




# SPIE.

CONNECTING MINDS.  
ADVANCING LIGHT.

## Annual report

# Institute of Radiophysics and Electronics SPIE Student Chapter Activity 2015



**SPIE**  
**Student Chapter**  
Institute of Radiophysics and Electronics



Dear colleagues,

IRE SPIE Student Chapter greets you in the coming year! During 2015 we continued our activities and now tell about our achievements.

For the next year we are going to realize a lot of different new ideas and expect that support of SPIE will help us. Thus, in our plans for the next year the election of officers, the Conference of Young Scientists and a large outreach program are exists.

New Year 2016 gives hope on new achievements and interesting meetings. We also want to wish you success and fulfillments in the new season.

Sincerely yours

President of IRE SPIE SC Sergii Poperezhai

Mariia Pashchenko

And collective of IRE SPIE SC

## IRE SPIE STUDENT CHAPTER ACTIVITY ANNUAL REPORT 2015

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## 1. General Information about IRE SPIE Student Chapter Chapter

### Officers List in 2015

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**President:** Sergii Poperezhai, ILTPE, [sergey.poperedjay1986@gmail.com](mailto:sergey.poperedjay1986@gmail.com)

**Vice-President:** Roman Golovashchenko, IRE, [golovashchenko@ukr.net](mailto:golovashchenko@ukr.net)

**Treasurer:** Mariia Pashchenko, ILTPE, [p.maria1984@gmail.com](mailto:p.maria1984@gmail.com)

**Secretary:** Denis Laptev, ILTPE, [laptev.denis@mail.ru](mailto:laptev.denis@mail.ru)

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## 2. VI International Conference for Young Scientists “Low Temperature Physics” (June 2-5, 2015)

### About Conference and O&P session



The VI International Conference for Young Scientists – Low Temperature Physics 2015 was held at the Institute for Low Temperature Physics and Engineering in Kharkiv, Ukraine, despite various difficulties. Students and young scientists from different universities and institutes of Ukraine and European countries were involved in the conference work with oral and poster reports. The conference topics included different fields of Low Temperature science, such as optics and photonics, magnetism and spintronics, physics of nanostructures; quantum crystals and quantum liquids, cryocrystals; biophysics etc. Bright invited lectures and Young Scientist Workshop devoted to international collaboration and International Year of Light made this conference cognitive and informative for students and young scientists.

**As previous times, SPIE Student Chapter of Institute of Radiophysics and Electronics took part in holding session on Optics and Photonics (OP) and Young Scientist Workshop in Round Table format.**

Photos below show the brightest moments of the conference.



**Program of the Optics & Photonics session:**

- **SPIE Invited Lecturer:** Igor Meglinski (University of Otago, Otago, New Zealand). Lecture "THE POINCARÉ SPHERE FOR CANCER DIAGNOSTICS."
- Oral and poster presentations of the young scientists – participants of the ICYS-LTP-2015

**Invited talk–** Igor Meglinski (University of Otago, Otago, New Zealand). Lecture "THE POINCARÉ SPHERE FOR CANCER DIAGNOSTICS." - SPIE Invited Lectures

In this lecture a recent success in application of coherent circularly polarized light for cancer diagnostics and tissues biopsy was given. It was demonstrated that circularly and/or elliptical polarized light scattered within the tissues is highly sensitive to the presence of cancer cells and their aggressiveness in tissues. It was also shown that navigation by Poincaré sphere (similar to the terrestrial globe, using longitude and latitude as in a GPS navigator) is a convenient graphical tool to monitor and determine properties and the condition of biological tissues.



**Stokes vector**

The Stokes parameters can be arranged in a Stokes vector  $\mathbf{S}$  ( $S_0, S_1, S_2, S_3$ ):

$$\begin{pmatrix} I \\ Q \\ U \\ V \end{pmatrix} = \begin{pmatrix} E_{0x}^2 + E_{0y}^2 \\ E_{0x}^2 - E_{0y}^2 \\ 2E_{0x}E_{0y}\cos\epsilon \\ 2E_{0x}E_{0y}\sin\epsilon \end{pmatrix} = \begin{pmatrix} \text{intensity} \\ I(0^\circ) - I(90^\circ) \\ I(45^\circ) - I(135^\circ) \\ I(\text{RCP}) - I(\text{LCP}) \end{pmatrix}$$

• Linear polarization	$Q \neq 0, U = 0, V = 0$	
• Circular polarization	$Q = 0, U \neq 0, V \neq 0$	
• Fully polarized light	$I^2 = Q^2 + U^2 + V^2$	
• Partially polarized light	$I^2 > Q^2 + U^2 + V^2$	
• Unpolarized light	$Q = U = V = 0$	





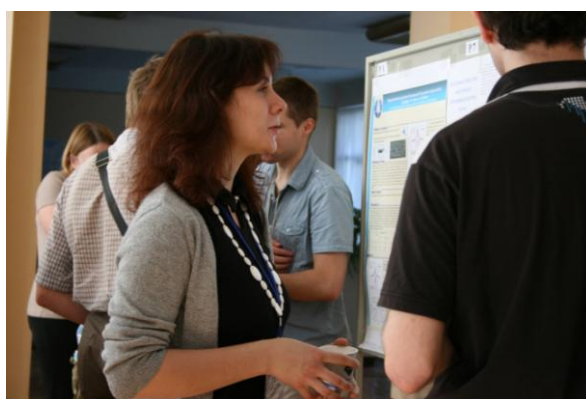
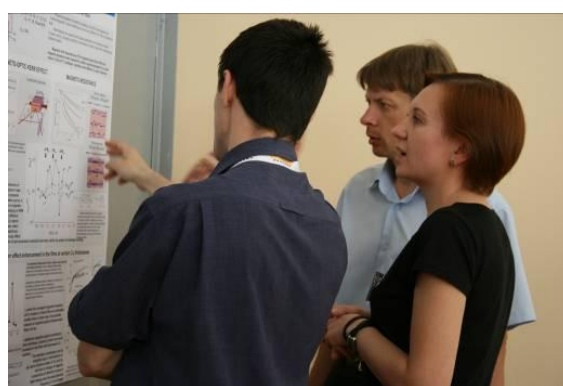
**Oral and poster presentations of the young scientists:**

The working language of the Session, as well as the language of the conference, was English.

Geography of the O&P Session participants included institutions:

- *ILTPE NASU, Kharkiv, Ukraine;*
- *V. N. Karazin Kharkiv National University, Kharkiv, Ukraine*
- *National Technical University “Kharkiv Polytechnic Institute”, Kharkiv, Ukraine*
- *Institute for Scintillation Materials, STC “Institute for Single Crystals”, NASU, Kharkiv, Ukraine*
- *Institute for Single Crystals, STC “Institute for Single Crystals”, NASU, Kharkiv, Ukraine*
- *International Center “Institute of Applied Optics”, Kyiv, Ukraine*

These Ukrainian institutes are considered among the strongest in field of optics and crystal optics.



### Social program.

Our party included not only banquet, but also an entertainment program with physical contests and quizzes devoted to Physics and especially Light. All participants had great possibility for having fun and chatting. You can see it on bright photos below:





The next point of social program was bright excursion around Kharkov with Maxim Rosenfeld, who told a lot o interesting and little-known details about different places of our city.



The excursion provided excellent possibility for our guests to explore the city and for participants from Kharkov – to learn more about it.



### Closing and awards.

Traditionally at all session during the conference organizing comity choose the best presentation. At the closing ceremony the winners were awarded by SPIE membership for the 2016 year.

This year winner – Elena Kostenyukova (Institute for Single Crystals, STC “Institute for Single Crystals”, NASU, Kharkiv, Ukraine)



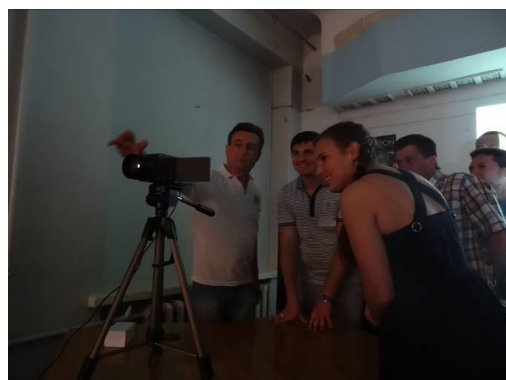
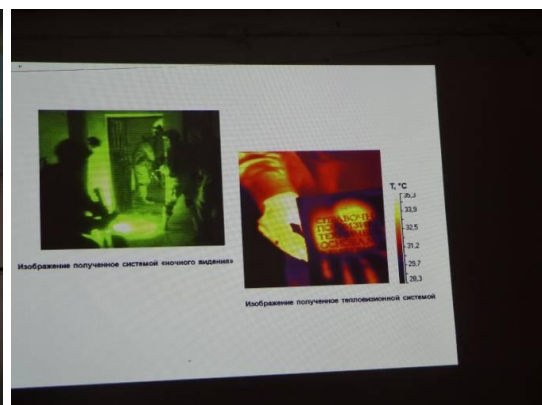
### 3. Young Scientists Workshop (4 June 2015)

IRE SPIE Student Chapter every year holds Young Scientist Workshop in Round Table format in frame of International Conference for Young Scientist - LTP. On the workshops we discuss about the international scientific societies, like SPIE, opportunities for career and international exchange of experience and interesting questions about and around science.

Today, research in the optics, photonics and light technologies is of particular importance, as it opens new opportunities for the science, technology, economics, and public health service development. B. Verkin ILTPE NAS of Ukraine as one of the leading Ukrainian scientific centers in the field of solid state physics, optics and lighting technology, has been actively involved in large-scale international events. During the International young scientists conference LTP-2015 our IRE-OSA-SPIE student chapter has organized the **Workshop devoted to the International year of light.**



It was demonstrated the work and capabilities of thermal imagers...





told about our Chapter and SPIE...



and shown bright optic experimental demonstration.



#### 4. Outreach activities.

##### Day of Science



To mark the **International Year of Light** our IRE-OSA-SPIE Student chapter together with the other Kharkov young scientists has organized the scientific event "Science Days". During this event we had interesting lectures, demonstrations, experiments and tours of the scientists leading research institutes and institutions of Ukraine for all regardless of age and of knowledge. The action took place in November 14-15 in Kiev, Kharkov and Lviv.



Lectures of young scientists, "Science Days", Kharkov 2015.





Denis Laptev has shown exciting experiments in optics and other physical topics for the participants of the event.



**Excursion around Institute for Low Temperature Physics and Engineering:**



**Laboratory of point contact spectroscopy:**



Laboratory of Thermal imaging:



**Outreach Activity with children and their parents, Kharkov 2015.**



In summer 2015 the Summer school for pupils has been organized. Children learned a lot of exciting physical laws and demonstrations in optics and other physical topics.

In the Museum of Literature the active people of our city have organized the scientific event with interesting scientific demonstrations for young researchers and their parents.



## 5. Participation of IRE OSA-SPIE Student Chapter members in conferences

This year, due to SPIE support, Student Chapter members visited a lot of Ukrainian and International conferences on optics and photonics using SPIE grants, small travel grants and emotional support from IRE SPIE SC.

### **SPIE Leadership Meeting, Saint Petersburg 2015**

Denis Laptev was lucky to attend the SPIE Leadership Meeting and Opening ceremony of the International Year of Light and Light-Based Technologies which were held at the one of the most beautiful scientific and cultural centers in the Europe Saint Petersburg. First international congress of European and Asian counterparts, timed to the opening of the International Year of Light and Light-based Technologies, was organized by members of the [ITMO University Optical Student Chapter \(OSC\)](#). Members of the Congress presented universities of Spain, Portugal, Latvia, Ukraine, Germany, China and Poland. According to Egor Gurvitz, the president of the ITMO University OSC, a Master's student of the [Photonics and Optical Information Technology Department](#), this is an excellent opportunity to establish scientific contacts with foreign institutions through the interaction of young scientists. More information see here <http://osc.ifmo.ru/iyl2015/>



The participants of the International leadership meeting during the excursion in the laboratories of the ITMO University, St. Petersburg.



Denis Laptev makes a report during the Leadership workshop, ITMO University, St. Petersburg.



Denis Laptev and other participants of the Leadership meeting (Germany, Poland, Russia ) during the welcome party dinner.





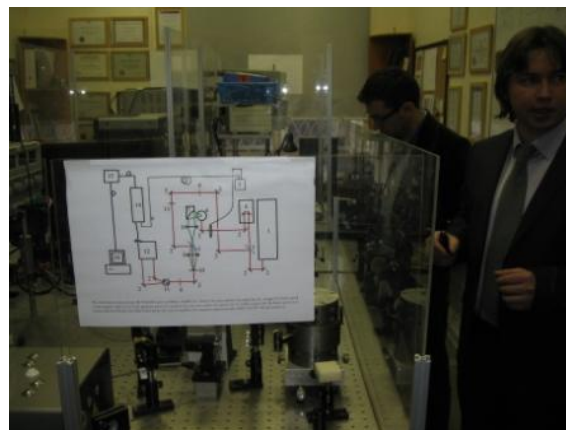
The participants of the excursion were impressed by the high level of the experimental equipment in the laboratories of the ITMO University.



Raman microscope.



M. Khodzitskiy has a talk about the laboratory of the terahertz research.



In the laboratory of the terahertz research.



The laboratory of Quantum optics and cryptography.



The IR picture during the excursion in the museum of optics in the ITMO University St. Petersburg.



The opening ceremony of the International Year of Light and Light-based Technologies in St. Petersburg was held at the Manege of the First Cadet Corp.



Georgy Poltavchenko, the St. Petersburg governor, and Vladimir Vasiliev, the chairman of the organizing committee of the Year of Light events in St. Petersburg, the ITMO University rector, gave the official start to the Year of Light in St. Petersburg.



Professor Charles Falco from University of Arizona talked about the contribution of the XI century Arab scientist Ibn al-Haytham in Renaissance art.



Sergei Stafeyev, the dean of the ITMO University [Natural Sciences Faculty](#), explained the optics affect on the achievements of architecture, painting and theater at different stages of civilization development.



Professor Alessandro Farini from the University of Florence, an expert in the field of interaction of optics and creativity, impressed guests with visual illusions.





**SPIE Student Chapter Leadership Workshop, San Diego, CA, US**

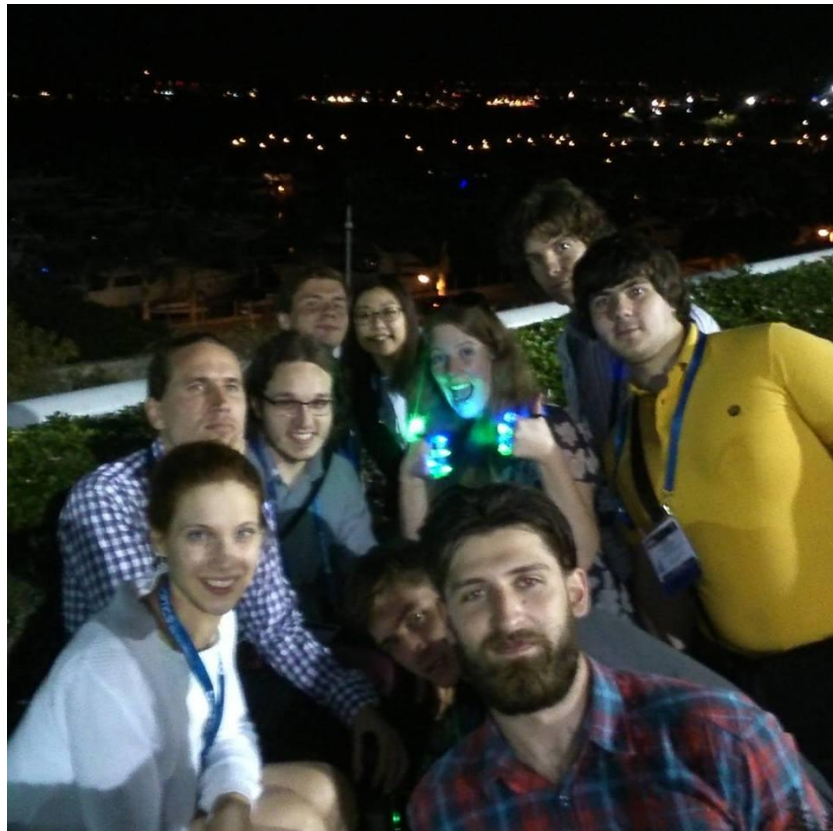
This year Georgii Vdovychenko was given a chance to attend International SPIE Meeting that was held in beautiful city of San Diego. This annual meeting includes giant amount of different events, courses, talks on different thematic and huge exhibition where companies from all over the world present their products and recruiting new people. The fact making this meeting even cooler that it was held is San Diego Conventional Center, the same place where ComicCon is usually preforming. For SPIE students there were a special events: big workshop for improving connections between people within chapters and develop efficiency of chapters activity, and a series of educational lectures. The thematic of the lectures were improving personal qualities of young scientists such as persuasion, writing skill, an art of presentation and many more. The speakers and their talks were even better than tempting weather of the south California and beautiful beaches of San Diego. In order to make new connections, share results and experience students, scientists and engineers came from around the world and this made unique atmosphere for exchange of ideas and studying in interesting, creative and relaxed way.



Praticipants of Student Chapter Leadership Workshop on the background of breathtaking view of San Diego bay.



Thankful Ukrainian company with “rock star“ of Student Leadership Conference  
Jean-luc Doumont.



Of course positive atmosphere of the meeting and Pacific Ocean air were a perfect ground not only for scientific discussions but also for founding friendship with people from other countries. On the picture students from US, Finland, Canada, New Zealand (the shiny girl), Ukraine, Russia Japan and I guess guy from Mexico was holding a camera.

I would like to say many thanks to SPIE for this amazing opportunity and incredible experience.



**The 8th Conference on Aperiodic Crystals, APERIODIC 2015**

Denis Laptev took part in **the 8th Conference on Aperiodic Crystals, APERIODIC 2015** (30 August- 04 September, 2015). The Conference was placed in Prague, Czech Republic at the Brevnov Monastery. APERIODIC 2015, 8th Conference on Aperiodic Crystals touched on aspects like optical and physical properties of the Aperiodic Crystals, Crystals, Crystallography and Material Science. 8th Conference on Aperiodic Crystals is organized triennially.

Official Event Web Site [Click for official site of Aperiodic 2015](#)

APERIODIC 2015 was organized by International Union of Crystallography.



The participants of the conference Aperiodic 2015.



Dinner during the conference.

Prague is a famous historical city and is considered by many as one of the most beautiful cities in the world, the participants enjoyed not only the scientific program, but also the opportunity to explore the magic and beauty of this city in the heart of Europe.





**Workshop with international participation "Discrete breathers in crystals 2015".**

Denis Laptev took part at the Workshop with international participation "Discrete breathers in crystals 2015". During the workshop the main achievements and open problems in the study of discrete breathers (DB) in optical and mechanical systems were considered. The Workshop was held in the Institute for Metals Superplasticity Problems of the Russian Academy of Sciences, Ufa, Russian Federation.



The participants of the Workshop, Ufa 2015.



Dr. S.V. Dmitriev had a talk about the research in the IMSP RAS.



The participants were lucky to have dinner in the **Congress Hall**, the Government House in [Ufa](#), built for the 450th anniversary of the [accession of Bashkortostan to Russia](#).

Its architecture is characterized by the use of spatial, formal, coloristic prototypes of Bashkir culture for the formation of a modern national architecture. The epitome of this style became glazed facade with Bashkir ornament, looking at the Belaya River.

The [BRICS](#) summit was held in Congress Hall in 2015.



The participants during the welcome party.





Friendly atmosphere during the picnic at the Belaya River

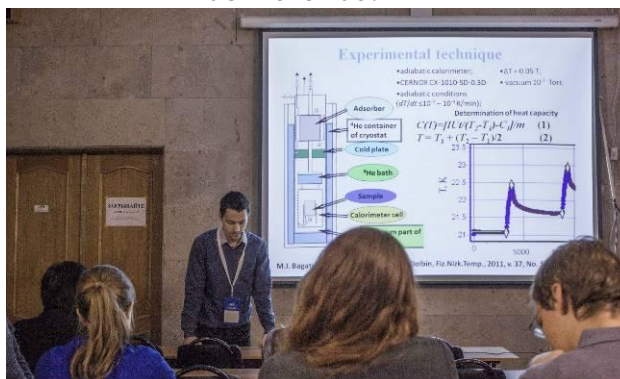
### **Ninth International Conference of Young Scientists and Specialists** **"Optics-2015"**

Ninth International Conference of Young Scientists and Specialists "Optics-2015" continues the tradition of holding regular meetings of students, bachelors, masters and PhD students enrolled in the optical and related fields, researchers and designers of new optical techniques and technologies, organized in Leningrad - St. Petersburg since 1956. In the conference were presented results of the study in the fields of physical optics and spectroscopy; nonlinear and coherence optics; lasers physics and technologies; photonics materials and technologies; photonics devices and technologies; informational technologies of photonics; optics and photonics in biology and medicine.

The Conference Optics 2015 was organized in the framework of the International year of Light and Light-based Technologies 2015 (IYL 2015). Maxim Barabashko was a participant of **The school on Photonics and Optoinformatics 2015**, which was held as one of the part of this conference. He has presented report «**VIBRATIONS AND LATTICE EXCITATIONS OF FULLERENES C<sub>60</sub>**» and obtained new knowledge at the Workshops (Quantum Informatics; Optical Metamaterials; Computational Photonics; Medicine of Future) and Master classes (Terahertz Spectroscopy; Femtosecond Optics; Quantum Cryptography; Numerical Simulation CST/HFSS/COMSOL Multiphysics). He has also presented the work of our chapter on the Student chapters meeting SPIE/OSA/IEEE and Optical Societies Student Chapters Meeting.



Professor Gregory J. Quarles reports the “A Historical Overview of 20 Years of Ceramics Lasers: Enabled by Nano-Technology” on the open ceremony of the conference.



Maxim Barabashko with the report «VIBRATIONS AND LATTICE EXCITATIONS OF FULLERENES C60»

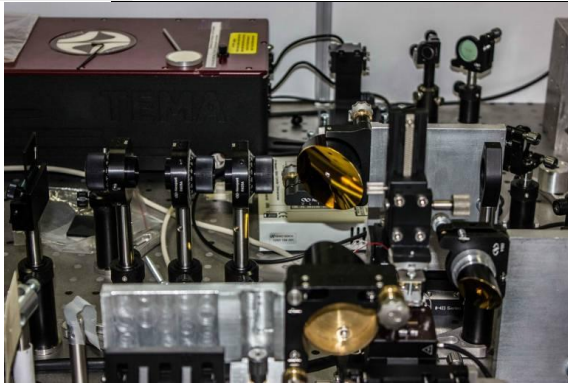


Student chapters meeting SPIE/OSA/IEEE



Night walks on the Saint Petersburg





ITMO University. Terahertz Spectroscopy lab and Master class: Numerical Simulation CST/HFSS/COMSOL Multiphysics

### **The International Conference "Correlation Optics-2015"**

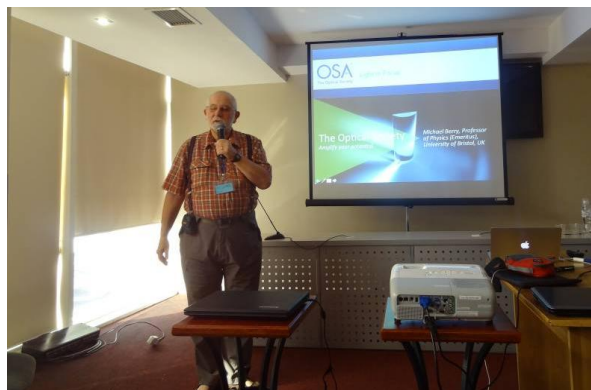
This year Mariia Pashchenko and Sergii Poperezhai took part in the International Conference "Correlation Optics-2015" in Chernivtsi. The conference location was in Chernivtsi in west Ukraine. Good and qualified lecturers, creative atmosphere and lots of students from different countries were the main components of meeting. It was good opportunity to tell about our scientific works and IRE SPIE Student Chapter for big amount of students.



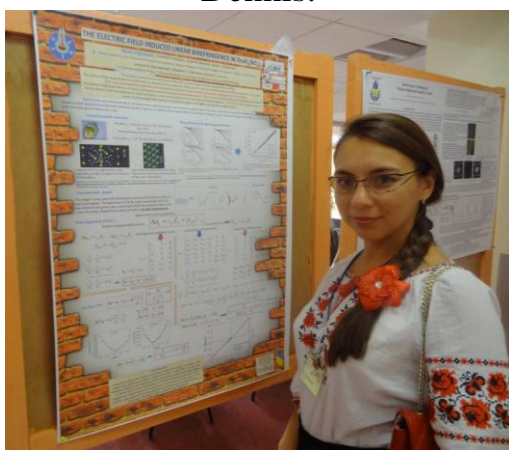
Chernivtsi University was conference venue.



Bright and expression lecture by Dr Mark Dennis.



Excellent talk by professor sir Michael Berry for children and not only.



Mariia Pashchenko presented her report  
“THE ELECTRIC FIELD INDUCED LINEAR  
BIREFRINGENCE IN  $\text{TmAl}_3(\text{BO}_3)_4$ ”



Sergii Poperezhai presented poster  
“Far IR spectra of the crystal  
 $\text{KTm}(\text{MoO}_4)_2$ ”.



Conference dinner



After session





**V Ukrainian-German Symposium On Physics And Chemistry Of Nanostructures And On Nanobiotechnology – 2015 September 21 – 25, Kyiv, Ukraine**

The Symposium was held at Taras Shevchenko National University of Kyiv. All forum sessions were organized in auditoriums of the Institute of Continuing Education of TSNUK.



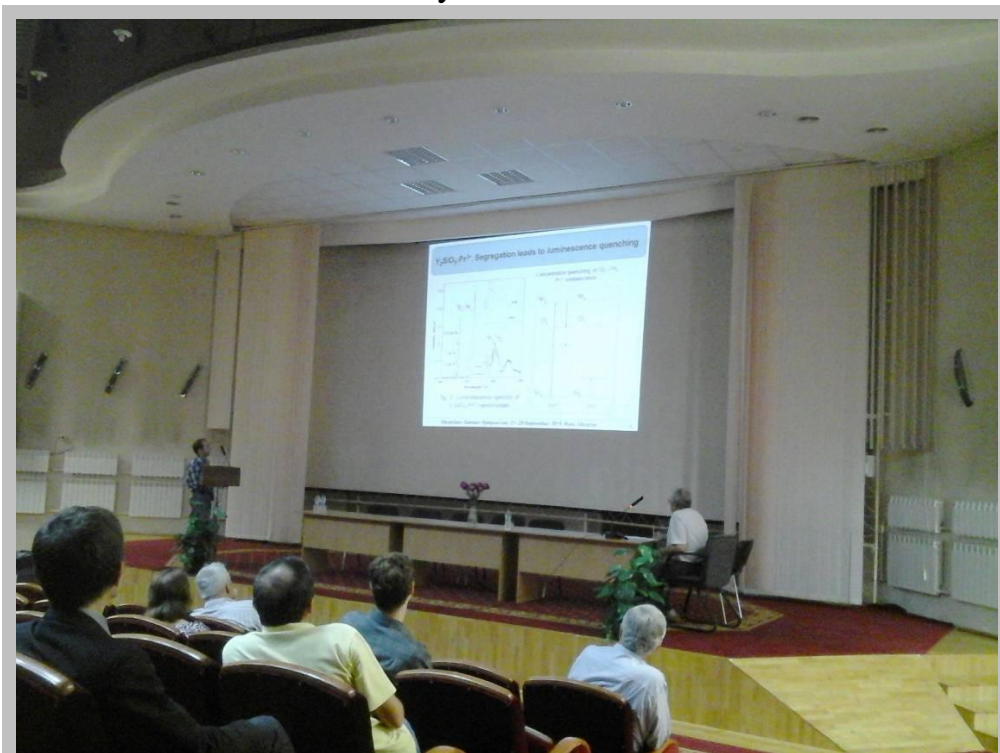
At the Opening Ceremony it was read appeals from President of NASU, Minister of Education and Science of Ukraine for the conference participants.

Professors A. Naumovets, S. Komisarenko, P. Scharff, and M. Epple greeted the audience.



The Conference brought together Ukrainian and German scientists working in the field of basic and applied nanophysics, nanochemistry, materials science, and biology. The Symposium encompassed the scope of the unique chemical, mechanical, electrical, thermal, optical, and magnetic properties of nanomaterials, as well as their bioactivity, and their applications in nanoscale materials science, nanoelectronics, optoelectronics, photonics, and biomedical engineering.

The conference featured a number of interesting reports on all the main areas of nanomaterials and methods for their study.

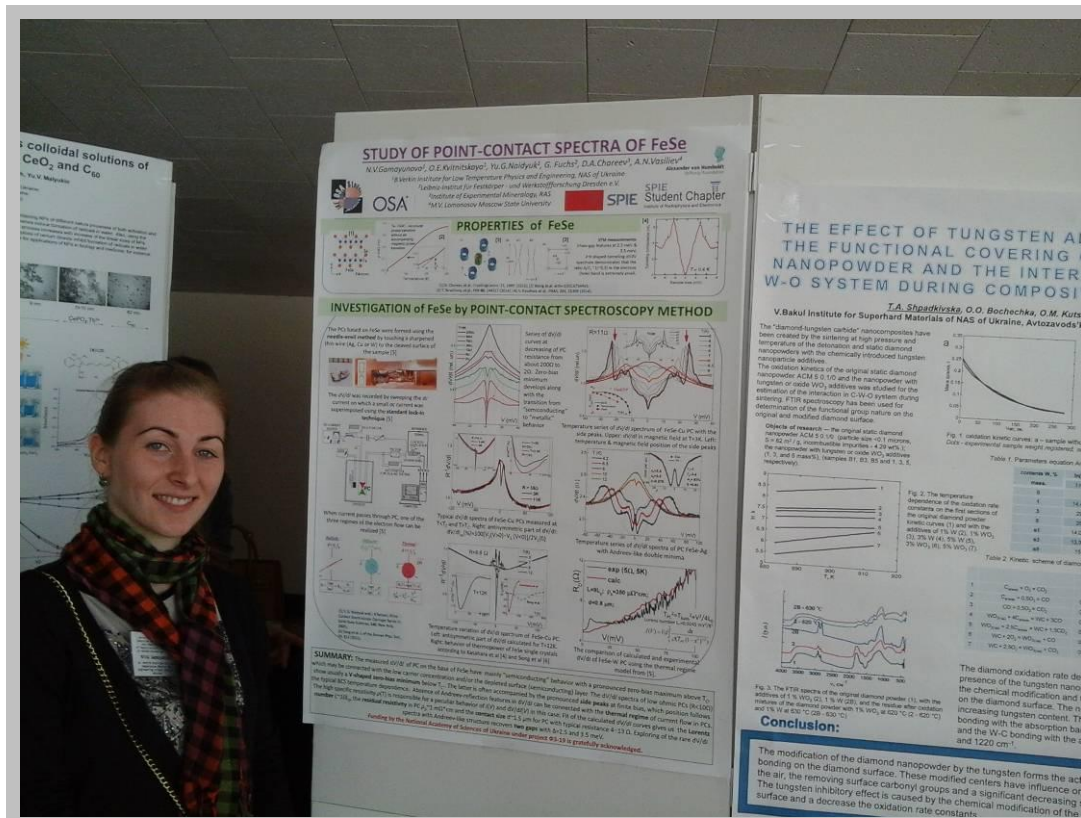




### At the Poster Session:



Nina Gamayunova presented the poster report with topic “Analysis of Point-Contact Spectra of FeSe”



**International Young Scientists Forum On Applied Physics September  
29 - October 2, 2015, Dnipropetrovsk, Ukraine**

The Forum was held at Oles Honchar Dnipropetrovsk National University. All forum sessions were organized in auditoriums of the Palace of Students of DNU which is located in the Shevchenko Park.



The Forum brought more than 170 participants from Ukrainian and foreign countries. The Forum had a lot of interesting plenary and section reports, which encompassed the wide range of topics in modern physics, such as optics & photonics, electromagnetics, microwave & terahertz electronics, magnetism & magnetic materials, power & energy conversion and control systems, radio astronomy, biophysics, solid state radiophysics, nano & metamaterials, physical materials science & nondestructive testing, and nuclear and plasma physics.



Nina Gamayunova presented the oral report with topic “Study of Point-Contact spectra of FeSe in the Normal and Superconducting States”



The Social program was also full of interesting events. One of them was Dnipropetrovsk Walking Tour



**The 2015 OSA Student Leadership Conference At Frontiers In Optics/Laser Science Conference (Fio/Ls)**

The 2015 OSA Student Leadership Conference (SLC) at FiO/LS was held in the nice and comfortable Hyatt Place hotel in the snug city San Jose, California on the 18<sup>th</sup> of October.

Our IRE – OSA – SPIE Student Chapter was represented by student chapter officer Nina Gamaionova, PhD Student of ILTPE NASU.



This Conference included many interesting and useful lectures, which were aimed to explain how to perform chapter activities successfully as well as how to be a successful researcher in the field of the Photonics and Optical Science.

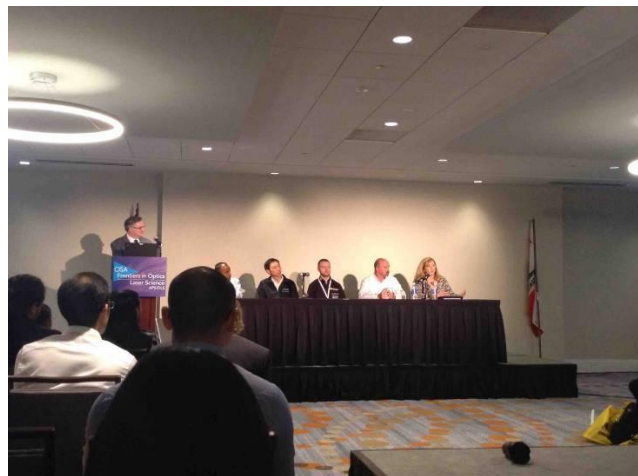
Several morning photos, which is made before we started.



1 – during the lecture by Dr. Hans-Juergen Schmidtke; 2 - during the Illuminating



Career Path – Panel Discussion: Susan Lowder were answering questions from the audience:



The pleasant moment of the issuing certificates and commemorative photos:



Nina Gamaiunova presented the poster about IRE – OSA – SPIE Student CHAPTER 2014/2015 ACTIVITIES.

Additionally it was the great opportunity to attend the FiO/LS Conference – 2015.



Participants from Kharkiv (Ukraine) – Nina Gamaiunova and Yulia Bakhmat – became to the Fairmont hotel to listen the Plenary FiO Session:



... during the work of the session of FiO Conference hall of the Fairmont hotel:



It was very jovially to make such funny FiO/LS Conference snapshots!



After Conference Sessions participants could see the most popular tourist places of San Joce by friendly company from people of different countries, as one can see on photos below. This event became the amazing experience for all participants!





## 6. Summary Annual Financial Report

	Amount, USD	Description
1	<b>200</b>	Participation of Chapter members in Ukrainian conferences on Optics and Photonics (travel grants + local conferences fee)
2	<b>300</b>	International Conference for Young Scientists on "Low Temperature Physics-2015", 2-5 June 2015, ILTPE, Kharkiv, Ukraine ( <a href="http://www.ilt.kharkov.ua/kmu2015/">http://www.ilt.kharkov.ua/kmu2015/</a> )
3	<b>150</b>	Young Scientist Workshop devoted to IYL in Round Table format in frame of International Conference for Young Scientist LTP-2015 - 2-5 June 2015, Kharkiv, Ukraine
4	<b>100</b>	Outreach activities, optical demonstration devoted to IYL .
5	<b>150</b>	Complex scientific and popular events on international days of Photonics and Science - September– December 2015, Kharkiv, Ukraine

**Amount Requested by IRE SPIE SC: 900 USD**

**Amount Spent by IRE SPIE SC: 900 USD**

***Thanks SPIE for support!!!***

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