

## **Project: FOTONIKA-LV**

# **Unlocking and Boosting Research Potential for Photonics in Latvia – Towards Effective Integration in the European Research Area**

**Grant agreement no: 285912**

## **Interim report on Participation in high level international conferences**

**WP4. Knowledge Transfer and Training: Organisation of Workshops,  
Conferences and Research Courses**

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<b>D.Berzina</b>	WP4 Leader	<b>31 July 2013</b>
<b>S.Smalina</b>	Project Manager	<b>31 July 2013</b>
<b>A.Ūbelis</b>	Project Co-ordinator	<b>31 July 2013</b>

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## 1. Introduction

Participation to the international conferences / workshops / etc. is a part of Work Package 4 “Knowledge Transfer and Training: Organisation of Workshops, Conferences and Research Courses” within FOTONIKA-LV project; in particular, the Task 4.1 foresees “Presentation and testing the FOTONIKA-LV researches community scientific results at high level international conferences”.

The main objective of the Work Package is to:

- facilitate development and transfer of knowledge in photonics at national and international level,
- raise publicity and visibility of FOTONIKA-LV researchers community,
- become a recognised partner in the European Research Area (ERA).

The aim of the Task 4.1 is to:

- present at least 24 reports (on average 8 presentations per year) on the results of basic and applied research obtained in photonics domain in Riga by participation at international conferences in the photonics fields,
- promote *Rīgas Fotonikas Centrs* in general,
- establish contacts with world class scientists for further collaboration in the field.

Task 4.1 runs throughout the whole project duration. This Report covers 1<sup>st</sup> reporting period from 1 February 2012 to 31 July 2013.

## 2. Background information

Researchers from all three institutes of FOTONIKA-LV association: Institute of Atomic Physics and Spectroscopy, Institute of Astronomy as well as Institute of Geodesy and Geoinformatics have been active in presentation and testing research results at conferences on topics dealing with fundamental and applied photonics, including aerospace applications, atmosphere and biosphere research, optical imaging, biomedical optics, cardiovascular monitoring as well as micrometre and nanometre scale research. Each of the three institutes has long track record of excellent achievements, for example: Institute of Atomic Physics and Spectroscopy – is EU Centre of Excellence in Nanosciences and Applications; Institute of Astronomy – operates two observatories and is internationally well known for its activities in classical astronomy and satellite laser ranging technologies; Institute of Geodesy and Geoinformatics – the newest as re-established only after re-gain of independence rapidly collects international recognition.

Oral presentations at conferences or international seminars allow sharing of research results with other scientists. FOTONIKA-LV participants are asked to make presentations convincing the audience that the research on photonics carried out in Riga is important, valid, and relevant to them – the main aim is to inform and during social gatherings to provide additional information on activities, resources and achievements to attract established scientists and lay foundation for new collaborations.

The leading scientists Professor Janis Spigulis, Dr. Maris Abele, Dr. Janis Balodis, Dr. Ilmars Eglitis, Dr. Arnolds Ubelis prove long list of publications and invited speeches therefore priority for participation support was given to young researchers / PhD students (frequently together with scientific supervisor supported from other funding resources or vice versa) and recruited / repatriated researchers.

Young researchers in majority take the advantage of a poster report. FOTONIKA-LV participants are assisted to make poster presentations that are effective and focused to engage colleagues in conversation and get main point(s) across to as many people as possible. The overall aim is the same as for oral presentation – to grasp the interest of attendees, inform on achievements and accumulate experience for further oral presentations or even invited speeches.

The Task 4.1 is carried out in synergy with Task 4.2 “Organisation of the 1<sup>st</sup> International Conference and Training course “Photonics Technologies - Riga 2012”” and Task 4.5 “Organisation of the 3<sup>rd</sup> International Conference on Integrative Approaches towards Sustainability “Knowledge”” in training of young researchers for presentations at International conferences. Among the most successful ones attracting interest of established foreign researchers can be mentioned:

- Kalvis Salmiņš – SLR technologies including working visit to the Geodynamics Observatory: presentation at Research training course on “Photonics Technologies”;
- Elīna Kaziņa – The quest of weak carbon stars in the Milky Way Galaxy: presentation on “Photonics Technologies” Conference parallel session;
- Aigars Apsitis – Mobile ion beam instrument: presentation at “Photonics Technologies” Conference parallel session;
- Inese Janpaule – Photonics results applied in GNSS and geoid determination: poster at “Photonics Technologies” Conference;

- Aija Laure – Photonics technologies in astrospectroscopy: poster at “Photonics Technologies” Conference;
- Lana Saksone – Long term non-formal education - a key to qualitative involvement of society in sustainable development: presentation at “Knowledge” Conference parallel session;
- Egils Bogans – Analysis of Mercury Pollution in Air in Urban Area of Riga using Atomic Absorption Spectrometry: poster at “Knowledge” Conference.

### 3. Promotion of basic and applied research results obtained in Riga for photonics domain

The initially proposed list of conferences had to be changed due to several reasons since in 2011 when the project was proposed, the full information on conferences was not available; for example: Photonics West 2012 was held in January - project started in February, highly costly trips outside EU to Australia (Nuclei in the cosmos XII) and China (XXVIII International Astronomical Union General Assembly) were skipped and substituted with European travels, SPIE/OSA European Conferences on Biomedical Optics was not held in 2012, etc.

During the first reporting period in total 17 participations of 13 scientists were supported in attending 15 diverse high-level international events: 8 conferences, 2 general assemblies, 1 congress, 1 cluster meeting, 1 workshop, 1 summer school where in 11 poster reports and 7 oral presentations research results of FOTONIKA-LV participants were disclosed (Annex 1).

#### 3.1. Overview of events

The results were presented at photonics related conferences and other events throughout Europe including 4 travels outside EU: Russia, Ukraine, Georgia and Canada. The conference themes covered biomedical and geosciences, atomic and molecular physics as well as stellar systems and satellite services (Table 1).

**Table 1.** List of attended conferences

	<b>Conference</b>	<b>www</b>	<b>Place</b>	<b>Dates</b>
1.	21 <sup>st</sup> International Conference on Spectral Line Shapes – ICSLS 21	<a href="http://icsls21.spbu.ru">http://icsls21.spbu.ru</a>	St. Petersburg, Russia	3-9 June, 2012
2.	3 <sup>rd</sup> International Congress on Biophotonics – ICOB 2012	<a href="http://www.icob2012.org">www.icob2012.org</a>	Jena, Germany	19-21 June, 2012
3.	European Geosciences Union General Assembly 2012 – EGU GA 2012	<a href="http://www.egu2012.eu/">www.egu2012.eu/</a>	Vienna, Austria	22-27 June, 2012
4.	17 <sup>th</sup> Cambridge Workshop on Cool Stars, Stellar Systems and the Sun – CoolStars 17	<a href="http://www.coolstars17.net">www.coolstars17.net</a>	Barcelona, Spain	24-29 June, 2012
5.	44 <sup>th</sup> Conference of the European Group on Atomic Systems – EGAS 44	<a href="http://www.egas44.org">www.egas44.org</a>	Gothenburg, Sweden	9-13 July, 2012

	<b>Conference</b>	<b>www</b>	<b>Place</b>	<b>Dates</b>
6.	23 <sup>rd</sup> International Conference on Atomic Physics – ICAP 2012	<a href="http://www-lpl.univ-paris13.fr/icap2012">www-lpl.univ-paris13.fr/icap2012</a>	Palaiseau, France	23-27 July, 2012
7.	The Zeiss-50 telescope: the first hundred years working for astronomy	<a href="http://www.crao.crimea.ua/index.php?option=com_content&amp;view=article&amp;id=381&amp;Itemid=55&amp;lang=ru">www.crao.crimea.ua/index.php?option=com_content&amp;view=article&amp;id=381&amp;Itemid=55&amp;lang=ru</a>	Nauchny, Crimea Ukraine	9-13 September, 2012
8.	2012 Joint Conference "Satellites in the Service of Humanity"	<a href="http://www.kaconf.org/2012/c4p_KA.php">www.kaconf.org/2012/c4p_KA.php</a>	Ottawa, Canada	24-27 September, 2012
9.	First international GOCE SOLID EARTH workshop	<a href="http://www.itc.nl/gocesolidearth">www.itc.nl/gocesolidearth</a>	Enschede, the Netherlands	16-17 October, 2012
10.	Cold and Ultracold Molecules	<a href="http://www.esf.org/serving-science/conferences/details/2012/confdetail396.html">www.esf.org/serving-science/conferences/details/2012/confdetail396.html</a>	Obergurgl, Austria	18-23 November, 2012
11.	European Geosciences Union General Assembly 2013 – EGU GA 2013	<a href="http://www.egu2013.eu">www.egu2013.eu</a> ; <a href="http://meetingorganizer.copernicus.org/EGU2013/posters/11671">http://meetingorganizer.copernicus.org/EGU2013/posters/11671</a>	Vienna, Austria	7-12 April, 2013
12.	23 <sup>rd</sup> EUPOS International Conference	<a href="http://eupos.vgtu.lt/index.php?page_name=organisation">eupos.vgtu.lt/index.php?page_name=organisation</a>	Tbilisi, Georgia	7-8 May, 2013
13.	7 <sup>th</sup> European Photonics Cluster and National Technology Platform Meeting	<a href="http://cordis.europa.eu/fp7/ict/photonics/cluster2052013_en.html">http://cordis.europa.eu/fp7/ict/photonics/cluster2052013_en.html</a>	Brussels, Belgium	22 May, 2013
14.	School of Biophotonics 2013	<a href="http://www.biophysics.sk/en/event/1/school-of-biophotonics-2013">www.biophysics.sk/en/event/1/school-of-biophotonics-2013</a>	Kosice, Slovakia	17-30 June, 2013
15.	12 <sup>th</sup> International Conference on Education and Training in Optics and Photonics – ETOP 2013	<a href="http://www.optica.pt/etop2013/index.htm">www.optica.pt/etop2013/index.htm</a>	Porto, Portugal	23-26 July, 2013



### 3.2. Participants

The project supported employees from all the three association FOTONIKA-LV institutes and associated University of Latvia Laser Centre, 2 repatriates as well as 2 recruits – visiting scientists from Russia and Bulgaria (Table. 2). Among 17 supported conference attendances 5 are young researchers / PhD students who have contributed in total with 7 reports: 3 oral presentation and 4 posters.

**Table 2.** List of supported conference participants

	<b>Participant</b>	<b>Affiliation; Status</b>	<b>Participation; Presentation</b>
1.	Balodis Jānis	Institute of Geodesy and Geoinformatics; Lead researcher	2 participations - 2 Reports
2.	Bērziņš Uldis	<i>Repatriate</i> to the Institute of Atomic physics and Spectroscopy; Professor	1 participation - Poster
3.	Bezuglov Nikolai	<i>Recruit</i> from Russia; Professor	1 participation - Poster
4.	Brūvelis Mārtiņš	Laser Centre; <i>Young researcher</i>	1 participation - Report + Poster
5.	Eglīte Mārīte	Institute of Astronomy; Lead researcher	1 participation - Report
6.	Eglītis Ilgmārs	Institute of Astronomy; Lead researcher	1 participation - Poster
7.	Ekers Aigars	<i>Repatriate</i> to the Institute of Atomic physics and Spectroscopy; Lead researcher	2 participations - 2 Posters
8.	Feruļova Inesa	Institute of Atomic physics and Spectroscopy; <i>Young researcher</i>	1 participation - School attendance
9.	Haritonova Diāna	Institute of Geodesy and Geoinformatics; <i>Young researcher</i>	1 participation - Poster
10.	Janpaule Inese	Institute of Geodesy and Geoinformatics; <i>Young researcher</i>	2 participations - Report + 2 Posters
11.	Kirova Teodora	<i>Recruit</i> from Bulgaria; Lead researcher	1 participation - Poster
12.	Lesiņa Natālija	Institute of Atomic physics and Spectroscopy; <i>Young researcher</i>	1 participation - Report
13.	Spīgulis Jānis	Institute of Atomic physics and Spectroscopy; Professor	2 participations - Report + Poster

### 3.3. Reported themes

Although majority of presentations were poster type (Table 3) it does not diminish the value of results – during poster sessions discussions are possible with more scientists and it enables broader dissemination of the FOTONIKA-LV results among European research constituency.

**Table 3.** List of reports

	<b>Heading</b>	<b>Type of report</b>
1.	Analytical model of transit time broadening for two-photon excitation in a three-level ladder and its experimental validation	poster
2.	Atomic Physics Group in RIGA and GRIBAM “Gothenburg Riga Ion Beam Apparatus - Mobile”	poster
3.	Effects of dark-state formation in the hyperfine excitation spectra of Na atoms	poster
4.	ESF project “Biophotonics research group” at University of Latvia	poster
5.	Eventual Participation in GMES of Institute of Geodesy and Geoinformation	poster
6.	GNSS station displacement analysis	poster
7.	Improvement of Latvian Geoid Model Using GOCE Data and Vertical Deflection Measurements	poster
8.	Laser manipulation of adiabatic states and its application towards resolution of hyper-fine structure and population switching	poster
9.	Manifestation of dark state formation in Na hyperne level system	poster
10.	New Carbon Stars in Region $\delta > 60^\circ$	poster
11.	Two Component Superluminal Light	poster
12.	120 cm Baldone Ceiss telescope	oral report
13.	Doppler Profile Particularities in Supersonic Beams for Circular, Square and Arbitrary Collimating Apertures	oral report
14.	EUPOS-Riga certification procedure in Latvia	oral report
15.	GNSS Network Time Series Analysis	oral report
16.	Hands-on optics and photonics outreach in Riga	oral report
17.	Photonics activities in Latvia and Baltics	oral report
18.	Research Activities in Geodesy at the University of Latvia	oral report

Summary for majority of presentations is published in abstract books of the respective conferences; some of the presentations resulted in submitted papers which will be published and available for broader research community. For example: “120 cm Baldone Ceiss telescope” will be published in "Известия Крымской Астрофизической обсерватории"; “Hands-on optics and photonics outreach in Riga” will be published in the Proceedings of 12<sup>th</sup> International Conference on Education and Training in Optics and Photonics.

### 3.4.Outcomes

The main outcome of the Task 4.1 is dissemination of the achieved results and promotion of the association FOTONIKA-LV in general. “Many interesting and informative lectures and posters; practical and theoretical knowledge” – are the most frequently mentioned individual benefits linked to the conference participation.

Institute of Atomic Physics and Spectroscopy has long-lasting tradition to come together during University of Latvia annual scientific conference in January-February to inform colleagues about research results presented on international conferences during the previous academic year. For the first time this habit was extended to the whole association FOTONIKA-LV and a section on Photonics was held on 1 February 2013 [http://dspace.lu.lv/dspace/bitstream/handle/7/1379/LU-71\\_konf-programma\\_2013.pdf;jsessionid=51898A72C553268F8C417544AA9B1BFC?sequence=1](http://dspace.lu.lv/dspace/bitstream/handle/7/1379/LU-71_konf-programma_2013.pdf;jsessionid=51898A72C553268F8C417544AA9B1BFC?sequence=1) (pp. 94-100). Book of Abstracts (Annex 2) consolidates first year scientific outcomes of the FOTONIKA-LV project including some abstracts of the conference participation financially supported under project Task 4.1. The booklet on research results is widely disseminated at all international as well as in Latvia organised events with international participation.

Supported participants report also on new contacts established not only in Europe but also beyond: Ukraine, USA (Table 4):

**Table 4.** Established contacts

	<b>Institution</b>	<b>Collaboration contact</b>
1.	Aarhus University, Denmark	Georg Bruun
2.	Becker and Hickl GmbH, Germany	Wolfgang Becker
3.	DTU Space (National Space institute), Denmark	Per Knudsen
4.	European Science Foundation (ESF)	Thibaut Lery
5.	European Space Agency (ESA)	Rune Floberghagen
6.	Institute of Astronomy, Russian Academy of Sciences	Igor S.Savanov
7.	Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation, Russian Academy of Sciences	Moisey A.Livshits
8.	International Society for Optics and Photonics, Slovakia	Alzbeta Chorvátová
9.	Odessa Astronomical Observatory, Ukraine	Sergii A.Korotin
10.	Ohio State University, USA	Robert F.Wing
11.	P.J.Safarik University, Slovakia	Pavol Miškovský
12.	Research Institute of Geodesy, Academy of Sciences of the Czech Republic	Jaroslav Šimek

	<b>Institution</b>	<b>Collaboration contact</b>
13.	Stony Brook University, Physics and Astronomy Department, USA	Harold Metcalf
14.	Technological Educational Institute of Crete (TEI), Greece	Georgios Kavoulakis
15.	Universidad Autónoma de Madrid, Spain	Luis Viña
16.	Universita' di Trento, INO-CNR BEC Center and Dipartimento di Fisica, Italy	Iacopo Carusotto
17.	Universität Innsbruck, Austria	Hans-Christoph Naegerl
18.	Université de Strasbourg, France	Guido Pupillo
19.	Université Paris, Laboratoire Aimé Cotton, France	Olivier Dulieu
20.	University of Cambridge, Cavendish Laboratory, UK	Richard Phillips
21.	University of Helsinki, Finland	Marjaana K.Lindborg
22.	University of Pisa, Italy	M.Allegri

## 4. Conclusions

According to the WP4 objectives 17 researchers were supported in attending 15 international events under Task 4.1 where research results in photonics domain were presented, *Rīgas Fotonikas Centrs* was promoted and more than 20 contacts with world class scientists for further collaboration in the field were established.

Although it was planned to support only 12 reports on international events during 1<sup>st</sup> reporting period, project managers decided to reallocate under-spent resources for conference organisation in Riga: Task 4.2 “Organisation of the 1<sup>st</sup> International Conference and Training course “Photonics Technologies - Riga 2012”” and Task 4.5 “Organisation of the 3<sup>rd</sup> International Conference on Integrative Approaches towards Sustainability “Knowledge”” in order to support more participations from association FOTONIKA-LV to high level international events. Also, several other funding sources were used to support attendance of conferences therefore the average expenditures per participation are lower than planned – about 650 € instead of planned 800 €.

The visits of association FOTONIKA-LV participants promoted not only research carried out in the three scientific institutes but also relevant expertise of research and technology development in photonics domain in Riga and Latvia and existing links to photonics related industry, including a number of companies: Z-Light Ltd, Holograma Ltd., HEE Photonic Labs Ltd., etc. since nowadays no significant research results can be achieved within single organisation only – cooperation of expertise and skills is essential for achieving of world-class outstanding results.

**Annex 1: Extended list of Conference participants**

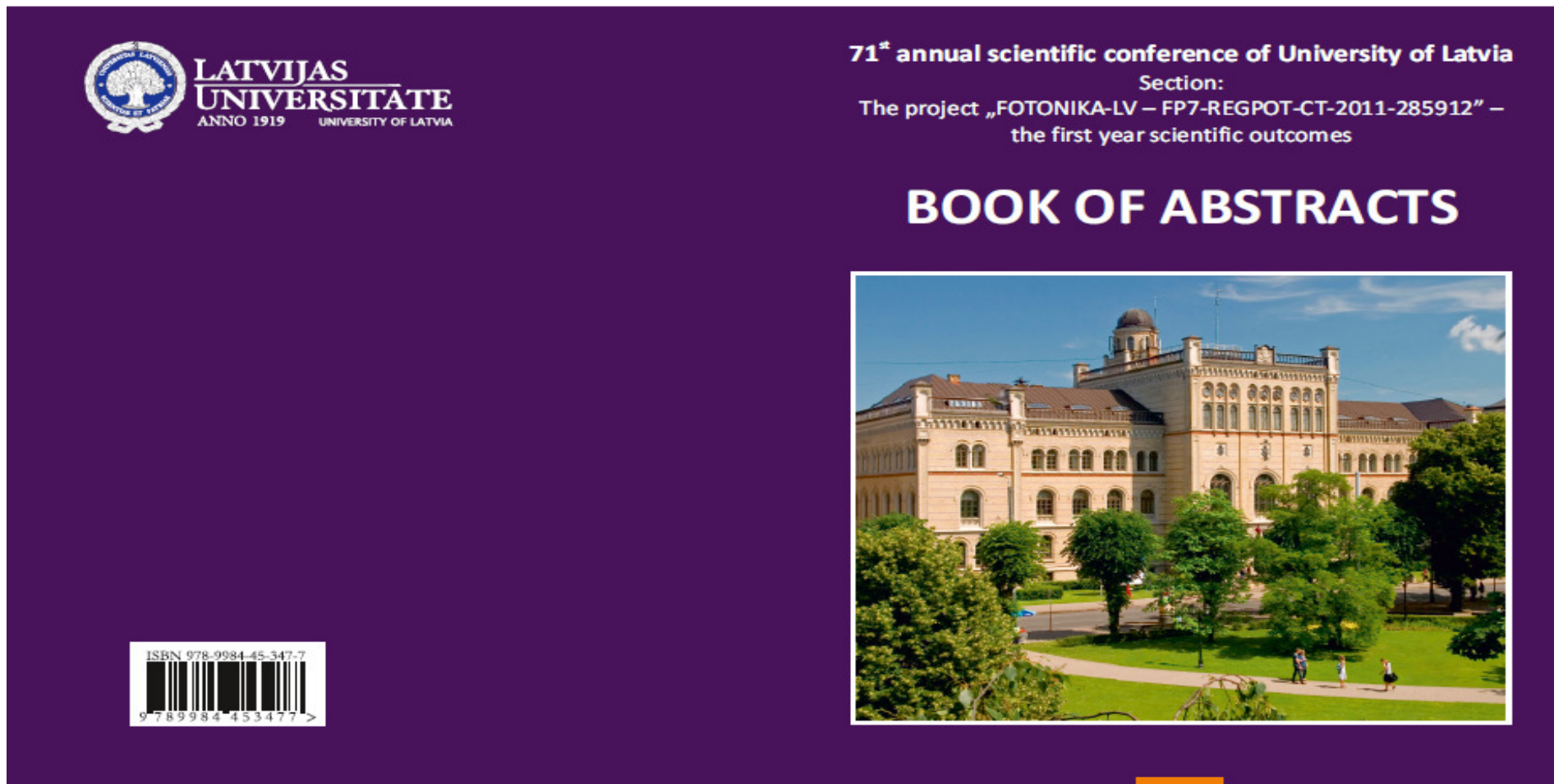
	<b>Name</b>	<b>Location</b>	<b>Dates</b>	<b>Conference</b>	<b>www</b>	<b>Presentation title</b>
1.	<b>Brūvelis</b> Mārtiņš	St. Petersburg, <b>Russia</b>	3-9 June, 2012	21 <sup>st</sup> International Conference on Spectral Line Shapes – ICSLS 21	<a href="http://icsls21.spbu.ru">http://icsls21.spbu.ru</a>	<b>Report:</b> Doppler Profile Particularities in Supersonic Beams for Circular, Square and Arbitrary Collimating Apertures; <b>poster:</b> Analytical model of transit time broadening for two-photon excitation in a three-level ladder and its experimental validation
2.	<b>Spīgulis</b> Jānis	Jena, <b>Germany</b>	19-21 June, 2012	3 <sup>rd</sup> International Congress on Biophotonics – ICOB 2012	<a href="http://www.icob2012.org">www.icob2012.org</a>	<b>poster:</b> ESF project “Biophotonics research group” at University of Latvia
3.	<b>Janpaule</b> Inese	Vienna, <b>Austria</b>	22-27 June, 2012	European Geosciences Union General Assembly 2012 – EGU GA 2012	<a href="http://www.egu2012.eu/">www.egu2012.eu/</a>	<b>Report:</b> GNSS Network Time Series Analysis; <b>poster:</b> Eventual Participation in GMES of Institute of Geodesy and Geoinformation
4.	<b>Eglītis</b> Ilgmārs	Barcelona, <b>Spain</b>	24-29 June, 2012	17 <sup>th</sup> Cambridge Workshop on Cool Stars, Stellar Systems and the Sun – CoolStars 17	<a href="http://www.coolstars17.net">www.coolstars17.net</a>	<b>poster:</b> New Carbon Stars in Region $\delta > 60^\circ$
5.	<b>Bērziņš</b> Uldis	Gothenburg, <b>Sweden</b>	9-13 July, 2012	44 <sup>th</sup> Conference of the European Group on Atomic Systems – EGAS 44	<a href="http://www.egas44.org">www.egas44.org</a>	<b>poster:</b> Atomic Physics Group in RIGA and GRIBAM “Gothenburg Riga Ion Beam Apparatus - Mobile”
6.	<b>Kirova</b> Teodora	Gothenburg, <b>Sweden</b>	9-13 July, 2012	44 <sup>th</sup> Conference of the European Group on Atomic Systems – EGAS 44	<a href="http://www.egas44.org">www.egas44.org</a>	<b>poster:</b> Manifestation of dark state formation in Na hyperne level system

	Name	Location	Dates	Conference	www	Presentation title
7.	<b>Bezuglov</b> Nikolai	Palaiseau, <b>France</b>	23-27 July, 2012	23 <sup>rd</sup> International Conference on Atomic Physics - ICAP 2012	<a href="http://www-lpl.univ-paris13.fr/icap2012">www-lpl.univ- paris13.fr/icap2012</a>	<b>poster:</b> Two Component Superluminal Light
8.	<b>Ekers</b> Aigars	Palaiseau, <b>France</b>	23-27 July, 2012	23 <sup>rd</sup> International Conference on Atomic Physics - ICAP 2012	<a href="http://www-lpl.univ-paris13.fr/icap2012">www-lpl.univ- paris13.fr/icap2012</a>	<b>poster:</b> Effects of dark-state formation in the hyperfine excitation spectra of Na atoms
9.	<b>Eglite</b> Mārīte	Nauchny, Crimea <b>Ukraine</b>	9-13 September, 2012	The Zeiss-50 telescope: the first hundred years working for astronomy	<a href="http://www.crao.crimea.ua/index.php?option=com_content&amp;view=article&amp;id=381&amp;Itemid=55&amp;lang=ru">www.crao.crimea.ua/index. php?option=com_content&amp; view=article&amp;id=381&amp;It mid=55&amp;lang=ru</a>	<b>Report:</b> 120 cm Baldone Ceiss telescope
10.	<b>Balodis</b> Jānis	Ottawa, <b>Canada</b>	24-27 September, 2012	2012 Joint Conference "Satellites in the Service of Humanity"	<a href="http://www.kaconf.org/2012/c4p_KA.php">www.kaconf.org/2012/c4p _KA.php</a>	<b>Report:</b> Research Activities in Geodesy at the University of Latvia
11.	<b>Janpaule</b> Inese	Enschede, the <b>Netherlands</b>	16-17 October, 2012	First international GOCE SOLID EARTH workshop	<a href="http://www.itc.nl/gocesolidearth">www.itc.nl/gocesolidearth</a>	<b>poster:</b> Improvement of Latvian Geoid Model Using GOCE Data and Vertical Deflection Measurements
12.	<b>Ekers</b> Aigars	Obergurgl, <b>Austria</b>	18-23 November, 2012	Cold and Utracold Molecules	<a href="http://www.esf.org/serving-science/conferences/details/2012/confdetail396.html">www.esf.org/serving- science/conferences/details /2012/confdetail396.html</a>	<b>poster:</b> Laser manipulation of adiabatic states and its application towards resolution of hyper-fine structure and population switching
13.	<b>Haritonova</b> Diāna	Vienna, <b>Austria</b>	7-12 April, 2013	European Geosciences Union General Assembly 2013 – EGU GA 2013	<a href="http://www.egu2013.eu;">www.egu2013.eu;</a> <a href="http://meetingorganizer.copernicus.org/EGU2013/posters/11671">http://meetingorganizer.cop ernicus.org/EGU2013/post ers/11671</a>	<b>poster:</b> GNSS station displacement analysis
14.	<b>Balodis</b> Jānis	Tbilisi, <b>Georgia</b>	7-8 May, 2013	23 <sup>rd</sup> EUPOS International Conference	<a href="http://eupos.vgtu.lt/index.php?pg_name=organisation">eupos.vgtu.lt/index.php?pg _name=organisation</a>	<b>Report:</b> EUPOS-Riga certification procedure in Latvia
15.	<b>Spīgulis</b> Jānis	Brussels, <b>Belgium</b>	22 May, 2013	7 <sup>th</sup> European Photonics Cluster and National Technology Platform Meeting	<a href="http://cordis.europa.eu/fp7/ict/photonics/cluster22052013_en.html">http://cordis.europa.eu/fp7/ ict/photonics/cluster22052 013_en.html</a>	<b>Report:</b> Photonics activities in Latvia and Baltics



	<b>Name</b>	<b>Location</b>	<b>Dates</b>	<b>Conference</b>	<b>www</b>	<b>Presentation title</b>
16.	<b>Feruļova</b> Inesa	Kosice, <b>Slovakia</b>	17-30 June, 2013	School of Biophotonics 2013	<a href="http://www.biophysics.sk/en/event/1/school-of-biophotonics-2013">www.biophysics.sk/en/event/1/school-of-biophotonics-2013</a>	Summer School
17.	<b>Lesiņa</b> Natālija	Porto, <b>Portugal</b>	23-26 July, 2013	12 <sup>th</sup> International Conference on Education and Training in Optics and Photonics	<a href="http://www.optica.pt/etop2013/index.htm">www.optica.pt/etop2013/index.htm</a>	<b>Report:</b> Hands-on optics and photonics outreach in Riga

## Annex 2: Abstracts of the 71<sup>st</sup> annual Scientific conference University of Latvia, Photonics section



Cover sheet, content available upon request

**Annex 3: Abbreviations**

<b>Abbreviation</b>	
Association FOTONIKA-LV	Association of three University of Latvia research institutes: Institute of Atomic Physics and Spectroscopy, Institute of Astronomy and Institute of Geodesy and Geoinformation
CoolStars 17	17 <sup>th</sup> Cambridge Workshop on Cool Stars, Stellar Systems and the Sun
D	Deliverable
EGAS 44	44 <sup>th</sup> Conference of the European Group on Atomic Systems
EGU	European Geosciences Union
EGU GA 2012 / 2013	European Geosciences Union General Assembly 2012 / 2013
ERA	European Research Area
ESA	European Space Agency
ESF	European Structural Fund
ETOP 2013	12 <sup>th</sup> International Conference on Education and Training in Optics and Photonics
EU	European Union
EUPOS	European Position Determination System
GMES	Global Monitoring for Environment and Security
GNSS	Global Navigation Satellite System
GOCE	Gravity Field and Steady-State Ocean Circulation Explorer
GRIBAM	Gothenburg Riga Ion Beam Apparatus
ICAP 2012	23 <sup>rd</sup> International Conference on Atomic Physics
ICOB 2012	3 <sup>rd</sup> International Congress on Biophotonics
ICSLS 21	21 <sup>st</sup> International Conference on Spectral Line Shapes
Na	Sodium
PhD	Doctorate (usually based on at least 3 years graduate) study and a dissertation
Photonics21	European Technology Platform for photonics
<i>Rīgas Fotonikas Centrs</i>	Riga Photonics Centre (in Latvian)
SLR	Satellite Laser Ranging
SPIE/OSA	International Society for Optics and Photonics / Optical Society of America
WP	Work package