiO₂, suitable for optical elements and optical fiber waveguides for high-power lasers, for harsh radiation environments and for sensing/analytic applications in near infrared to deep UV spectral regions. The main goal is to identify and understand the factors,</p>	<p>Vacuum UV, UV, visible, infrared, Raman and magnetic resonance spectroscopy of wide-bandgap materials. High-power excimer laser-induced phenomena in UV-transparent glasses and optical waveguides. Luminescence of SiO₂/GeO₂-based and other</p> <p>Dr. Linards Skuja, Kengaraga 8, LV-1063, Riga, Latvia skuja@latnet.lv +371 6726 0756 http://www.cfi.lu.lv/eng</p>

			which are detrimental to these applications and to find ways to remove them. The fundamental knowledge developed in the laboratory has significantly contributed to the understanding of the main optically active radiation defects in SiO ₂ materials.	wide-bandgap materials. Ionizing- and particle-irradiation effects on transmission of optical fiber waveguides and related optical materials. Characterization of fiber-optical waveguides in VIS - UV- deep-UV spectral regions.	
15	 <p>University of Latvia, Institute of Solid State Physics</p> <p>INSTITUTE OF SOLID STATE PHY UNIVERSITY OF LATVIA</p>	Laboratory of Nanomaterials and Optoelectronics	Research activity of the lab is focused mainly on synthesis of novel 0D and 1D nanomaterials (nanocrystals, nanorods, nanowires) with emphasis on hybrid nanostructures. These materials can be used for photoelectric and photonic applications (solar cells, photodetectors).	Synthesis of metal nanowires (Au, Ag, Pd, Cu), oxide (ZnO, CuO, SnO ₂ , etc) and sulfide (PbS, CdS, ZnS, etc) nanowires and nanocrystals, hybrid and core-shell (Ag-SiO ₂ , ZnO-WS ₂ , etc) nanowires. Metal nanowires for surface plasmon enhanced luminescence. Semiconducting nanowires for photodetectors. Nanocrystal based solar cells.	Dr. Boris Polyakov, Kengaraga 8, LV-1063, Riga, Latvia boris.polyakov@cfi.lu.lv +371 26718631 http://www.cfi.lu.lv/eng
16	 <p>University of Latvia, Institute of Solid State Physics</p> <p>INSTITUTE OF SOLID STATE PHY UNIVERSITY OF LATVIA</p>	Laboratory of Optical Spectroscopy	The research activities of the laboratory are related to synthesis and spectroscopic investigation of rare-earth doped inorganic materials: nanocrystals, fluorides, oxyfluoride glasses and glass ceramics. Applications of the materials in the fields of sensors and photonics are assessed.	Synthesis of rare-earth doped fluoride nanocrystals Synthesis of rare-earth doped oxyfluoride glasses, glass ceramics Investigation of up- and downconversion luminescence in various materials	Dr. Anatolijs Sarakovskis, Kengaraga 8, LV-1063, Riga, Latvia anatolijs.sarakovskis@cfi.lu.lv +371 264 09394 http://www.cfi.lu.lv/eng
17	 <p>University of Latvia, Institute of Solid State Physics</p> <p>INSTITUTE OF SOLID STATE PHY UNIVERSITY OF LATVIA</p>	Laboratory of Organic Materials	Fundamental and applied research of organic molecules, materials and their structures are conducted by the Laboratory. The main goal is to develop organic materials for next generation electronics and photonics. Assessment and demonstration of the possible applications of novel developed materials is an important task of the laboratory. Trained human resources, generated knowledge and technology within the Laboratory are the key elements for development of organic electronics and photonics in Latvia.	Quantum chemical investigation of structure and properties of chromophores; Design of thin films; Energy structure of thin films; Electrical and photoelectrical properties; Nonlinear optical phenomena; Stimulated emission; Electroluminescence in thin films; Optically induced switching; Thermoelectric properties of thin films.	Dr. Martins Rutkis, Kengaraga 8, LV-1063, Riga, Latvia martins.rutkis@cfi.lu.lv +371 292 34521 http://www.cfi.lu.lv/eng
18	 <p>University of Latvia, Institute of Solid State Physics</p> <p>INSTITUTE OF SOLID STATE PHY UNIVERSITY OF LATVIA</p>	Laboratory of Solid State Radiation Physics	The research is focused on electronic as well as ionic processes in inorganic materials, including macroscopic single crystals, nanocrystals and coatings. The study of oxides, simple and complex, are of main interest contemporaneity. Therefore the basic and applied studies are conducted in laboratory	The methods used are UV, visible and infrared spectroscopy, time-resolved spectroscopy, including transient absorption study, thermo stimulated processes (including fractional glow techniques). The synthesis of coatings by plasma electrolytic oxidation (PEO) is possible. The coatings with nanometer pores will be produced and the pores of these coatings subsequently can be filled with luminescent compound. The radiation interaction with materials under study changes the electronic processes and therefore the optical properties changes also. These changes were detected for a number of materials including up-conversion materials.	Dr. Larisa Grigorjeva Kengaraga 8, LV-1063, Riga, Latvia lgrig@latnet.lv +371 26545803 http://www.cfi.lu.lv/eng
19	 <p>University of Latvia, Institute of Solid State Physics</p> <p>INSTITUTE OF SOLID STATE PHY UNIVERSITY OF LATVIA</p>	Laboratory of Wide Band Gap Materials	Fundamental spectroscopic investigation and applied research of wide-bandgap nanosize and bulk materials - metal nitrides and oxides such as AlN, Al ₂ O ₃ , hBN and others in order to broaden knowledge about the light induced processes characteristic for these materials as well as to evaluate application of these materials for creation of new light emitters working within the UV and visible spectral region, including white light emitters, for optical oxygen gas sensors and dosimetry of UV light and ionizing radiation.	Spectral characterization of wide-bandgap materials based on measurements of photoluminescence spectra within a wide spectral region from 230 nm up to 1500 nm; luminescence excitation spectra (190 nm-400 nm) and absorption spectra (190 nm – 1100 nm). All spectra can be measured at any fixed temperature in the 10-300 K interval. Investigation of luminescence polarization.	Dr. Baiba Berzina Kengaraga 8, LV-1063, Riga, Latvia baiber@latnet.lv +371 2615 7869 http://www.cfi.lu.lv/eng

Investigation of optically stimulated luminescence.
Material characterization using methods of microscopy: SEM, TE M.
Luminescence characterization of material in different environments such as vacuum and different gasses (oxygen, nitrogen, syntethic air etc.).

The Engineering Research Institute “Ventspils International Radio Astronomy Centre” (VIRAC) is a scientific institution in Ventspils University College. It operates a radiotelescope complex, along with other infrastructure items. VIRAC conducts fundamental and applied research in the fields of astronomy and signal processing. VIRAC was recognized as one of 15 Latvian scientific institutions of international level in the international Research Assessment of science Latvia (2013).

RT-32 and RT-16 are Cassegrain system radiotelescopes with 32 and 16 meter main mirrors, respectively. These were obtained from the Soviet Army, and were restored to operating condition since 1994. In 2012, RT-32 was finally confirmed to match the standards necessary for scientific observations in the European Very Long Baseline Interferometry (e-VLBI EVN) network. The network itself is transforming to ERIC excellence status with high performance multi-antena data processing centre.

RT-32 is equipped with receivers in 327 MHz and 1.6; 5 and 12 GHz frequency bands as digital data registration systems suitable for single dish and VLBI observations of near-Earth, Solar system, and far space objects. There is a dedicated receiver for Solar observations in the 3.2 – 4.8 cm wave range with 16-channel spectropolarimeter. Both telescopes will undergo a major overhaul in 2014-2015. The process of installing new broad band cryogenic receiver in 4.5 – 8.8 GHz band is to be finished during September, 2014 and full renovation and modernization of both telescopes tracking and pointing systems is to be finished on August 2015. After this, the RT-32 together with Torun (Poland) and Svetloe (Russia) will be one of three advanced radio telescopes of such a diameter in Baltic region. VIRAC also operates an IBM cluster for high-performance computations, and a prototyping laboratory.

VIRAC has a close collaboration with European VLBI Network and together with members of this network takes part in ES funded projects, such as RADIONET4

VIRAC has four departments with more than 40 scientific personnel, supported by technical staff for maintenance of radio telescopes.

Dr. Valdis Avotiņš, director
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Ventspils International
Radio Astronomy Centre

