

Self-Assessment Report

Institute of Atomic Physics and Spectroscopy, University of Latvia (IAPS, UL)

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GENERAL INFORMATION

Institution	Institute of Atomic Physics and Spectroscopy, UL
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Phone	+371-67225493
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Head of the Institution/Unit	Jānis Spīgulis
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G.1. Institution's/Unit's research profile

(give estimate of the percentage)

Research fields	(%)
Physics	100

G.2. Other relevant fields connected to the Institution's/Unit's research profile

(Mark with x the columns 1, 2 or 3, where 1=collaboration, 2=joint projects, 3=integrated in the group. More than one column can be marked in the same row.)

Research fields	1	2	3
Biology	X		X
Chemistry			X
Medicine	X		
Environmental Science	X		
Engineering Science	X		X

1. RESOURCES

1.1. Staff in 2006-2011 (person-months or FTE)

See instructions at the end of the report.

	2006	2007	2008	2009	2010	2011
Academic personnel						
Professors						
Associated Professors						
Docents						
Lecturers						
Assistants						
Doctoral students, from above						
Academic research personnel	15.12	28.17	19,23	16,81	26,68	22,56
Leading researchers	7.55	11.23	8.31	7.90	9.80	7.90
Researchers	4.20	7.33	6.43	5.32	8.25	5.29
Research Assistants	3.37	9.61	4.49	3.59	8.63	9.37
Doctoral students from above	4.42	5,50	6.65	5.18	6.39	5.31
Other academic personnel						
Visiting Professors						
Visiting researchers and visiting research students <i>from above</i>				0	1.17	1.29
Total active academic and research personnel	15.12	28.17	19.23	16.81	26.68	22.56
Administrative personnel ¹⁾	2.00	4.36	3.33	2.96	3.21	2.58
Technical personnel ²⁾	5.80	9.12	8.78	6.28	10.30	7.10
Other (e.g., cleaners, security guard) ³⁾						
Total staff at the institution/unit	22.92	41.65	31.34	26.05	40.19	32.24

¹⁾ Includes all administrative personnel

²⁾ Includes all technical personnel

³⁾ Includes all personnel not included in the other categories in the table.

1.2. Academic and postdoctoral researchers (personnel with doctoral degree)

In case person's duties have changed during the period under review (e.g. from technical personnel to active academic or research staff), indicate the person's both tasks and period according to the format.

Name, Surname	Position	Period of time
Jānis Āboliņš	Leading researcher	12/2005—(12/2011)—12/2017*
Imants Bērsons	Leading researcher Leading researcher	12/2005—(12/2011) —4/2010 4/2010—(4/2016)
Erna Gailīte	Leading researcher, Head of Laboratory Leading researcher	12/2005—(12/2011)—4/2010 4/2010—(4/2016)
Agris Gailītis	Leading researcher	12/2005—12/2008
Uldis Gross	Leading researcher	12/2005—(12/2011)
Jānis Kļaviņš	Leading researcher	12/2005—(12/2011)
Gīta Rēvalde	Leading researcher	12/2005—(12/2011)
Atis Skudra	Leading researcher, Head of Laboratory Leading researcher	12/2005—(12/2011)—4/2010 4/2010—(4/2016)
Jānis Spīgulis	Leading researcher Director of the Institute, Head of Laboratory	4/2010—(4/2016) 3/2007—
Arnolds Ūbelis	Leading researcher, Head of Laboratory Leading researcher	12/2005—(12/2011)—4/2010 4/2010—(4/2016)
Renārs Erts	Researcher Leading researcher	1/2006—6/2008 6/2008—(6/2014)—8/2011
Rīta Veilande	Researcher Leading researcher	1/2006—6/2008 6/2008—(6/2014)
Ilona Kuzmina	Researcher	12/2005—(12/2011) —
Uldis Rubīns	Researcher Researcher (Dr.)	1/2007—4/2010 4/2010—(4/2016)
Zanda Gavare	Research assistant Researcher	1/2006—6/2008 6/2008—(6/2014)
Aleksejs Ļihačovs	Research assistant Researcher	1/2006—6/2008 6/2008—(6/2014)
Saulius Bagdonas	Leading researcher	12/2009—(3/2012)
Indulis Kukulis	Leading researcher Leading researcher	2006—2008 12/2009—(3/2012)
Ričards Rotomskis	Leading researcher	12/2009—(3/2012)
Rīta Poikāne	Researcher (Dr.)	12/2009—(11/2013)
Maija Rumaka	Research assistant (Dr.)	9/2009—(3/2012)
Kristīne Rozniece	Researcher (Dr.)	12/2009—(3/2012)

* Terms of election and contracts being given in brackets.

2. RESEARCH OUTPUT

2.1. Describe the Institution's/Unit's research

(max. 4 pages)

This question surveys how the research carried out in the Institution/Unit has impacted research in its own field(s). What are main fields and foci of research at the Institution/Unit? Has the Unit defined its strategic, long-term research plans – and if so, how does the Institution/Unit seek to realize those plans? How does the Institution/Unit develop and maintain structures and practices that foster good research and help early-career researchers to make their way into the profession? Is there a shared plan for publishing the research results, for employing research personnel and guiding the research of the Unit? Describe the orientation of scientific publishing, most important research results and the role of multidisciplinary or interdisciplinarity etc. Also, describe the role of basic and applied research. In case the research carried out in the Unit is clearly specialised, describe each field separately (see also question 6.3).

Fundamental and applied research in physics performed within joined projects in cooperation with experts of chemistry, biology, medicine, and environmental science (see V1, V2) during 2006-2011 have made **photonics** – a rapidly advancing *interdisciplinary* field of research and technology, to become the research priority of the IAPS UL. Photonics devices produce, amplify, transfer, detect and control the optical/laser (including visible) radiation to solve particular problems of science, technology, medicine, and everyday services the photons being carriers of information and energy (similar to electrons in electronic devices). Photonics in the EU is recognised as one of the 6 priorities of research and technology up to 2020.

The main 2006-2011 research topics of the Institution include

1. PLASMA research and diagnostics for applications such as light source technology, environment pollution control, surface treatment
2. BIOPHOTONICS methods and systems for medical diagnostics, monitoring, and imaging.
3. SUSTAINABILITY. Physics and photochemistry of the polluted atmosphere. Environmental engineering.
4. THEORETICAL PHYSICS. Theory of interaction of atoms with strong laser fields

The researchers engaged

- PLASMA
Leading researcher **A. Skudra**, *Dr. phys.* qualified in laser physics and spectroscopy.
Other leading researchers: Z. Gavare, *Dr. phys.*, G. Rēvalde, *Dr. phys.*
- BIOPHOTONICS
Leading researcher *prof. J. Spīgulis* *Dr. habil. phys.* qualified in medical physics.
Other leading researchers: **R. Erts**, *Dr. phys.* I. Kuzmina, *Dr. phys.*, A. Lihachev, *Dr. phys.*, U. Rubins, *Dr. phys.*
- SUSTAINABILITY
Leading researchers **A. Ubelis**, *Dr. phys.*, qualified in atomic and molecule physics.
Other leading researchers: **J. Abolins**, *Dr. phys.*, U. Gross *Dr. phys.*
- THEORETICAL PHYSICS
Leading researchers **E. Gailite-Karule**, *Dr. habil. phys.* and **I. Bērsons**, *Dr. habil. phys.*, **Rita Veilande**, *Dr. phys.* all qualified in theoretical physics.

The main achievements of the Institute within 2006-2011 are published in reviewed internationally cited journals (see 2.3.)

Evaluation of the research performance of Latvian research institution (2006-2011)

A concise list of principal results includes:

- PLASMA

Special type of spectral lamps for UV-IR filled with gas or metal vapor and buffer gas like Sn, Cd, Hg, Zn, Pb, As, Sb, Bi, Tl, In, Se, Te, Rb, Cs, I, H, He, Ne, Ar, Kr, Xe, He, H, as well as combined Hg-Cd, Hg-Zn, Hg-Cd-Zn, Se-Te etc (also isotope fillings, as example, Hg202) for

Spectrometers for measurement of the glass refraction index

Quantum standards

Atomic absorption spectrometers

Spectral reference lamps

Optical pumping;

Models for spectral line shape modeling;

Methods for light source diagnostics;

Methods for solving non-linear tasks;

Pollution control measurements for Hg – maps of the regions in Riga.

“Spectrometric detection of heavy metal contaminants” ESF project (2009 - 2012)

- BIOPHOTONICS

Development of SiO₂-based optical fibres.

Model devices for optical fibre sensors.

Medical laser light-guide instruments.

Development of new optical techniques to diagnose skin and blood-vesels disorders.

(such as Device for biosignal imaging using touch-sensitive screen, 2007, Student Council of UL;

Sensors for optical cardiovascular monitoring; etc)

Photoplethysmography (PPG) measurement technique and equipment:

One-,two-, ..., multi-channel PPG devices;

Multi-spectral (MS) PPG technique;

Different designs of set-up for PPG measurements; PPG signal treatment (registration of optical signals; data storage, acquisition, analysis; processing up to 2-D imaging) in order to obtain information about blood pressure, cardio-vascular pulse wave dynamics, peripheral arterial occlusions, skin condition of patients.

PPG sensors for cardiovascular monitoring, PPG video-imaging.

Multispectral and RGB imaging technologies for skin assessment.

Skin fluorescence, photobleaching and photo-memory.

“Biophotonics research group,” ESF project (2009-2012)

- SUSTAINABILITY

Interdisciplinary programme of MSc studies in SUSTAINABILITY “Science of global change and technologies for sustainable development,”

International Conferece.

Facility for glass and quartz handmade handling.

UV and vacuum UV spectroscopy in atomic physics and atmospheric chemistry.

- THEORETICAL PHYSICS

Above threshold ionization of atomic hydrogen in ns states with up to four excess photons.

Electron beam from oriented Rydberg atoms irradiated by a half-cycle pulse.

Revival phenomenon for strong-field excitation of Rydberg atom.

Evaluation of the research performance of Latvian research institution (2006-2011)

Important *national* research areas within the period of 2006-2011

1. **Spectroscopic techniques and devices for monitoring environmental pollution in Latvia** (Dr. phys. Atis Skudra). Implementation of the following contracts and projects: Contract with Riga Municipality about control of mercury pollution in air (2005-2006); Contract with the Institute of Physics on control of contamination with mercury, 2009, ESF 1.1.1.2 Spectrometric techniques for detection of heavy metal contaminants (2009-2012)

2. **Technological improvements of optical fibres made in Latvia** (Dr. habil. phys. Jānis Spīgulis). ERD project: New methods and technologies for production and application of optical fibres (2006-2008)

3. **Concepts, research and technologies of sustainable development of the Baltic Region** (Dr. phys. A. Ūbelis and Dr. phys. J. Āboliņš).

The obtained results refer to projects:

- Cooperation Programme in the Baltic Sea Region: PHARE 2003. (2005-2006) and 5th FP and 6th FP International Conferences projects (2002-2004-2006) TOWARDS and SHARING in 2006;
- ESF 3.2.3.2. project: Innovations in MS studies of physics „Physics of global change and Technologies for sustainable development” (2006-2008);
- BUSNET - Building Useful NCP Networks. EU FP6 project (contractor: SPIE) (07.2006 – 05.2007).

Results published by research staff members of the Institute having received *international recognition* in Europe and beyond (see 2.3):

1. **Theory of short laser-pulse interaction with atoms** (Dr.habil.phys I.Bērsons, Dr.habil.phys. E.Gailīte, Dr. phys. R.Veilande). Projects of Latvian Science Council (LSC) for basic and applied research (2006-2011) and the Taiwan-Baltic project: Taiwan-Baltic theoretical studies in atomic spectroscopy and behaviour of atoms in strong laser fields (2006.–2008).

2. **Optical diagnostics of disbalanced plasma** (Dr. phys. A. Skudra, Dr. phys. G. Rēvalde) **Interaction of plasma with materials used in photonics** (Dr. phys. A. Skudra). Projects of the LSC (2006-2011).

3. **Design of novel techniques and devices for bio-photonics** (Dr.habil.phys. J. Spīgulis; Dr.phys. R. Erts). Projects of the LSC (2006-2011) and ESF 1.1.1.2 project Biophotonics Research Group (2009-2012)

4. **UV spectroscopy and space technologies in atmospheric studies**. Dr. phys. A. Ūbelis, Dr.phys. U. Gross).

The achieved results refer to projects:

- EU project for improvement of the research infrastructure and equipment, 2008.
- ACCENT – Change of the Atmospheric Composition, FP6 Network of Excellence project (2004-2008-2009-2010)
- On-line research in stratosphere and troposphere with white light beam (Earth – satellite on-board sensors) and laboratory research on photochemistry of ozone-halogens mixtures), LCS project (2005-2008)
- Worktop for glass handling (Purchase and installing), UL development project (2006-2007)
- Cooperation in laboratory and field research on atmospheric photochemistry (Laboratory for Atmospheric and Climate Science, CSIC-JCCM, Toledo, Spain), 2010.

2.2. Number of scientific publications and other outputs 2006-2011

	2006	2007	2008	2009	2010	2011
1. Original articles in anonymously refereed scientific journals cited in <i>Thomson Reuters Web of Science</i> , SCOPUS, ERIH or Engineering Village	8	9	6	7	9	9
2. Articles in other refereed scientific edited journals and conference proceedings	13	13	9	8	20	16
3. Monographs published ¹⁾	-	2	2	2	3	4
4. Other scientific publications ²⁾	1	-	3	-	-	-
5. Text books and other research-related publications	2	3	-	2	-	-
6. Patents/ including international	1/0	1/0	-	3/1	1/0	-
7. Computer programs and algorithms ³⁾					2	1
8. Registered cultivars	-	-	-	-	-	-
9. Conference abstracts	24	14	22	18	28	24
10. Visiting lectures	7	7	8	2	4	3
11. Articles, radio and television programmes and journals popularising science	2	2	-	-	11	3
12. Other ⁴⁾	1	2	2	1	3	8

¹⁾ Includes doctoral theses and monographs in university series

²⁾ Includes edited proceedings, collections and special issues of scientific journals, and unrefereed scientific articles, excluding conference abstracts

³⁾ Approximates the number of programs and algorithms that have been in use outside the unit.

⁴⁾ May include design products, prototypes, artifacts, exhibitions, performances etc. Please specify.

2.3. Lists of most important publications by academic personnel and researchers with doctoral degree

(max 7 publications/person)

Each academic staff and researcher will list 7 of his/her key publications during the period under review, preferably indicated in the order of quality. The list may also include manuscripts published in 2011 or manuscripts approved for publication but still unpublished. References to books should give the names of any editors, place of publication, editor, and year.

Only publications of academic staff and researchers that have obtained their doctoral degree or who have defended thesis before 31 October 2011 listed.

List of the most important publications (*see examples for reference list in the Instructions to submission form*):

Name and Surname

Jānis Āboliņš

1. **Abolins J.** and Gravitis J.: A Simple Analytical Model for Remote Assessment of the Dynamics of Biomass Accumulation. In: Progress in Biomass and Bioenergy Production,

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- ed. S. Shahid Shaukat. (91-106) ISBN 978-953-307-491-7, InTech Open Access Publishers, 2011.
2. **Abolins J.** and Gravitis J.: Potential of Photosynthesis as a Renewable Source of Energy and Materials. *Latvian Journal of Physics and Technical Sciences* 2011, iesnigts publicēšanai.
 3. **Abolins J.**, Gravitis J., Kosmacha J.: Optimising the Yield of Energy from Biomass by Analytical Models of the Rate of Growth, *Latvian Journal of Physics and Technical Sciences* 47 (5) pp. 25-32, 2010.
 4. **Abolins J.**, Gravitis J.: Energy from Biomass for Conversion of Biomass, *Latvian Journal of Physics and Technical Sciences* 46(5) pp. 16-23, 2009
 5. **Abolins J.**, Gravitis J.: Energy Evaluation of Steam Explosion Auto-Hydrolysis Pretreatment of Biomass, *International Symposium on Energy, Engineering, Economics and Policy, EEEP 2009 (Orlando, Florida, July 10-14, 2009)* pp. 1-4.
 6. Gravitis J., **Abolins J.**, Kokorevics A.: Integration of biorefinery clusters towards zero emissions, *Environmental Engineering and Management Journal* 7(5) pp. 569-577, 2008.
 7. **Abolins J.**, Tupciauskas R., Veveris A., Alksnis B., Gravitis J.: Effects of steam exploded lignin on environmentally benign hot-pressed alder boards, *Environmental Engineering : 7-th International Conference, May 22 – 23, 2008, Faculty of Environmental Engineering, Vilnius Gediminas Technical University : Selected papers (eds D. Cygas, K. D. Froehner) Vilnius Gediminas Technical University Press „Technika”, 2008. – Environmental Protection 1, 2008, pp.1-7.*

Imants Bērsons

1. Veilande R. and **Bērsons I.**: Wave packet fractional revivals in one-dimensional Rydberg atom, *Journal of Physics B: Atomic, Molecular and Optical Physics* 40(11), pp. 2111-2120, 2007.
2. **Bērsons I.** and Korovin Y.: Electron beam from oriented Rydberg atoms irradiated by a half-cycle pulse, *Journal of Physics B: Atomic, Molecular and Optical Physics* 41, 155002 (6pp) 2008.
3. Veilande R., **Bērsons I.**: Analysis of revival phenomenon for strong-field excitation of Rydberg atom, *Latvian Journal of Physics and Technical Sciences* 46(4) pp. 61-65, 2009.
4. Skudra A., **Bērsons I.**, Revalde G., Bogans E., Gavare Z., Zorina N., Berzinsh M.: High-frequency electrodeless plasma interaction with the lamp bulb walls, *Latvian Journal of Physics and Technical Sciences* 2, pp. 12–16, 2006.

Renārs Erts – ASI līdz 08/2011

1. Spigulis J., Gailite L., Lihachev A., and **Erts R.**: Simultaneous recording of skin blood pulsations at different vascular depths by multi-wavelength photoplethysmography, *Applied Optics* 46(10) pp. 1754-1759, 2007.
2. Spigulis J., Lihachev A., and **Erts R.**: Imaging of laser-excited tissue autofluorescence bleaching rates, *Applied Optics* 48(10) pp. D163-D168, 2009.
3. **Erts R.**, Rubins U., and Spigulis J.: Monitoring of blood pulsation using non-contact technique, In: *WC 2009, IFMBE Proceedings 25/VII (11th World Congr. Med Phys. Biomed. Engin., Munich)*, Eds.: O. Dössel and W.C. Schlegel, Springer, 2009, pp. 754-756
4. Marcinkevics Zbignevs, Greve Mara, Aivars Juris Imants, **Erts Renars**, Zehtabi Aram Hussain: Relationship between arterial pressure and pulse wave velocity using photoplethysmography during the post-exercise recovery period, *Acta Universitatis Latviensis, Vol. 753, Biology, Scientific papers, University of Latvia*, pp. 59-68, 2009
5. Rubins U., **Erts R.** and Nikiforovs V.: The blood perfusion mapping in the human skin by photoplethysmography imaging. *MEDICON 2010 (XXII Mediterranean Conference on Medical*

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and Biological Engineering and Computing, May 27-30, 2010, Chalkidiki, Greece) eds.: P.D. Bamidis and N. Pallikarakis, IFMBE Proceedings, Vol. 29, Part 2, 2010, pp. 304-306.

Erna Gailīte-Karule

1. **Karule E.** and Gailītis A.: Above threshold ionization of atomic hydrogen in ns states with up to four excess photons, *Journal of Physics B: Atomic, Molecular and Optical Physics* 43(6) 065601 (7pp), 2010.
2. **Karule E.:** Latvian Women in Physics, *Women in Physics, 3rd IUPAP International Conference, ICWIP2008 (Seoul 8-10 October, 2008)* eds.: B.K. Hartline, K.R. Horton, and C.M. Kaicher, *AIP Conference Proceedings Vol.1119*, Melville, New York, 2009, pp. 134-135.

Zanda Gavare

1. **Gavare Z.:** Determination of helium number densities in high-frequency electrodeless plasma, *Nuclear Instruments and Methods in Physics Research A623*, pp. 731–733, 2010. (doi:10.1016/j.nima.2010.04.014)
2. **Gavare Z.**, Revalde G., and Skudra A.: Plasma temperature determination of hydrogen containing high-frequency electrodeless lamps by intensity distribution measurements of hydrogen molecular band, *International Journal of Spectroscopy: Special Issue on Spectral Line Shapes in Plasmas and Gases 2010*, Article ID: 804506, 8 pages, 2010. (doi:10.1155/2010/804506)
3. **Gavare Z.**, Gött D., Pipa A.V., Röpcke J., Skudra A.: Determination of the number densities of argon metastables in argon-hydrogen plasma by absorption and self-absorption methods, *Plasma Sources Science and Technology* 15, pp. 391–395, 2006.
4. Denisova N., **Gavare Z.**, Revalde G., Skudra Ja. And Veilande R.: A study of capillary discharge lamps in Ar–Hg and Xe–Hg mixtures, *Journal of Physics D: Applied Physics* 44 155201, 2011. (doi:10.1088/0022-3727/44/15/155201)
5. Skudra A., **Gavare Z.**, Zorina N., Zinge M., Gavars E., Poplausks R., Svagere A.: Plasma Temperature and Surface Studies of Argon-Hydrogen Containing Low-Temperature Dumbbell form Light Sources, *Journal of Materials Science and Engineering B* 1, 2011, in press.
6. Skudra A., Revalde G., **Gavare Z.**, Zorina N.: Study of inductive coupled hydrogen and argon plasma interaction with SiO₂ Glass, *Plasma Processes & Polymers: Special Issue on PSE 2008*, 6, pp. S183–S186, 2009.
7. Skudra A., Zorina N., **Gavare Z.**, Berzins M., and Erts D.: Light source inner surface changes depending on treatment, *Physica Status Solidi C* 5 (4) pp. 915–917, 2008.

Iļona Kuzmina

1. **Kuzmina I.**, Diebele I., Jakovels D., Spigulis J., Valeine L., Kapostinsh J., Berzina A.: Towards noncontact skin melanoma selection by multispectral imaging analysis, *Journal of Biomedical Optics* 16(6), 060502, 2011.
2. **Kuzmina I.**, Diebele I., Spigulis J., Valeine L., Berzina A., Abelite A.: Contact and contactless diffuse reflectance spectroscopy: potential for recovery monitoring of vascular lesions after intense pulsed light treatment, *Journal of Biomedical Optics* 16(4), 040505, 2011.
3. **Kuzmina I.**, Diebele I., Valeine L., Jakovels D., Kempele A., Kapostinsh J., Spigulis J.: Multi-spectral imaging analysis of pigmented and vascular skin lesions: results of a clinical trial, *Proceedings of SPIE* 7883, 788312-1-7, 2011.

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4. Diebele I., **Kuzmina I.**, Kapostinsh J., Derjabo A., Spigulis J.: Melanoma-nevus differentiation by multispectral imaging, Proceedings of. SPIE 8087, 80872G, 2011.
5. **Kuzmina I.**, Diebele I., Asare L., Kempele A., Abelite A., Jakovels D., Spigulis J.: Multispectral imaging of pigmented and vascular cutaneous malformations: the influence of laser treatment, Proceedings of. SPIE 7376, pp. 73760J -1-6, 2010.
6. **Kuzmina I.**, Lihachev A., Gailite L., Spigulis J. : Compact multi-functional skin spectrometry set, Proceedings of. SPIE 6596, pp. 65960T-1-6, 2007.

Aleksejs Lihachovs

1. **Lihachev A.**, Lesins J., Jakovels D., Spigulis J.: Low power cw-laser signatures on human skin, Quantum Electronics 40(12), pp. 1077–1080, 2010.
2. Spigulis J., **Lihachev A.** Erts R.: Imaging of laser-excited tissue autofluorescence bleaching rates, Applied Optics. 48 (10) pp. D163-D168, 2009.
3. Lesinsh J., **Lihachev A.**, Rudys R., Bagdonas S., Spigulis J.: Skin autofluorescence photobleaching and photo-memory, Proceedings of. SPIE 8092, 80920N, 2011.
4. Lihachev A., Rozniece K., Lesins J., Spigulis J.: Photobleaching measurements of pigmented and vascular skin lesions: results of a clinical trial, Proceedings of. SPIE 8087, 80872F, 2011.
5. **Lihachev A.** and Spigulis J.: Skin autofluorescence fading at 405/532nm laser excitation, IEEE Xplore, 10.1109/NO.2006.348375, pp.63 – 65. Posted online 2007-04-23.
6. **Gailite L.**, **Spigulis J.**, Lihachev A. : Multilaser photoplethysmography technique. *Lasers in Medical Science*, vol. 23, pp. 189-193, 2008.
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1. Sustainable Development in the Baltic and Beyond (2006) – Series of “Environmental Education, Communication and Sustainability”, Vol.23, Peter Lang Europäischer Verlag der Wissenschaften, Frankfurt am Main. Eds: Walter Leal Filho, **Arnolds Ūbelis**, Dina Berzina, 612 p.
2. Gómez Martín J. C., Blahins J., Gross U., Ingham T., Goddard A., Mahajan A. S., **Ūbelis A.** and Saiz-López A.: *In situ* detection of atomic and molecular iodine using Resonance and Off-Resonance Fluorescence by Lamp Excitation: ROFLEX, *Atmospheric Measurement Techniques* 4, pp. 29-45, 2011.
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5. Bajars G., Lūsis A., **Ūbelis A.**: Integration of ecodesign course in design studies at the University of Latvia. *Proceedings of Engineering Education in Sustainable Development 2008 Conference*, Graz, Austria, pp. 356-364, 2009.
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1. Gómez Martín J. C., Blahins J., **Gross U.**, Ingham T., Goddard A., Mahajan A. S., Ubelis A. and Saiz-López A.: *In situ* detection of atomic and molecular iodine using Resonance and Off-Resonance Fluorescence by Lamp Excitation: ROFLEX, *Atmospheric Measurement Techniques* 4, pp.29-45, 2011.
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Jānis Kļaviņš

1. Głódź M., Huzandrov A., Safronova M. S., Sydoryk I., Szonert J. and **Klavins J.**: Experimental and theoretical study of the *nf*-level lifetimes of potassium, *Physical Review A* 77 (2), 022503, 2008.
2. Głódź M., Huzandrov A., Sydoryk I., Szonert J. and **J. Klavins**: All-Experimental Values of Self-Quenching Cross-Sections for *nf* States ($n = 5 - 8$) of Potassium Atoms, *Acta Physica Polonica A*.112(6), p. 1185, 2007 .

2.4. Copies of the Institution's/Unit's best publications

(Append copies of publications, maximum number of publications = number of professors/researchers in the Institution/Unit, but a minimum of five publications)

The copies of relevant publications should be scanned and added as separate files together with the self-assessment report file in the Information Site of the Latvian Academy of Sciences <http://vertejumi.lza.lv> or as printed copies submitted to the Latvian Academy of Sciences. For ensuring easy readability do not make the font size smaller when copying publications. The copies of publications shall be two-sided. For monography and book copy the title page and content.

Original articles:

1. Karule E. and Gailītis A.: Above threshold ionization of atomic hydrogen in ns states with up to four excess photons, *Journal of Physics B: Atomic, Molecular and Optical Physics* 43(6) 065601, 2010.
2. Bersons I. and Korovin Y.: Electron beam from oriented Rydberg atoms irradiated by a half-cycle pulse, *J.Phys.B:At.Mol.Opt.Phys.* 41, 155002, 2008.
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5. Spigulis J., Lihachev A., Erts R.: Imaging of laser-excited tissue autofluorescence bleaching rates, *Applied Optics* 48, pp. D163-D168, 2009.
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9. Abolins J. and Gravitis J.: A Simple Analytical Model for Remote Assessment of the Dynamics of Biomass Accumulation. In: *Progress in Biomass and Bioenergy Production*, ed. S. Shahid Shaukat. (91-106) ISBN 978-953-307-491-7, InTech Open Access Publishers, 2011.
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Monographs and books:

1. **Proceedings of SPIE, Vol. 7142**: Sixth International Conference on Advanced Optical Materials and Devices, AODM-6 – Bellingham, USA, 2008 – 295 p, Eds. : **Janis Spigulis**, Andris Krumins, Donats Millers, Andris Sternberg, Inta Muzikante, Andris Ozols, Maris Ozolinsh, Techn. Ed. **Rita Veilande**.
2. Sustainable Development in the Baltic and Beyond– Series of “Environmental Education, Communication and Sustainability”, Vol.23, Peter Lang Europäischer Verlag der Wissenschaften, Frankfurt am Main, Editors: Walter Leal Filho, **Arnolds Ubelis**, Dina Berzina, 2006, 612 p.

3. DOCTORAL TRAINING

3.1. Number of students in 2006-2011

Give the number of Master degrees and of those, new post-graduate students to indicate the ratio enrolled in the doctoral training.

	2006	2007	2008	2009	2010	2011
Completed their Master degree ¹⁾	5	2	2	2	3	3
Started doctoral studies ²⁾	3	0	1	2	3	3

¹⁾ Master students are enrolled at the host universities and complete their degree there. Institution's/Unit's personnel is also involved in supervising MSc theses. Research institutes indicate Master students, if at least half of the Master thesis has been performed at research institute during 2006-2011 under the guidance of the research staff of the institute.

²⁾ Doctoral students enrolled at the university/ or a number of PhD students who have been working at Institution/Unit during 2006-2011 under the guidance of the researcher of the Institution/Unit, their FTE performing research work being almost 50 percent of the total.

3.2. List of doctoral dissertations in 2006-2011 and present employment

If at least half of the doctoral dissertation has been supervised and/or done at a research institute, the research institute can also list the doctoral dissertation as its own outcome. In this case indicate also the university (in year of completion) where the doctoral dissertation has been presented for approval. In present employment, indicate the type of organisation (university, business company, research institute, state, municipality or other).

Name (given name and family name)	Topic of dissertation	Year of completing the degree	Present employment (job description, organisation)
Renārs Erts	New photoplethysmography methods and devices for non-invasive cardiovascular control	29.06. 2007. UL	Head of chair, Riga Stradins University
Rita Veilande	One-dimensional Rydberg atom interaction with half-cycle pulses	12.05.2008. UL	Leading Researcher, UL IAPS
Uldis Rubins	Waveform analysis of photoplethysmography biosignals and modeling of blood flow dynamics	11.05.2009. UL	Researcher, UL IAPS
Aleksejs Ļihačovs	Kinetics of laser-excited <i>in-vivo</i> skin autofluorescence and remission	11.02.2011. UL ISSP	Researcher, UL IAPS
Zanda Gavare	Spectroscopic diagnostics of low-temperature gas discharge plasma	28.06.2010. UL	Researcher, UL IAPS
Ilona Kuzmina	Contact and contactless diffuse reflectance spectrometry for assessment of skin pathologies	14.10.2011. UL Faculty Physics and Mathematics	Researcher, UL IAPS

4. NATIONAL AND INTERNATIONAL COLLABORATION

4.1. National collaboration

List the national collaboration partners of the Unit. Collaborator refers to a person or a research team with whom the cooperation has either generated or is expected to generate within the next three (3) years one of the outcomes indicated in item 2.2. Types of collaboration include e.g. joint projects, researcher mobility. In "Field of science", give the main field of the collaborator (physics, chemistry, mechanical engineering etc.)

Organisation	Type of collaboration	Field of science
Universities		
Daugavpils University (Centre for Inovative Spectroscopy)	ESF 1.1.1.2. project "Bio-photonics research group." Seminars.	Physics
Latvian University of Agriculture (ITF)	EU FP 6 project. Papers, reports.	Physics. Information Technologies
Riga Stradins University	National Research Programme (NRP) project, seminars.	Physics. Medicine
Riga Technical University	ESF 1.1.1.2. project. NRP project. Cooperation greement. (supervising research for BS and MS degrees. Interdisciplinary programme in MS studies. Joined seminars.)	Physics. Chemistry. Environmental Science. Engineering.
University of Latvia (UL) Faculty of Biology (FB)	ESF 1.1.1.2. project "Bio-photonics research group". UL project. Reports, papers.	Physics. Biology.
UL Faculty of Chemistry (FCh)	Cooperation in graduate and postgraduate studies ESF 1.1.1.2. project „Spectrometric detection of heavy metal contaminants”	Physics. Chemistry
UL Faculty of Physics and Mathematics (FPM)	ESF, 7 IP, The Latvian Science Council (LSC), NRP and UL projects. (drawing students in projects; BS, MS, and PhD)	Physics.
UL Faculty of Medicine	ESF 1.1.1.2. project "Bio-photonics research group "	Physics. Medicine.
UL Faculty of Earth Science and Geography	ESF 1.1.1.2. project „Spectrsopic detection of heavy metal pollution”	Physics. Environmental science
Other higher educational establishments, graduate schools, colleges		
Public research institutes		
Institute of Astronomy (UL)	Seminars. Association „Fotonika-LV”	Physics. Astronomy.
Scientific Institute of Cardiology (UL)	ESF 1.1.1.2. project " Bio-photonics research group"	Physics. Medicine.
Institute of Chemical Physics (UL)	ESF 1.1.1.2 prject „Spectrsopic detection of heavy metal pollution”	Chemical Physics. Chemistry
Institute of Solid State	NRP and ERDF projects. Published	Physics.

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Physics (UL)	reports.	
Institute of Physics (UL)	Joint projects (NRP, UL) and Taiwan-Baltic	Physics.
Institute of Mathematics and Informatics (UL)	National Research Programme (NRP) project	Physics.Mathematics. Information technologies.
Institute of Chemical Physics (UL)	ESF 1.1.1.2. project „Spectroscopic detection of heavy metal pollution	Physics. Chemistry.
Institute of Physical Energetics	NRP project. Published papers, reports.	Physics. Energetics.
Latvian Institute of Hydroecology	ESF 1.1.1.2. project „Spectroscopic detection of heavy metal pollution”	Physics. Chemistry.
Latvia State Institute of Wood Chemistry	NRP and "WoodNet" projects. Reports, published papers.	Chemical Physics. Chemistry.
Enterprises		
Others		
University Children' Clinical Hospital	ESF 1.1.1.2. project "Bio-photonics research group"	Physics.
Latvian Onkology Centre	ESF 1.1.1.2. project "Bio-photonics research group"	Physics.
Laser-plastics Clinic	ESF 1.1.1.2. project "Bio-photonics research group"	Physics. Medicine
Traumatology and Orthopedy Hospital	ESF 1.1.1.2. project "Bio-photonics research group"	Physics.
Health Centre 4	ESF 1.1.1.2. project "Bio-photonics research group"	Physics.
Technological Park (Ventspils Augstskola)	Visits. Consulting	Physics. Engineering.
State Coroner's Office	ESF 1.1.1.2. projekts „Spectrometric detection of heavy metal contaminants”	Physics
National conferences, workshops and seminars organised by the institution/unit		
UL IAPS weekly Science Seminars Thursdays, 9:00 AM, Šķūņu ielā 4, auditorium, 2006-2011-		
EK 6/7. IP projects „Researchers' Night”; end of September, 2006 (22.09.)-2011(23.09.) – UL IAPS, Šķūņu Str. 4		
Photonics section, Physics., Natural sciences, UL 67 th – 70 th conferences 2009 - 2012;		
Joint section of FPM, IAPS, and LPS: Physics, Natural sciences, UL 65 th conference 2007 and UL 66 th conference 2008; Photonics sections of IAPS of UL 67 th , 68 th , 69 th conf., since 2009		
National Day of the ACCENT Project, June 6, 2007. UL IAPS, Šķūņu Str. 4		
„Innovations in MS studies of physics „Physics of global change and Technologies for sustainable development” (ESF project) 2007/2008		
Stand of UL IAPS at the Exhibition of Latvian Inventors (Dec 16, 2010) RTU, Kaļķu ie. 1		
Seminar of Video-Sensors and Bio-Photonics (Co-organiser VieSenTIS.EDI), Šķūņu ie. 4, Apr 20, 2010		
Seminar of Annual Report 2010 of ESF project DU, Daugavpils (Nov 30, 2010); DU, Vilnius University, UL IAPS.		
Seminar of Annual Report 2011 (Dec 2) of ESF Project, Vilnius University, Lithuania		

4.2. Visits abroad (minimum duration of visit: one month)

List the visits per year. List the visits of each year by country in the alphabetical order. In item "Purpose of the visit" indicate clearly the objective of the visit.

Name	Target organisation	Country	Purpose of the visit	Year	Duration in months
Spigulis J.	University of Oulu	Finland	Visiting professor	2009	1

4.3. Visits to the Unit (minimum duration of visit: one month)

List the visits per year. List the visits of each year by country in the alphabetical order. In item "Purpose of the visit" indicate clearly the objective of the visit.

Name of visitor	Home organisation	Country	Purpose of the visit	Year	Duration in months
Natalya Denisova	Institute of Theoretical and Applied Mechanics, Novosibirsk, Russia	Russia	ESF 1.1.1.2.	2010	2
Natalya Denisova	Institute of Theoretical and Applied Mechanics, Novosibirsk, Russia	Russia	ESF 1.1.1.2.	2011	2
Saulius Bagdonas	Laser Research Centre, Vilnius University	Lithuania	ESF 1.1.1.2.	2010	6
Saulius Bagdonas	Laser Research Centre, Vilnius University	Lithuania	ESF 1.1.1.2.	2011	6
Ričardas Rotomskis	Faculty of Physics, Vilnius University	Lithuania	ESF 1.1.1.2.	2010	6
Ričardas Rotomskis	Institute of Onkology, Vilnius University	Lithuania	ESF 1.1.1.2.	2011	6

4.4. Most important foreign collaborators

List the most important foreign collaborators, as defined in item 4.1.

Name and Organisation	Type of collaboration	Country
Universities		
Laboratory for Atmospheric and Climate Science (CIAC), CSIC, Toledo, Spain	Agreement of cooperation. Joint experiments and published papers	Spain
Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei	Taiwanese-Lithuanian-Latvian project: "Taiwan-Baltic theoretical studies in atomic spectroscopy"	Taiwan (China)
National Taiwan University (Department of Physics)	Taiwanese-Lithuanian-Latvian project: "Taiwan-Baltic theoretical studies in atomic spectroscopy"	Taiwan (China)
National Taiwan University (Department of Physical medicine & Rehabilitation)	Cooperation project of Taiwan, Lithuania and Latvia	Taiwan (China)

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Vilnius University (Institute of Theoretical Physics and Astronomy)	Taiwanese-Lithuanian-Latvian project: “Taiwan-Baltic theoretical studies in atomic spectroscopy”	Lithuania
Vytautas Magnus University (Biology Department)	Taiwanese-Lithuanian-Latvian project: “Taiwan-Baltic theoretical studies in atomic spectroscopy”. Visiting lectures	Lithuania
Laboratoire Plasma et Conversion d'Energie) Universite Paul Sabatier - Toulouse	COST action in plasma research	France
University of Mainz	Joint research and published papers	Germany
Research Institutes		
Institute of Low Temperature Plasma Physics, Greifswald, Germany	“BalticNet-PlasmaTec” network. LSC projects, exchange, joint experiments and published papers	Germany
Institute of Theoretical and Applied Mechanics, Novosibirsk, Russia	ESF 1.1.1.2 project: “Spectrometric detection of heavy metal pollutants”. Publikācijas. Visiting researcher (Natalia Denisova)	Russia
Max-Planck-Institute of Quantum Optics (Max- Planck-Institut für Quantenoptik)	ESF 1.1.1.2 project: “Biophotonics research group” Joint workshops (Janis Alnis), visiting lectures	Germany
Enterprises		
Lumex Ltd, St.Petersburg, Russia	Joint experiments and published papers	Russia
Research & Development Applied Physics, SICK MAIHAK GmbH	Joint research and published papers	Germany
Others		
BalticNet-PlasmaTec	ESF 1.1.1.2 project: “Spectrometric detection of heavy metal pollutants”	Countries of the Baltic Region
Photonics 21	Annual meetings	European countries
Baltic Photonics Cluster	Member of the cluster	Estonia, Lithuania
GMOS	EUFP-7 project „Global Mercury Observation System”	24 partners
Fonds UN and WWF	Presentations in Latvian towns in 2010.	World countries
EGU General Assembly	EU FP-6. Network of Excellence projects“Atmospheric Composition Change: ACCENT”	Austria, Germany, UK, and other countries
International conferences, workshops and seminars organised by the institution/unit		
Advances in Laser Spectroscopy: in Memory of Prof. Maris Jansons 1936-1997 (Riga, Latvia, September 28 - 29, 2006. EUFP-6 project LAMOL.		
International Student Conference “Developments in Optics and Communications,” <i>DOC- 2006, 2007, 2008, 2009, 2010</i>): 29.04-30.04. 2006; 27.04.-29.04.2007; 04.2008; 24.04.- 26.04.2009; 23.04.-25.04.2010, April 28 -30, 2011, Riga (Student Chapters of SPIE, OSA involving young researcher from IAPS)		
Workshop on the strategy creation, July 9 -10, 2007, Jurmala (EUFP-6 project BASNET)		
The T&E ACCENT Workshop "Air Quality and Air Quality Management in Eastern		

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Europe", Birini Castle, Riga, Latvia, June 01 - June 08, 2007 (ES 6. IP "Network of Excellence" project: ACCENT)
EUSCEA project "WONDERS 07" – New PPG equipment popularization and demonstration in Spain and Portugal, 2007
14th Nordic-Baltic Conference on Biomedical Engineering and Medical Physics, NBC – 2008, Riga, Latvia, June 16-20, 2008 (Co-chairman J.Spigulis, conference secretary I.Kuzmina).
The 6th International Conference "Advanced Optical Materials and Devices" , Riga, Latvia, 24 – 27 August, 2008 (Chair of Programme Committee J. Spigulis, Programme Committee members other scientists from IAPS)
XII International Conference on Laser Applications in Life Sciences 2010 (LALS-2010) Oulu, Finland, June 9-11, 2010 (Programme Committee member, co-chairman of session J. Spigulis).
Stand of IAPS, MedBaltica 2010 K�psala, Riga 13.05.2010-15.05.2010
<i>Workshop</i> "Optical Cardiovascular Monitoring." Riga, 19 June, 2008. <i>Organizers:</i> University of Latvia, Institute of Atomic Physics and Spectroscopy, ERDF project "Information Technologies for Optical Cardiovascular Monitoring," 14th Nordic-Baltic conference on biomedical engineering and medical physics.
<i>Workshop:</i> Optical Fibres for UV-Applications, Riga, 26 Aug. 2008, 6th Int. conf. "Advanced Optical Materials and Devices."

4.5. Describe the most important outcomes of the visits and collaboration contacts

(max 2 pages)

Describe here e.g. key joint publications, researcher training, adoption and use of new technologies or new approaches.

Results of collaboration are reflected in materials (abstracts, proceedings) of the above-mentioned events and in joint publications (2.3., 2.4). Research training has been performed within the FP-7 project „Laserlab Europe” – Training School for Potential Laser Users in the Baltic Countries and Scandinavia, Riga, April 2010. The jointly developed medical technologies are tested in clinical environment at 5 major hospitals and clinics in Riga.

4.6. Non-academic collaboration

List here the Non-academic collaboration, e.g. industry contacts.

The Institute has fruitful long-term collaboration with Latvian photonics industry flagships SIA „Z-Light” and SIA „ISP Optics Latvia” the partners receiving newly developed technologies and advice. The leading scientists of the Institute sustain close contacts with local municipalities (Riga, Liepaja, Daugavpils) on detection and control of water and air pollution, especially with regard to mercury. The developed noninvasive diagnostic/monitoring technologies are clinically tested at Riga Stradins Hospital, Riga Oncology Centre, Children’ Clyrical Hospital of University in Riga, Laserplastics Centre and Health Centre – 4. SIA „Telemedica” is the industrial partner of the Institute in the ERDF Project on new optical technologies for distant skin diagnostics.

Name and Organisation	Type of collaboration	Country
Enterprises and standardisation organisations		
National Contact Point	Informing about guidelines of EU FPs and other project applications	Latvia
City Council of Riga	Contract	Latvia
Latvian Investment and Development Agency	Contract of services	Latvia

Other organisations		
SPIE	Organisational activities. Conferences, publishing	International
OSA, APS	Societal activities. Conferences	USA

5. OTHER SCIENTIFIC AND SOCIETAL ACTIVITIES

5.1. Invited presentations in scientific conferences

Invited plenary talks and other invited talks.

Name	Topic of presentation	Name and time of the conference
Āboliņš Jānis	Biomass Conversion to Chemicals and Nano-Materials by Steam Explosion (Co-author J. Grāvītis)	15-th European Biomass Conference & Exhibition, 7—11 May, 2007, Berlin
Bērsons Imants	Semiclassical theory of strong, short and high-frequency electromagnetic field's interaction with atoms. Half cycle pulses and the wave packet revivals	Taiwan-Baltic Atomic Physics Seminar, UL IAPS, Aug 27, 2007
Bērsons Imants	Vacuum	10-th Conference of the Association of Latvian Teachers of Physics, Oct 17-18, 2008; Rotary Club, March 12, 2007
Denisova Natalya	A study of physical processes in microplasma capillary discharges (Co-authors E. Bogans, G. Rēvalde, J. Skudra)	18 International Colloquium on Plasma Processes Nante (France) – July 5-8, 2011
Gailīte-Karule Erna	Priorities of Physics in Latvia	Meeting of IUPAP C13 Commission „Physics for development“, Paris, Aug 26-27, 2006
Gailīte-Karule Erna	Interaction of atoms with electromagnetic field	“Joint Taiwan-Baltic Seminar on Atomic Physics,” Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei, Taiwan, Republic of China, 02.04.–05.04.2007
Gailīte-Karule Erna	Latvian women in physics: sociological research on female scientists and strategy	IUPAP (International Union of Pure and Applied Physics) “Women Group” seminar, Bad Honnef, Vācija, 19. - 22.04.2007
Karule-Gailīte Erna	Learning from good examples	EPWS (European Platform of Women Scientists) Annual Conference “Women shaping science”, 5-7 June, 2008, Vilnius, Lithuania
Karule-Gailīte Erna	Women in sciences and high technologies in three Baltic States	ICWES14 (14th International Conference Women Engineers and Scientists) June 15-18, 2008, Lille, France
Gailītis Agris	Three physically different problems but similar	“Joint Taiwan-Baltic Seminar on Atomic Physics,” Institute of Atomic

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	mathematical solutions: H atom in DC field, H atom in AC field and MHD Dynamo experiment	and Molecular Sciences, Academia Sinica, Taipei, Taiwan, Republic of China, 02.04.–05.04.2007
Rēvalde Gita	Light related research at the Light source spectroscopy laboratory in Riga	COST Meeting, Mierlo, the Netherlands, March 30 – April 2, 2006
Rēvalde Gita	Diagnostics and non-lighting applications of electrodeless lamps	COST Strategic Workshop on Lighting, December 1 – 3, 2006, Heraklion Crete, Greece
Rubins Uldis	Digital Volume Pulse Waveform Analysis By Fitting With Four Gaussians	19th International EURASIP conference BIOSIGNAL 2008, Brno (Czech Republic), 29 June - 1 July 2008
Skudra, Atis	Mercury pollution determination in Riga	International conference EcoBalt 2006, Riga, May 11 - 12, 2006
	UV and VUV transparency of SiO ₂ glass ingots	ERDF seminar at Livani Inovative Technologies Centre, Jun 10, 2008
	Nobel lectures in Lindau 2008	Latvian Physics Teachers Association. Ventspils, Oct 2008
Spigulis Janis	CLEAR - Clinical Research Physician - in Latvia	EK LEONARDO DA VINCI project CLEAR meeting, Budapest (Hungary), 15 January, 2006
Spigulis Janis	Optical Technologies in Latvia	OSTSEE-STAMMISH on Optical Technologies in the Baltic Sea Region, Hamburg (Germany), 25 Januay, 2006
Spigulis Janis	Optical device for detection of arterial occlusions	3rd Int. Conf. “Northern Optics”, Bergen, Norway, 14-16 June, 2006
Spigulis Janis	Optical Technologies in Latvia	SPIE Poland and Baltic Chapters joint symposium on Optical Technologies in the Baltic Sea Region Warsaw (Poland), 18 –19 May, 2007
Spigulis Janis	ERDF project “UV studies of optical fibres”	ERDF seminar at Livani Inovative Technologies Centre, Jun 10, 2008
Spigulis Janis	Biophotonics teaching and training at University of Latvia.	1st International Congress on Biophotonics, Sacramento, USA, 5-6 Feb., 2008
Spigulis Janis	Skin optics as a tool for distant health assesment (Invited presentation)	4 th International Conference “Northern Optics 2009” Vilnius, August 26-28, 2009
Spīgulis Jānis	Optical technologies for distant diagnostics and monitoring.”	2nd Congress of Baltic Association on Laser Medicine (BAML) „Photo-Medicine: Diagnostics and Treatment”, Vilnius, Sept. 4-5, 2009
Spīgulis Jānis	Laser technologies for skin assessment	Laserlab Europe Training School for Potential Users, Application in Spectroscopy, Industry and Medicine, Riga, April 24, 2010 Riga
Spigulis Janis	Optical technologies for skin assesment (photoplethysmography, laser-Doppler,	Infotech Oulu Workshop 2010 on Optoelectronics Devices and Instrumentation X (Summer School),

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	fluorescence, multi-spectral	Oulu, Finland, 7 June, 2010
Spigulis Janis	Advanced optical technologies for in-vivo skin assessment	10th Int. Conf. "Advanced Laser Technologies", Egmond aan Zee, The Netherlands, – 12.09.2010.
Spigulis Janis	Lasers for medical diagnostics and monitoring	Alexander von Humbolt Forum "Science & Society in Modern Europe", Vilnius, Lithuania, – 25.09.2010.
Spigulis Janis	Biophotonics: Optical technologies for health.	Developments in Optics and Communications 2011, April 28 -30, 2011, Riga, Latvia
Veilande Rita	One-dimensional Rydberg atom interaction with half-cycle pulses	ICWIP 2008 : Third IUPAP International Conference on Women in Physics, 8-10 October, 2008, Seoul, Korea

The annual number of visiting lectures see in 2.2.

5.2. Memberships in editorial boards of scientific journals

Give only the most important membership. Present names for the most important journals in the field.

Name	Journal	Period
Name	Edited special issues of scientific journals	Year

Researchers of the Institute have edited several large-volume monographs and conference proceedings (D.Berzina, A.Ubelis, J.Abolinsh, J.Spigulis) without being permanent members of the editorial boards of the journals. However, considerable aid has been provided to editors of highly ranked journal in the role of peer-reviewers. For instance, Janis Spigulis has been reviewer of papers submitted to a number of peer-reviewed journals:

- Applied Optics
- Optics Letters
- Optical Engineering
- Journal of Biomedical Optics
- Journal of Biophotonics
- IEEE Transactions on Biomedical Circuits and Systems
- Computer Methods and Programs in Biomedicine
- IET Science, Measurement & Technology
- Journal of Biomedical Science and Engineering
- Biomedical Optics Express
- Physiological Measurement.

5.3. Prizes awarded to researchers, honours and scientific positions of trust

Give only the most important prizes and etc awarded to the personnel.

Name	Prize, position etc.
Diebele Ilze	<i>Werner von Siemens award</i> for MS paper "Hyper-spectral detection of melanin and haemoglobin in skin pigments", 2010
Gailite Lāsma	<i>Werner von Siemens Excellence award 2006 - Youth and Knowledge</i> for MS paper "Dynamic spectrometry of the diffuse skin reflections"

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	2006
Erts Renārs	<i>SPIE Educational Scholarship Award in Optical Science and Engineering, 2006</i>
Erts Renārs	<i>SIEMENS Excellence Award, 2007</i>
Kviesis-Kipge Edgars	<i>Werner von Siemens Recognition</i> for MS paper „Wireless photoplethismographic health monitoring,” 2008 (Adviser: Prof. J. Spīgulis)
Spīgulis Jānis	<i>The “Grindex” award “Golden Owl”</i> for outstanding research in Biomedical Optics, 2007
Spigulis Janis, Prof.	<i>The Grade of Fellow of the SPIE Society – 2011</i> , San Francisco (in recognition of distinguished and valuable contributions to the fields of optics and photonics)
Ūbelis Arnolds	<i>“Energy Globe 2007 - the World Award for Sustainability”</i> category "Youth" – national award to the UL Institute of Atomic Physics and Spectroscopy for EU FP-5 and FP-6 projects (1997 - 2008): "Physics of technologies for sustainable development" (1997-2006) and ESF project of MS studies in „Science of global change and sustainable Technologies” (2006 - 2008.) (Project team – A.Ūbelis, J.Āboliņš, D. Bērziņa, U.Gross, J.Blahins J.Spīgulis, L.Gailīte, A.Skudra). Award presented to A. Ūbelis in 2008.

5.4. Memberships in committees and in scientific advisory boards of business companies or other similar tasks of no primarily academic nature

Give only the most important memberships in governmental and private structures.

Name	Tasks	Period
Bērsens Imants	Corresponding Member of Latvian Academy of Sciences (LAS)	Since 24.11.1992
	Latvian Science Council (LSC) expert in theoretical physics	11.05.2010- 11.05.2013
Bērziņa Dina	National Delegate of the FP-7 „Information and Communication Technologies” Programme Committee	Since 2007
	Delegate of the FP-7 "Energy" Programme Committee in Latvia	Since 2009
	National Delegate of the FP-7 “Joint Technology Initiatives” Programme Committee	Since 2010
	Member of the Public Authorities Board ARTEMIS JU	Since 2008
Erts Renārs	President of the SPIE Student Chapter of the University of Latvia	2007-2009
	Reviewer of the Physiological Measurement (Institute of Physics) journal	2007-
Gailīte Erna	Member of the C13 Commission “Physics for Development” of IUPAP (International Union of Pure and Applied Physics)	2006-
	Member of the IUPAP “Working Group on Women in Physics”	2006-
Gavare Zanda	Latvian Science Council (LSC) expert in laser	25.11.2010 -25.11.2013

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	physics and spectroscopy	
Rēvalde Gita	European Technology Platform: Photonics 21 „Mirror” Working Group member	Since 2007
	LSC expert in laser physics and spectroscopy	15.10.2007 - 15.10.2010 14.04.2011 - 14.04.2014
Skudra Atis	Representative of Latvia in BalticNet- Plasma Tech	Since 2006
	Representative of Latvia in the „Emerging Lighting, Electronics and Displays” Working Group of the European Platform “Photonics 21”	2007-2009
	Representative of Latvia in the „Security, Metrology and Sensors” Working Group of the European Platform “Photonics 21”	Since 2010
	LSC expert in laser physics and spectroscopy	15.10.2007 - 15.10.2010
	LSC expert in laser physics and spectroscopy	14.04.2011 - 14.04.2014
	Latvian Academic Partner Executive Secretariat of the Council for the Lindau Nobel Laureate Meetings	Since 2007
Spīgulis Jānis	Presiding member of the Latvian regional committee of ICO – International Commission for Optics	Since 2006
	Presiding member of the Latvian local section of the OSA (Optical Society of America)	Since 2006
	Co-chairman of the Baltic Chapter of SPIE – the International Society for Optical Engineering	Until 31.12.2007
	Reviewer of “Physiological Measurement”, “Applied Optics,” and “Optics Letters” journals	Since 2007-
	Corresponding member of the Latvian Academy of Sciences (Section of Physics and Technical Sciences)	Since 22.11.2007
	LAS expert in Optics, laser physics and spectroscopy, and medical physics	11.05.2010- 11.05.2013
	Representative of Latvia in the „Life Sciences and Health” Working Group of the European Platform “Photonics 21”	Since 2009
Šmaliņš Edgars	National Representative of the General Assembly of the FP-6 Excellence Network „ACCENT” project	Since 2008
Veilande Rita	LSC expert in theoretical physics	25.11.2010 -25.11.2013
Ūbelis Arnolds	National representative of the General Assembly of the FP-6 Excellence Network „ACCENT” project	Since 2004
	National Delegate of the FP-7 “People” Programme Committee	Since 2007
	National of the FP-7 JPI High-Level group	Since 2007
	National Delegate of the FP-7 „Ideas” Programme Committee	Since 2007
	National Delegate of the FP-7 „Knowledge Regions” Programme Committee	Since 2007

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	National Delegate of the FP-7 JCR	Since 2007
	National Delegate of the FP-7 „Information and Communication Technologies” Programme Committee	Since 2010
	National Representative JPI “Urban Europe”	Since 2010
	National Representative JPI “Clik`EU (Climate Knowledge for Europe)”	Since 2010

6. THE INSTITUTION'S/UNIT'S SELF-ASSESSMENT

6.1 SWOT – evaluation of the Unit's scientific strengths, weaknesses, opportunities and threats

(max 2 pages)

Analyse the Institution's/Unit's scientific expertise and achievements, funding, facilities, organisation and management. What are the major internal Strengths and Weaknesses as well as external Threats and Opportunities in the Institution's/Unit's activities and research environment? Assess what the present Strengths enable in the future and what kinds of Threats are related to the Weaknesses.

Strengths	Weaknesses
<ul style="list-style-type: none"> • A centre recognised in Latvia and Europe by its own “school” of science and scientists qualified in physics of atoms and plasma, bio-photonics and related fields • Subjects of research correspond to three scientific priorities approved for the period 2010-2013 by the Cabinet of Ministers of the republic of Latvia in 2009: <ul style="list-style-type: none"> ○ Energy and environment (technologies of production and utilisation of energy from renewable resources, technologies mitigating climate change); ○ Innovative materials and technologies (information and signal processing, nanostructured multifunctional materials); ○ Public health (means of diagnostics, bio-medical techniques and technologies). • Favourable location in the downtown (Old City of Riga). • Experience and success in the EU Framework Programmes and ESF projects; • Developed science infrastructure and partly updated experimental basis; • International cooperation in Europe and beyond; • Experience in organising international meetings • Active participation of young scientists in research in recent years; • Part of the research subjects are prospective for application, e. g., in medicine and environmental control 	<ul style="list-style-type: none"> • Uneven age structure of the research personnel – dominating groups are 25-30 years old inexperienced scientists and experienced scientists at retirement age while the group of the most productive age of 30-50 is relatively small; • Losing a few researchers of highest qualification due to poor financing; • A low number of visiting researchers and visiting professors; • A rather small number of international patents • The budget being essentially smaller compared with most research institutions in other EU countries causes problems of supporting material resources and personnel.

Opportunities	Threats
<ul style="list-style-type: none"> • Alternative opportunities need to be found under circumstances of reduced financing of the Latvian science: <ul style="list-style-type: none"> ○ a structural change, such as transforming the status to UL agency; ○ drawing international financing (FP-7 and other programmes); ○ projects financed by ERDF and ESF ○ lifelong learning and continuing education; ○ professional studies programmes for Latvian clients • utilisation of space in attic and basement to attract finances from ERDF; • saving on expenses (for electricity, heating, water, communications, etc.) • further integration of efficient research with teaching at the faculty • raising research efficiency by reducing bureaucracy. 	<ul style="list-style-type: none"> • Possible loss of young researchers and post-graduates after the end of Human Resources projects financed by ESF in case of insufficient financing from other sources: • essentially reduced budget for science including co-financing and pre-financing of the ESF projects; • a possible drop of the number of students (demographic decline + a reduced budget financing of studies) preventing the change of generations; • problems with equally high performance of research in all the currently supported fields; • the country may avoid to follow the goals of R&TD strategies of the EC appealing to economic crisis; • a drain of experienced researchers to other countries or retirement under conditions of further reducing of the budget for science to support “economic development”.

6.2. Evaluate the Unit in relation to its leading scientific competitors

(max 1 page)

How does the Institution/Unit perceive itself in the international context? What is the “niche” of the Institution/Unit in the global research environment? What characteristic features distinguish the Institution/Unit from its international competitors? What are the most relevant competitors (university departments or other research institutions) of the Institution/Unit in the international context? What are the main channels through which the Institution/Unit interacts (in both ways) with the international scientific community? Are the professors and leading researchers at the Institution/Unit active in international learned societies etc.? What are the most relevant research projects the Institution/Unit has been engaged in during the Assessment Period jointly with other Institutions in Latvia or abroad? Has the Institution/Unit been the main organizer of major international conferences?

Since 2005 the Institute is among the top ten successors in Latvia competing for financial support from EC Framework Programmes. It is the largest (by the number of staff members and annual budget) of the institutes-structural units of the University of Latvia and is ambitious to raise its legal status to that of an institute- research agency in 2012

The strengths are rooted in lasting research experience, advanced qualification of research staff, international contacts, and, due to ESF projects, attraction of young scientists. Within the nearest 2-3 years the Institute can count on annual financing of ~1 million LVL, though saving jobs for young scientists any further is not certain. On the other hand, at least 5 of the veteran scientists will be of age beyond 70-75 and cut research activity causing risk to the Institute. A possible solution in the situation might be changing the status of the Institute to UL Agency providing more liberty in management of available resources and rising responsibility of each employee for usage of the obtainable results in national economy.

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The main risk to success of the (2011-2016) strategy of UL IAPS is the inconsistency of the Latvian science policy under which financing of science and education from the National Budget may be cut considerably in nearest years, which would lead to catastrophic consequences for the Institute and the University altogether.

6.3. The Institution's/Unit's research strategy (relation to the state'/parent organisation's strategy, research priority areas, development measures, performance indicators)

(max 2 pages)

Describe the Institution's/Unit's research programme for the next 5 years, the key research objectives and means to achieve these objectives. What is the role of basic and applied research? Is there need for new knowledge, facilities; is the present level of funding sufficient for attaining the objectives laid down? Do the strategies of State and the Institution/Unit support each other? How do you take into account the possible ethical questions within research?

The main goal of the UL Institute of Atomic Physics and Spectroscopy is to sustain internationally recognised fundamental and applied research in atomic physics, spectroscopy, photonics, medical physics, and related branches of physics. The **medium-term goal** is integration in the number of national research institutes taking the leadership in photonics, optical spectroscopy, physics of the atmosphere, and research related to theoretical atomic physics. The long-term goal –essentially contribute to sooner integration of the national research activities into the ERA.

In 2012-2016 will be continued **research priorities** (see 2.1) developed in recent years – fields of science important to the strategic development of the Institute.

The strategy of the IAPS UL is developed to provide sustainable performance of tasks in accordance with the “research-education-innovation” framework and, within the 2011-2016 period, based on implementation of large projects related to the National Research and Technological Development priorities and ERA strategies, in particular including:

- two projects of the ESF 1.1.1.2 “ activities (1.9 million LVL total)
- one project of the ESF 2.1.1.1 “Support to science and research” (~0.4 million LVL)
- FP7 REGPOT project Fotonika-LV ~2.7 million LVL)

Strategy of the territorial development of the Institute is functionally and inseparably related to implementation of the strategic projects mentioned above.

The strategy of the territorial development of the Institute is functionally related to implementation of the strategic projects. The Institute has longstanding traditions as a science establishment of the University. At the present premises under different names the research of relevant profile is carried out since 1967. Up to 1980 it was the Laboratory of Spectroscopy, later – Division of Spectroscopy of the LU Department of Science. In 1994 by incorporating the laboratories of Theoretical Physics of the Institute of Physics of Latvian Academy of Sciences it was transformed into Institute of Atomic Physics and Spectroscopy of the Faculty of Physics and Mathematics of UL. In 2007 the Institute was reorganised as a structural unit of the University. Regarding decision of the research staff (from Apr 3, 2010), it was proposed to reorganise the present status into UL Institute-Agency as of Jan 1, 2012.

Within the last couple of years three researchers – Z. Gavare, A. Ļihačovs, and I. Kuzmina have been awarded doctor's degree in physics. Presently seven employees of the Institute are postgraduate students of the UL: E. Kvisis-Kipge, D. Jakovels, A. Grabovskis, I. Diebele, L. Asare, J. Lesiņš, A. Švāgere, I. Feruļova. A qualified supplement of 10 new doctors of physics to the Institute is expected in mid-term future.

6.4. The societal impact of the Institution's/Unit's activities

(max 1 page)

What are the main channels through which the Institution/Unit interacts (in both ways) with the society at large? Describe here how the Institution's/Unit's research activities and cooperation with other organizations have promoted the activities of other societal actors, e.g. industry or SMEs. What are the most important research projects the Institution/Unit has carried out with non-university partners from the public or private sector during the Assessment Period? Has the research of the Institution/Unit produced spin-off companies? Are the members of research active staff preferred experts also outside the academic research field?

The important international projects and activities undertaken and/or accomplished in the Institute during 2006 – 2011 (see 7.1) have brought international recognition. Papers of popular science reports, demonstrations of experimental devices at exhibitions in the country (Innovation tent, Day of Inventors) and abroad (Germany, Portugal, Spain) inform the population about the Institute and results it has achieved. The Institute has been active in organising the annual “Researchers Night” meetings with highschool students and other interested persons attracting 300-400 visitors each year and providing excursions to physics teachers and schoolchildren. A permanent exhibition of optics and photonics available at the ground floor is intended to become a part of the Riga Photonics Centre proposed within the REGPOT project (see www.fotonika.lv). The personnel of the Institute also participates in art projects (e. g., “Staro Riga” 2010) and advising artists in optical technologies (e. g., Prof. J. Spīgulis lecturing to the audience of RMT on “Optical technologies and visual art” 2008). Popular lectures and classes are annually provided to the participants of the “Alpha” camp.

In April 2011 the IAPS and two other research institutes established association FOTONIKA – LV with the aim to take responsibility for sustainable advancement of the sector of photonics in Latvia. The association submitted an ambitious FP-7 project of basic and applied research in traditional and innovative fields of photonics: REGPOT – 2011-1 winning 3.8 MEUR. The project will start in February 2012.

Since April 2007. IAPS is a member of the network BALTICNET-PlasmaTEC (www.balticnet-plasmatec.org). BalticNet-PlasmaTec, a borderless network, stands for a technology and market-oriented cooperation of science, research, and economics in the field of plasma technology.

In 2011 the Institute became a member of the Baltic Photonics Cluster fostering development of photonics industry and applications in the Baltic countries (<http://bpc.edicypages.com/en>).

The Institute has direct links with the emerging **industry** of photonics products in Latvia – fibre-optic cables and assemblies (Z-Light, Ltd), optical crystals and components (ISP Latvia, Ltd.), holographic products (Holograma, Ltd., Difraks, Ltd., Dardedze Holografija, Ltd.), and others.

6.5. Assess the the role of the Institution/Unit in doctoral training as well as academic and societal need for doctoral training within the Institution's/Unit's research fields

(max 1 page)

Is the placement record of the Institution's/Unit's doctoral graduates from 2006-2011 available for inspection? Has the Institution/Unit been able to place doctoral graduates into foreign universities on non-Latvian funding? Are the professors and leading researchers at the Institution/Unit active in tenure and doctoral committees etc.?

The system of promotions developed in the Institute has lately been successfully supported by special purpose ESF scholarships resulting in 1 – 3 degrees awarded each year. Special purpose scholarships for postgraduate studies have been received by a number of staff employees of the Institute: R. Erts, U. Rubīns, Z. Gavare, A. Ļihačovs, and I. Kuzmina (all of whom have been awarded doctoral degrees within the period reported). Presently postgraduate scholarships are received by D. Jakovels, I. Diebele, J. Lesiņš, and E. Kviesis-Kipge. New postgraduates are being prepared by involvement of undergraduate and graduate students in research activities of the

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Institute. As a part of professional training 20 BS, 10 MS (see 3.1), and 5 PhD theses (see 3.2) have been presented during 2008 – 2011, mainly in medical physics and optics. There is and will be a doubtless social need for studies at postgraduate level in the fields mentioned.

In the period of 2006-2011 a number of undertaken projects and activities have contributed to international identity and recognition of the Institute. Members of the research staff each year prepare and deliver 4-5 diverse courses to the faculty students apart from UL including other establishments of higher education, e. g., Riga Technical University (RTU), Ventspils Augstskola (VA). Subjects and space for research are provided to undergraduates, graduates, and post-graduates on a regular basis.

6.6. Assess the Institution's/Unit's research infrastructure available

(max 1 page)

Describe the use and availability of research infrastructures (including research equipment, computer resources, databanks, material collections, archives, research management, support services and technical staff.) Both for staff of the Institution/Unit and for outside users.

The research infrastructure of the Institute has been developed 40 years and comprises modern laboratory equipment for optical measurements, computers, wired and wireless network, high-power electric installation, glass and quartz workshop, vacuum system network, mechanical workshop, library, and auditorium of 35 seats in the 5 floors of the building at 4 Šķūņu Str. with partly utilised basement and attic (existing projects for reconstruction of the space of which are still to be accomplished). Practically all workplaces are provided with computers and Internet connection; the electronic workshops have soldering equipment and specialised measuring instruments.

The most valuable instruments and equipment have been acquired by ERDF Structural funds for improvement of equipment. (2005-2008) (See below)

Modern, exceptional, and rare scientific equipment the Institute can offer to collaboration partners include

- Portable Hg analyzer for Hg control in air (DL 1-2 ng/m³), in natural and industrial gases, water, solid samples;
- High-resolution monochromator 1000 MP with CCD detector – for spectral measurements of emission in UV and VIS spectral ranges from 25 000 cm⁻¹ to 4 800 cm⁻¹;
- High resolution Fabry-Perrot interferometer;
- Spectrometer AVASPEC 2048-2 (2006) – available for measurement of the absorption and fluorescence spectra within UV, VIS and near IR spectral region;
- Blue emission LED arranged with optical fibers at the exit, for connection – 40 mW power emitter of 405 nm;
- Hyperspectral imaging camera NUANCE.

7. FUNDING

7.1. The Institution's/Unit's funding for scientific activities

(Express as thousand LVL)

Core (maintenance) funding applies to the Institution's/Unit's budget received annually under the Regulations No1316 adopted by the Cabinet of Ministers on 10th November 2009. The funding covers both the salary costs with societal charges of the staff and the operational cost. Use of research funding received from external sources, indicated per year.

Source of Funding	2006	2007	2008	2009	2010	2011*	Total
State budget funding							
Core (maintenance) funding	39.830	83.898	90.940	46.930	19.854	21.923	303.375
State budget funding for research development in higher educational establishments	0	0	0	0	0	0	0
Grants of the Latvian Council of Science	19.148	21.946	22.421	16.189	15.126	13.626	108.456
State Research Programs	3.600	5.470	7.658	4.180	2.873	3.024	26.805
Other (UL research, development, educational projects)	45.540	5.000	9.130	0	0	0	59.670
Other funding							
Contract research	22.333	16.000	21.188	18.969	4.919	0	83.409
ESF, ERAF funding	171.667	152.365	195.653	24.870	67.5917	1084.109	2304.581
Framework Program projects	37.162	33.747	30.722	18.520	0	44.429	164.580
Other international project funding	1.648	6.500	0	1.670	2.900	0	12.718
Private funding	2.700	0	0	0	0	0	2.700
Other							
Total	343.628	324.926	377.712	131.328	721.589	1167.111	3066.294

2011 funding data are approximate.*

7.1.1. Characterise the international competitiveness of the Institution/Unit in attracting the funding (number of projects granted, types of the projects (EU Framework Programmes, European Cooperation in Science and Technology (*COST*), North Atlantic Treaty Organisation (*NATO*), other international projects) in 2006-2011)
(*name of project, project execution time, allotted funds for project*)

The Institute has attracted considerable financing from the ESF, Framework Programmes, and other sources:

EU Framework Program projects: (*Networks of Excellence, Specific targeted research Project, Collaborative Project*):

1. "ACCENT – Change of atmospheric composition: a European Network" – EU FP-6 project of the **Network of Excellence** Contract No. 505337 2004-2008 (01.03.2004 - 01.03.2008) - 50 000 EUR (36 000 LVL); 2009 - 18 520 LVL.
2. EU FP-7 project "Global Mercury Observation Systems", 2010-2015, financing 91134 EUR (FP-7) and 13709 LVL.

Other EU Framework Program projects:

1. TOWARDS - "Integration Approach Towards Sustainability", first conference, FP-5project. Contract HPCF-CT-2002-00102 (01.10.2002 - 30.09.2005 – 2006) 1 700 LVL
2. SHARING - "Integrative Approaches Towards Sustainability," second conference, FP-6 project. Contract 009244-(GOCE)-SHARING (01.09.2004-31.03.2006-extended) 15 706 LVL
3. Baltic States Network Project "Women in Science and High Technologies" FP6 017170: BASNET (01.01.2006 - 31.12.2008) 13 878 LVL

Other international projects:

(NATO, The scientific cooperation of Latvia, Lithuania and Taiwan, bilateral co-operation projects (Latvia-Belorussia, Latvia-France), LIFE, others)

1. "Effective lighting for the 21st century." European Cooperation in the Field of Scientific and Technical Research, EC COST Action G529 (2001 - 2006). 500 EUR 2006
2. "Clinical Research Physician," EC LEONARDO DA VINCI project (2003 – 2006)
3. Co-operation Programme in the Baltic Sea Region: PHARE 2003. LV2003/005-876/MPF/0014 (11.12.2005 – 30.11.2006) 29 040 LVL
4. EUSCEA project "WONDERS 07" – New PPG equipment popularization and demonstration in Spain and Portugal, 2007
5. "Atomic physics and Spectroscopy" (interational cooperation), 2009, 1 670 LVL.
6. Cooperation in laboratory and field research on atmospheric photochemistry. Cooperation with the Laboratory for Atmospheric and Climate Science, CSIC-JCCM, Toledo, Spain. (14.12.2009-31.12.2010) 2 900 LVL.
7. Combination of electroporation and sonoporation for efficient drug delivery into cells and tissues for tumor treatment. MUTUAL FUNDS TAIWAN-LATVIA-LITHUANIA COOPERATION PROJECT. (2011–2013) 14 500 LVL 2011

7.1.2 Characterise the potential contribution of the Institution/Unit in economical development – the orientation to commercialization of the research and implementation of the results of research (collaboration with industry partners/comersants, contract research, Market-oriented research projects, and International support program for market-oriented R&D and innovation projects by industry to develop innovative and competitive products (*EUREKA*) in 2006.-2011):

(name of project, time period, funding)

Three of the four laboratories of the Institute have made studies oriented to practical application in different sectors of economics including production of *high-tech* optical components by SMEs, lighting, medical services, detection and control of environmental pollution, and other. A number of practical projects have been completed:

Market-oriented research projects

1. "Effective lighting for the 21st century." European Cooperation in the Field of Scientific and Technical Research, EC COST Action G529 (2001 - 2006). 500 EUR 2006
2. "Clinical Research Physician," EC LEONARDO DA VINCI project (2003 – 2006) 5 526 EUR 2006
3. Special quartz and glass products and constructions for science and practice (TOP 05-20) (20.06.2005 – 20.11.2006) 6 462 LVL
4. "Taiwan-Baltic theoretical studies in atomic spectroscopy and behaviour of atoms in strong laser fields" (IZM 06-0501/6; LU 2008/2407) (2006-2009) 20 680 LVL
5. Prototype device for functional neurostimulation (IZM TOP 08-06) (01.08.2008 – 30.11.2009) 12000 LVL (01.12.2009 - 31.03.2010) 8 260 LVL

Contract research projects

1. Development of "PPG bracelet" prototype 2006, *order research from the Private Company "PRT"* 01.06.2006-01.10. 2006 2700 LVL
2. Service of University of Latvia: science equipment popularisation, *DPD (UL) project*, 2007, 1000 LVL
3. Development of the wireless electrocardio- device, *Innovation Centre (UL) project*, (2006-2007) (01.10.2006 –01.05.2007) 4000 LVL

Others

1. "Information technologies for optical cardio-vascular monitoring," **ERDF** project (2006-2008) 238 000 LVL
2. "New methods and technologies for production and application of optical fibres," **ERDF** project (2006- 2008) 148 039 LVL
3. BUSNET - Building Useful NCP Networks. EU FP6 project Nr. 003336 of WP1, WP4 un WP5 subtasks1-3, 4-1, 4-2, 4-3, and 5-3. (Contractor SPIE) (07.2006 – 05.2007) 4400 LVL.
4. Worktop for glass handling (Purchase and installing), **UL** development project (2006-2007) 13 000 LVL
5. Study of hydroxiapatite powder treatment by RF plasma and deposition on a surface in electric field (Biomaterial unit, RTU) (14.12.2009-31.12.2010) 4 919LVL.
6. Controll of mercury contamination in the UL IP, 2009, 1 029 LVL.
7. "Spectrometric detection of heavy metal pollutants" ESF 1.1.1.2. project (2009-2012) 636 600 LVL
8. "Biophotonics research group," ESF 1.1.1.2. project (2009-2012) 1 331 450 LVL
9. "New optical technologies for distant skin diagnostics", ERDF project (2010-2013); (2010-2011) 141 793LVL

7.2. Evaluate the role of different funding sources (State and different funding organisations) in promoting the scientific and societal impact of research

(max 1 page)

Describe how the funding awarded by State and other sources has supported the Institution/Unit in achieving the the Institution's/Unit's scientific and societal impact. Scientific impact refers to the contribution of the research carried out by the Institution/Unit to the development of the field. Societal impact refers to the ability of the research activities to promote values that are considered as important in society.

Research of the UL IAPS is partly supported from the basic National budget for research the main financing coming from international research funding (see Table 7.1) obtained from open call for project proposals. Though rather small, the National budget funding has been helpful to save the Institute at the beginning of 1990-ies and critical situations later on. Financing from National budget, structural and other international fundings has facilitated the scientific and social achievements of the Institute the activities of which have earned recognition in the country and abroad. The Institute is planning to advance further development providing knowledge and novel technologies.