Annual report

Institute of Radiophysics and Electronics SPIE/OSA Student Chapter Activity 2009

&

SPIE Workshop - 2009

Kharkiv, Ukraine
2009

IRE SPIE

Student Chapter
Institute of Radiophysics and Electronics

Dear colleagues,

As well as one year ago, we have tried to do the utmost for development our Student Chapter and sciences in Kharkiv and in Ukraine. Thanks to support of SPIE our plans couldn't destroy neither crisis nor flu epidemic.

This year we actively co-operated with many Ukrainian and foreign Student Chapters. New points have been brought in our cores activity. And the invited lecturers who participated in ours activity shared not only the experience as scientists, but also experience in construction of scientific career that was very useful for all young scientists.

You will find in this report both financial reports, and our impressions about activity expressed in photos. And certainly report for Collaborative Conference Grant. Thanks to which leading the young scientists conference IX Kharkiv YSC on “Electromagnetics, photonics and Biophysics” IRE-YSC-2009 and SPIE Workshop became possible.

We hope that you can appreciate our efforts. And because time of our report coincides with remarkable celebratory time, we would like to congratulate you sincerely on Christmas and New Year and to wish inspiration in job and happiness in life for everyone in 2010.

Sincerely yours

President of IRE SPIE SC Mariia Pashchenko

And collective of IRE SPIE SC

IRE SPIE/OSA STUDENT CHAPTER ACTIVITY ANNUAL REPORT 2009

Content

1. GENERAL CHAPTER INFORMATION

Chapter Officers List

Faculty Advisor: Prof. Sergey I. Tarapov, IRE, *tarapov@ire.kharkov.ua*
President: Mariia Pashchenko, ILTPE, *p.maria1984@gmail.com*
Vice-President: Oleksiy Bludov, ILTPE, *bludov@ilt.kharkov.ua*
Treasurer: Sergey Mizrakhy, IRE, *smizrakhy@ire.kharkov.ua*
Secretary: Mikhail Khodzitskiy, IRE, *khodzitskiy@ire.kharkov.ua*

SPIE SC Members List

№	Name	Organization	SPIE ID	E-mail
1	Mariia Pashchenko	ILTPE NAS Ukraine	3181042	p.maria1984@gmail.com
2	Mikhail Khodzitskiy	IRE NAS Ukraine	3180038	khodzitskiy@ire.kharkov.ua
3	Sergey Mizrakhy	IRE NAS Ukraine	3180848	smizrakhy@ire.kharkov.ua
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13	Khrystyna Kutko	ILTPE NAS Ukraine	3181046	kkutko@ilt.kharkov.ua
14	Sergey Poperedjay	ILTPE NAS Ukraine	3213001	sergey.poperedjay1986@gmail.com
15	Ekaterina Yarko	IRA NAS Ukraine	3181048	yarkokatya@rian.kharkov.ua
16	Mikhail Vidil	IRA NAS Ukraine	3214229	vidil_mikhail@ukr.net
17	Ludmila Berdina	IRA NAS Ukraine	3197584	lberdina@mail.ru
18	Anna Vozianova	KNURE	3197576	annavenus@mail.ru
19	Vladislav Seminko	ISMA	3283488	vladislav_phd@mail.ru
20	Nadiia Bondar	ILTPE NAS Ukraine	3285158	amuraf@bigmir.net
21	Denis Laptev	ILTPE NAS Ukraine	3285159	laptev.denis@mail.ru
22	Marina Mikhailova	IRA NAS Ukraine		aniramtiger@gmail.com

2. Travel Grants for chapter members participating in conferences 1 half-year

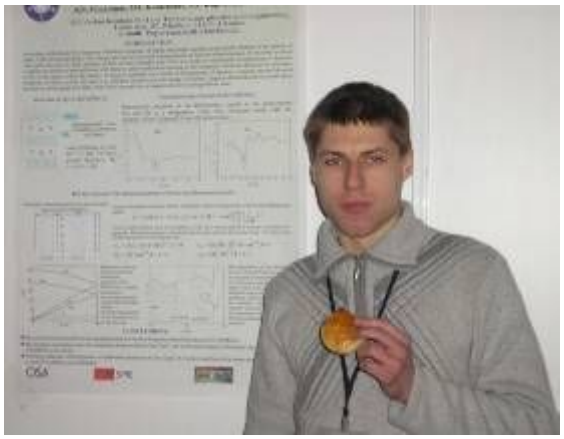
International Student Conferences "Young Optical Scientists Conference YOSC-2009" 2-7 February, 2009, Moscow, Russia

In frame of cooperation with Russian Student Chapters, representatives of our Chapter participated in International Student Conference "Young Optical Scientists Conference YOSC-2009" which was held in the Bauman Moscow State Technical University. This small conference passed in warm friendly conditions, representatives as western and east universities and institutes were going to. At conference have been presented not only reports of participants, but also Short Course by Marlos Viana (University of Illinois, Chicago, USA) "An Introduction to Dihedral Fourier Analysis", Chapters meeting, a lot of the interesting excursions and meetings.

The Vice Chair of conference Valentin Kozintsev and Secretary Nataliya Lisitsyna opened conference by the story about institute. They also has led excursion on optical laboratories of Bauman Moscow State Technical University.

In addition to this all participants took part in interesting excursion in University Museum with historical exhibits from times of tsarist Russia and Soviet Union

Only after our acquaintance with University, participants presented their oral and poster reports. In photo: oral report by Mariia Pashchenko and poster by Sergij Poperezhai – members of IRE-SPIE Student Chapter.



After reports of participants in frame of YOSC-2009 was held Short Courses by Marlos Viana (University of Illinois, Chicago, USA) “An Introduction to Dihedral Fourier Analysis“. It was amazing and very useful lecture a special for students who deal with theoretical physics.

Of course during the conference the leaders meeting were held. In this meeting were representatives from different OSA and SPIE Student Chapters from Bauman University, Armenia, Latvia, Moscow State University and our IRE-SPIE Student Chapter

General photo and information in a blackboard after Chapters meeting:

Due to Organizers YOSC-2009, participants had a golden opportunity to visit Kremlin and Famous Moscow Museums and Art Gallery. Unfortunately photo in this Famous pleases were prohibited so we have only wonderful impression and some general view.

The last day evening was devoted to farewell party with good banquet and friendly atmosphere. Each of participants gets a special certificate and good mood!

Mariia Pachinko and Sergii Poperezhay with Certificates

General photo YOSC-2009

International Student Conference "Developments in Optics and Communications - 5" Riga, April 24 - 26 2009

This year I hade a great opportunity to take part in the Conference organized by University of Latvia SPIE and OSA student chapters – DOC-5. This conference was in University of Latvia. And it combined interesting scientific topic, some kind of Leader's meetings, work with schools and social program. I'll try to write about all of this with more details.

Firs of all, I'd like to say that Riga is a beautiful city with their own history, with magnificent architecture and picturesque bridges crossing the Daugava River. And some photos can proves it.




Our first meeting with Organizing Committee and with representatives of Russian Student Chapter was before the official opening of Conference. We make the acquaintance of our colleagues from Latvia and Russia and had a good time. Our local meeting was in very cozy restaurant Lido, we tasted national dishes and chatting about our plans for future. I can say that from that moment we had very friendship relations between Student Chapters representatives.


On Friday the Conference started! Topics as “Optical Materials and Devices”, “Nonlinear Optics”, “Atomic and Molecular Spectroscopy”, “Vision Science and Holography” and “Image Processing” were presented during the conference.

The second Conference day was dedicated not only scientific works. We had a good opportunity to visit “Annual best scientific work competition” between different Latvian schools. The pupil of the last years studying presented their works connected with physics. The winners had a chance to participate in DOC-5 with poster report.

Furthermore, in that day the leaders' meeting was held. Representatives of SPIE and OSA Student Chapters showed presentation and told about their Chapters activity. St.-Petersburg SPIE Student Chapter (Russia), Kharkiv Joint IRE OSA & SPIE Student Chapter (Ukraine), Latvia University SPIE and OSA Student Chapters were presented.



Elizaveta Buyanovskaya presenter their St.-Petersburg SPIE Student Chapter

Presentation of IRE SPIE Student Chapter made by Mariia Pashchenko


Aivars Vembris – president of Latvian Student Chapter

After Student Chapters meeting

Of course, conference – it is not only reports and presentations. We had lots of walks, near the See and in Daugava Island with open-air historical museum.







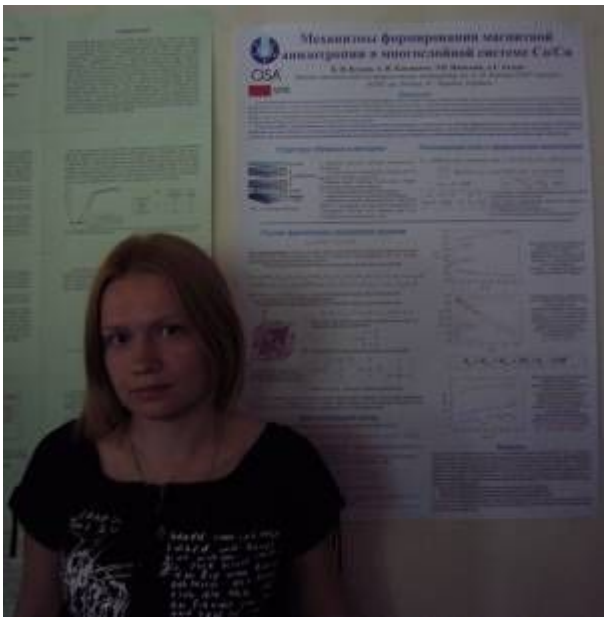
But, all of good things have their end. I'd like to thanks to Organizing Committee and personally Aivars Vembris for organization such interesting Conference and of course my IRE OSA-SPIE Student Chapter for supporting me. And I hope that our friendship with Latvian and Russian Student Chapters is not finished and we will support each other in our future Chapter's activity

Ukrainian conferences

Due to support of IRE SPIE Student Chapter members of this chapter had opportunity to visit different Ukrainian Conferences which was connected with their scientific interests.

XII International conference «Physics and Technology of thin films and nanosistems», Ivano-Frankivsk, May 18-23, 2009

Khrystyna Kutko presented poster report «Magnetic anisotropy in Co/Cu (111) superlattices»

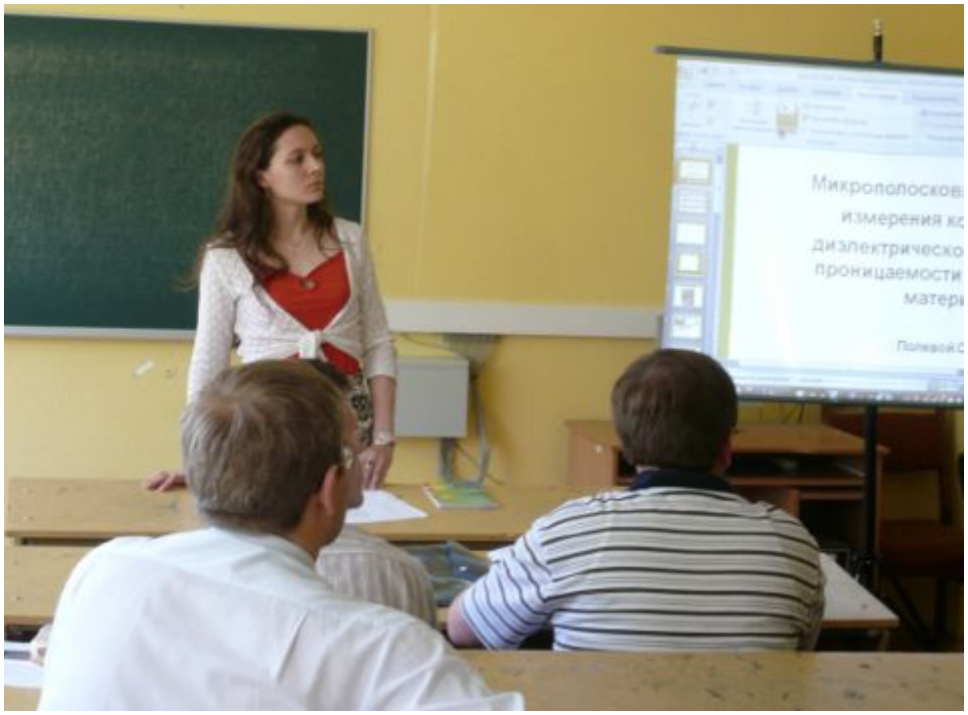


International conference of Young scientist and PhD students by Institute of Electronics Physics, Uzhgorod, May 25-28, 2009

Sergiy Poperezhay and Denis Laptev represented IRE SPIE Student Chapter in Uzhgorod

3. All-Ukrainian Best Diploma Contest
Jun 1, 2009

The All-Ukrainian contest for the Best thesis in Electromagnetics & Photonics field was carried out by youth student's optical organizations: OSA-SPIE IRE Student Chapter, IEEE LEOS Student Chapter, IRE-Kharkiv-MTT Student Chapter (further organizers) and young scientists councils of KhNURE, IRE NASU, ILTPE NASU.
The basic purpose of the contest was attracting of the most active young graduates of the Ukrainian high schools to work in Electromagnetics & Photonics field: optoelectronics, fiber optics, photonics, magnetooptics, nonlinear optics, optical materials, optical spectroscopy, radiospectroscopy, electromagnetic theory, microwave devices, physical foundation of microwave electronics etc.

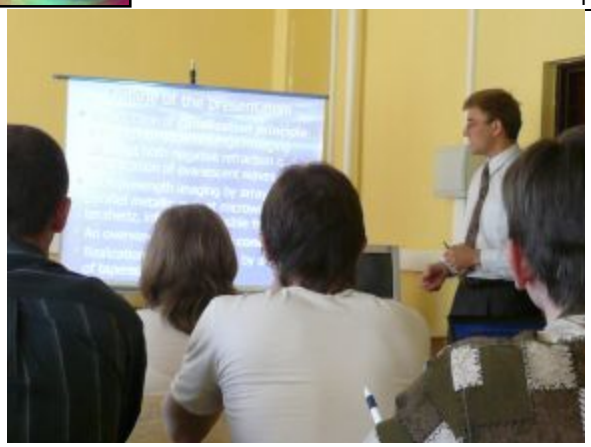


Anna Vozianova – Chair of Contest

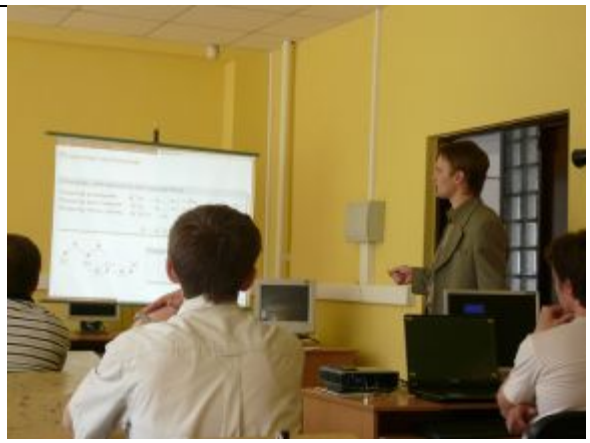
The primary goals of the contest were:

- Increasing of students' interest to studying Electromagnetics & Photonics problems;
- Stimulation of desire and readiness of youth to take part in scientific optical researches.

The contest was carried out in two stages: at first the jury of the contest considered the submitted materials and chosen ten the best works. The authors of these works invited for participation in final of the contest, which took place in Kharkiv National University of Radioelectronics in form of scientific seminar. In the frame of this seminar the two talks have been given by invited speakers:
1) Dr. Pavel Belov "Hyperlenses formed by arrays of metallic rods", Queen Mary University of London, London, UK
2) M. Klimenko "Optical response modeling in semiconductor nanostructures with many body effects", KhNURE, Kharkiv National University of Radio Electronics, Kharkiv



Dr. Pavel Belov



Dr. Mikhail Klimenko

Thesis abstracts of all contestants were published in the contest proceedings. The opportunity for the winners was given to publish the paper in the Ukrainian journal "Radiotekhnika" at the conditions of preparing of results of their work in form of the paper.
Valuable presents for winners: diploma and money award (two awards for the 1-st places in 100 US, two awards in 50 US for the 2-nd and 3-rd places)

The First Awards:

Demchenko P.P., *Research Magnetic and Magneto-Optics Characteristic is Epitaxial Bi-Substituted YTTRIUM Iron-Garnet Films, Ivan Franko National University of Lviv, Lviv*

I.V. Fedoryn, *Optical Properties of Semiconductor Fine-Grain Structures in the Magnetic Field, National Technical University «Kharkiv Polytechnic Institute», Kharkiv*

The Second Award:

***Konchakovskiy K.**, Mobile Nuclear Magnetic resonance Device, National Technical University of Ukraine "Kiev Politechnical Institute",Kiev*

The Third Award:

***Gertsog A.N.**, Simulation of Multilayered Periodic Systems Using Mictrostrip Analogs, Kharkiv National University of Radioelectronic, Kharkiv*

The winner of the Best Diploma Contest: Konchakovskiy Konstantin, Demchenko Pavel, Fedoryn Illya, Gertsog Andrey (from left to the right)

All participants the final of All-Ukrainian Best Diploma Contest and Jury (June 1, Kharkiv, Kharkiv National University of Radio Electronics)

Contest for the Best Master's Thesis in Optics&Photonics

	Amount, USD	Description
1.	**200**	Trevel Grats and accomodation for students participating in the Best Master's thesis contest
2.	**50**	Printing materials
3.	**200**	Prizes for the winners of the Contest for the Best Master's thesis

Total spent: 450 USD

Amount Requested and spent by IRE SPIE SC: 250 USD

Provided by IRE OSA SC : 150 USD

Provided by KNURE IEEE LEOS SC : 50 USD

4. V Kharkiv Young Scientists Conference on "Low Temperature Physics" (Jun 1-5, 200)

General Information

The 2-nd All-Ukrainian Kharkiv Young Scientist Conference on Low Temperature Physics (YSC-LTP-2009) was held traditionally at the Institute for Low Temperature Physics and Engineering of the National Academy of Sciences of Ukraine (ILTPE NASU). This year YSC-LTP-2009 was covered the ***50-th anniversary of Institute for Low Temperature Physics and Engineering*** which is a leading National Ukrainian scientific center with deep expertise in fields including low temperature materiology and instrument making, the mathematical physics and the mathematical analysis, physics of quantum liquids, liquid and cryocrystal, low temperature magnetism, biophysics, low temperature physics of macromolecules etc. The main goals of the conference, as a previous year, were to help young scientists and students from different research institutes and universities to get in touch with each other, to listen to review talks on hot topics presented by leading scientists, and to try their own skills in scientific presentations. This year the YSC-LTP-09 conference gathered over 140 young scientists from different parts of Ukraine as well as from FSU and European Countries and provided an opportunity of both scientific discussions and informal communication.

This year a session on Optics and Photonics (OP) has been added to the list of topics of the YSC thanks to the initiative from OSA/SPIE Joint Chapter of Institute of Radiophysics and Electronics and with the support of IEEE MTT of Institute of Radiophysics and Electronics.

Preliminary program of the OP Session included:

- Invited talk of the SPIE Traveling Lecturer Pavel Belov (Post-doctoral Research Assistant, Department of Electronic Engineering, Queen Mary University of London) titled "OPTICAL METAMATERIALS FORMED BY MULTILAYERED METAL-DIELECTRIC NANOSTRUCTURES"
- Oral and poster presentations of the young scientists – participants of the YSC-LTP-2009
- **Round Table.** Discussion about supporting of young scientist investigations

Optics & Photonics session as it was:

Invited talk–

Due to the SPIE Traveling Lecturer Program the participants of the conference were able to hear the excellent lecture of Pavel Belov about Hot topics in modern science such as metamaterials and nanostructures - “OPTICAL METAMATERIALS FORMED BY MULTILAYERED METAL-DIELECTRIC NANOSTRUCTURES”. In this lecture was shown that the material parameters extracted from reflection and transmission coefficients of a nano-fishnet pairs provide reasonable prediction about material parameters of infinite metamaterial only if the spacing between its constituent nano-fishnet pairs is large enough. In the opposite case the material parameters significantly diverge from each other. In spite of such difficult topic, the lecture was well-structures and clearly presented. Lecture of Pavel Belov attracted interest not only a young participants, but also most research workers



Photos: Pavel Belov presenting the invited talk during the Optics and Photonics session

Actually, Pavel Belov, not only made a wonderful lecture, he also actively participated in conferences work. Some moments you can see in the photos below:



Oral presentations –

The working language of the Session was Russian and English. The total number of abstracts submitted for the OP Session was 17 (10 oral and 7 posters).

Geography of the participants of the OP Session included 6 institutions :

- *IRE NASU,* Kharkiv;
- *ILTPE NASU,* Kharkiv;
- *KNURE,* Kharkiv;
- *KNU,* Kharkiv;
- *National Technical University "KhPI"*, Kharkiv
- *Akhiezer Institute for Theoretical Physics, NSC KIPT*, Kharkiv
- *E. Lashkaryov Institute of semiconductor physics,* Kyiv.
- *I.Franko National University*, Lviv
- *National Technical University of Ukraine «KPI»,* Kyiv
- *Institute of Semiconductor Physics*, Kyiv

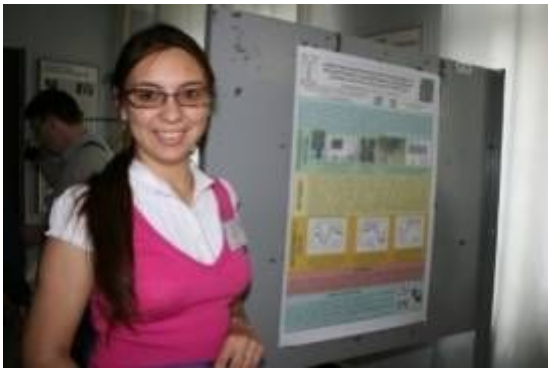
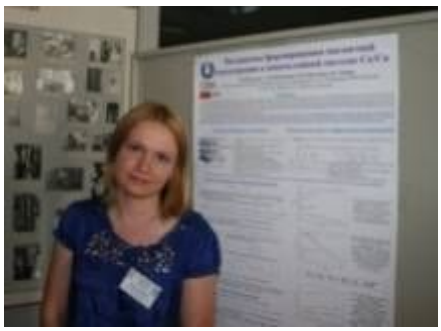
Presentations were followed with hot and fruitful discussions which made a great impact to the success of the event.

Photos: During the OP Session.

Poster presentations –

As a previous time, 7 posters related to the Optics and Photonics were presented at the joint poster session which was organized in the lobby of the conference room and combined with a coffee break. The informal atmosphere helped participants to communicate more easily and attract attention of lead scientist of institute.



Photos: Poster session.

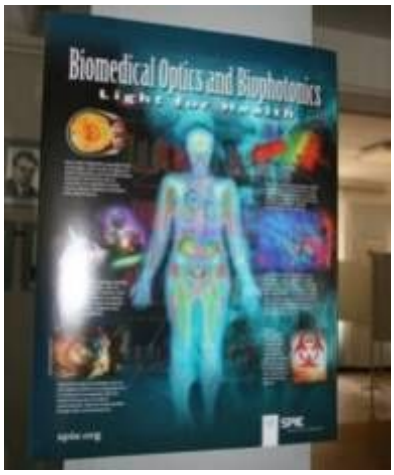
Round Table. Discussion about supporting of young scientist investigations.

Round Table with discussing programs and projects for young scientist was during the session at first time. In this Round Table were presented different Society, such as OSA, SPIE, Alexander Fon Humboldt foundation with their benefits for student and young scientist. Furthermore, report “How to make a successful career in science” was presented by our invited speaker Pavel Belov. And editorial staff of magazine “Science and Technique” made their presentation.


But, our special guests were the school pupil from Donetsk Lyceum. It was the first time when the school pupils joined to our activity they showed us experimental proving of Bifeld-Braun effect. It was so bright and breathtaking demonstration! In some photos from Round Table it is shown.


Social program –

During the YSC-LTP-2009 the special coffee-break with advertising materials and huge delicious cake with fresh fruits, traditionally, was organized by Joint IRE OSA and SPIE Student Chapter.



Thanks to support of OSA and SPIE, the welcome party this year was accompanied by live music and was free for all the participants of Optic and Photonic session. It impressed everyone and became a remarkable event for all the participants.







Due to Joint IRE OSA & SPIE Student Chapter supporting the excursion to the Kharkiv ZOO was organized for the conference participants.

Closing and Awards –

During the conference in each session was "The best report" competition. But, only in Optic and Photonic session was chosen 3 best reports instead 1. Our Joint IRE OSA & SPIE Student Chapter prepared special prizes for winners. It was Special certificate, Flash-discs and 2 DVD discs with two famous and big encyclopedic for each winner. And, of course, for Optics and Photonic session participants from the other city were organized a travel grants.

This year the next people become winners:

- **Svetlana. Romanyshyn**
ANALYSIS OF THE LOW TEMPERATURE PHASE TRANSITIONS AND MECHANISMS OF ENERGY TRANSFER IN DMAGS:CR^{3+} CRYSTALS BY LUMINESCENCE SPECTROSCOPY METHOD, Lviv I.Franko National University

- **Nadiia Bondar**
LOW FREQUENCY VIBRATIONAL SPECTRUM OF CRYSTAL $KYb(MoO_4)_2$, KhNU**,** Kharkiv

- **Svetlana Kondovych**
STUDY OF STATISTICS OF PHOTOCOUNTS FOR "SCHRÖDINGER'S CAT" STATES OBTAINED USING NON-IDEAL PHOTODETECTOR, National Technical University of Ukraine «KPI», Institute of Physics and Technology, Kiev

Afterword –

A combination of activities, namely the lecture of SPIE Traveling Lecturer, the Optics & Photonics Session, and the First Round Table “Discussion about supporting of young scientist investigations” These organized in the frame of the YSC-LTP-2009 conference, enabled us fully achieved the important goals of professional training of young scientists and attraction of attention of the scientific youth community to OSA and its local OSA chapters. This Event joint together the efforts of local SPIE SC and MTT-S SC and provided an opportunity for students and young scientists from different institutions to listen to invited talks, to try their own skills in the Scientific Contest organized within the OP Section, and to get in touch with the scientific community.

Financial Report

Expenses related to the Optics & Photonics Session of the YSC-LTP-2009 conference and the Round Table: "Discussion about supporting of young scientist investigations", ILTPE NASU, Kharkiv, Ukraine, June 01-05, 2009.

Organized by the IRE OSA/SPIE Student Chapter (in collaboration with the IEEE Microwave Theory and Techniques Society (MTT-S) of Institute of Radiophysics and Electronics)

YSC-LTP – 2009, Optics and Photonics Session

	Amount, USD	Description
4.	**30**	Stationery and printing materials (stickers with SPIE logo)
5.	**90**	Conference fees for 9 IRE OSA SC members
6.	**70**	Special OSA/SPIE fancy cake
7.	**50**	Coffee-breaks
8.	**100**	Banquet with live music
9.	**60**	Printing of English version of conference book for O&P session participants
10.	**100**	Prizes on O&P session (Special certificate, 4 Gb USB-flash storage drive, DVD discs with two famous and big encyclopedics)
11.	**50**	Smal Souvenirs about Kharkiv for O&P session participants
12.	**50**	Excursion to the Kharkov's ZOO

Total spent:	**600 USD**
Amount Requested and spent by IRE SPIE SC:	**250 USD**
Provided by MTT-S IRE SC:	**100 USD**
Provided by IRE OSA SC :	**250 USD**

Appendix A : Information about the YSC-LTP-2009 Conference

2-nd All-Ukrainian Young scientist conference
On
LOW TEMPERATURE PHYSICS (YSC-LTP-2009)

June 1-5, 2009

B. Verkin Institute for Low Temperature Physics and Engineering of the National Academy of Sciences of Ukraine

We invite graduate students, post-graduates, young lecturers and scientists under 35 years old, working in low temperature physics and electronics fields, to take part in the conference. In the plenary meetings the invited lectures of leading Ukrainian and foreign scientist are planed. This conference supported by
Institute for Low Temperature Physics and Engineering of NASU IEEE IRE-Kharkov-MTT Student Chapter
Institute of Radiophysics and Electronics OSA & SPIE Student Chapters

CONFERENCE TOPICS

1) **Superconductivity**
2) **electron properties of solids at low temperature**
3) **low temperature magnetism, spintronics**
4) **optics and photonics, optical investigations at low temperature**
5) **quantum crystals and quantum liquids, cryocrystals**
6) **hardness and Plasticity of solids at low temperature**
7) **biophysics, low temperature physics of macromolecules**
8) **physics of nanostructures and low-dimensional systems**
9) **modern aspects of mathematics and mathematical physics**

IMPORTANT DATES

APRIL 2, 2009 Deadline for submission of abstracts to orgcommittee
April 25, 2009 Decision on acceptance of a talk and sending of invitations on the conference
June 1-5, 2009 Conference dates.

The reports of participants will be heard at conference sessions and be published in the conference proceeding. The authors of the best scientist presentations will be awarded with prizes. The social program for the participants of the conference will be organized.

Schedule of the conference

Venue for the conference : The Institute for Low Temperature Physics and Engineering of NASU 47 Lenina Av. Kharkiv 61103, Ukraine
Working languages of the conference : Ukrainian / Russian / English
Participation Form : - *oral talks* till 15 min (for oral talks presentation the multimedia projector will be placed),- *posters* (for posters a space equivalent to A1-format will be allocated)
Conference proceedings : Abstracts of reports will be printed only at the condition of grant of expert's certificate about publication of scientific materials in press.
Participation in conference :

For inclusion of your materials in the conference program and receipt of invitation, you need to submit the application for the participation in the conference and the abstract of the report to organizing committee. The abstracts will be reviewed by program committee.

You need to submit the application and the abstract by e-mail on address: kmu2009@ilt.kharkov.ua. In the field of "Subject" you need to indicate your Surname and number of topic (see the topic above); example, ivanov_ivan_5. Also you need to refer the expert's certificate with stamp to organizing committee at the registration.

The conference fee (60 hryvnas or 150 rubles or 10 US dollars) is paid by the participant during the registration.

CONTACT INFORMATION

Co-chairmen of organizing committee: Kiyko Andriy, 8(057)3410853 Secretary: Savina Julia ,8(057)3410802
Members of the Organizing Committees of O&P section:
Ms.Mariia Pashchenko(ILTPE), E-mail: Pashchenko@ilt.kharkov.ua Tel.: +38.063.4750345
Mr.Mikhail Khodzitskiy (IRE), E-mail: Khodzitskiy@ire.kharkov.ua Tel: +38.093.5445158
E-mail: kmu2009@ilt.kharkov.ua Web-site: Http://www.ilt.kharkov.ua/kmu2009/index.php
http://www.irespie.ucoz.ua/index/0-41 http://www.ireosa.org/2009/ltp2009.html

Appendix B : Program of the Optics & Photonics Session

June 2 , Tuesday		
Session	**Optics and Photonics. Oral session.** (small holl)	**Page.**
Chairman:	**Mariia Pashchenko, PhD student** , ILTPE NASU	
10.00-10.30	**Pavel Belov**, Post-doctoral Research Assistant, Department of Electronic Engineering, Queen Mary University of London OPTICAL METAMATERIALS FORMED BY MULTILAYERED METAL-DIELECTRIC NANOSTRUCTURES *(invited lecture).*	4
10.30-10.45	**Mariia. Pashchenko** INVESTIGATION OF VIBRATION SPECTRUM OF CRYSTAL $TbFe_3(BOB_3)_4$ Pashchenko[1] M.I., Kutko[1] V.I., Gnatchenko[1] S.L., Bedarev[1] V.A., Bezmaternykh[2] L.N., Temerov[2] V.L., [1] ILTPE NASU, [2] L.V. Kirenskii Institute of Physics, Siberian Branch of RAS, 660036 Krasnoyarsk, Russia	5
10.45-11.00	**Yuriy. Naseka** CHANGE OF PHOTOLUMINESCENCE PROPERTIES OF $Cd_{1-x}Zn_xTe$ SINGLE CRYSTALS AT T= 5 K BY γ – IRRADIATION OF ^{60}Co SOURCE K.D.Glinchuk[1], N.M. Litovchenko[1], Yu.M. Naseka[1], A.V. Prohorovich[1], L.V. Rashkovetskyi[1], O.M. Strilchuk[1], B.O. Danilchenko[2] *1.V.E. Lashkaryov Institute of semiconductor physics of NAS of Ukraine, 41, pr. Nauki, Kyiv, 03028, Ukraine; 2. Institute of physics of NAS of Ukraine, 46, pr. Nauki, Kyiv, 03028, Ukraine*	6
11.00-11.15	**Svetlana. Romanyshyn** ANALYSIS OF THE LOW TEMPERATURE PHASE TRANSITIONS AND MECHANISMS OF ENERGY TRANSFER IN DMAGS:CR^{3+} CRYSTALS BY LUMINESCENCE SPECTROSCOPY METHOD S. Romanyshyn[1], V. Kapustianyk[1,2], U. Eliyashevskyy[1,2], M. Panasyuk[2] [1, 2], Lviv I.Franko National University	7
11.15-11.30	**Alexey.Girich** INFLUENCE OF TEMPERATURE ON PROPERTIES OF SURFACE OSCILLATIONS IN THE STRUCTURE MAGNETO-PHOTONIC CRYSTAL/SEMICONDUCTOR Girich A.A.[1,2], Khodzitsky M.K.[2], [1]KhNURE, [2]IRE NASU	8
11.30-11.45	**Ganna. Kharchenko**[1] EHF PROPERTIES OF THINLAYER STRUCTURES, PLASED IN A WAVEGUIDE G.O. Kharchenko[1], M.K. Khodzitskiy[1], IRE NASU	9
11.45-12.00	**coffee break**	
Session	**Optics and Photonics. Oral session.** (small holl)	**Page.**
Chairman	**Mariia Pashchenko, PhD student** , ILTPE NASU	
12.00-12.15	**Mikhail. Khodzitsky** INVESTIGATION METHOD OF FERROMAGNETIC RESONANCE EFFECT BY SURFACE OSCILLATIONS IN PHOTONIC CRYSTAL IN MILLIMETER WAVEBAND Khodzitsky M. K. IRE NASU	10
12.15-12.30	**Nadiia. Bondar** LOW FREQUENCY VIBRATIONAL SPECTRUM OF CRYSTAL $KYb(MoO_4)_2$ N. S. Bondar[1], V. I. Kutko[2], S. N. Poperezhay[2,1] KhNU, [2]ILTPE NASU	11
12.30-12.45	**Svetlana Kondovych** STUDY OF STATISTICS OF PHOTOCOUNTS FOR "SCHRÖDINGER'S CAT" STATES OBTAINED USING NON-IDEAL PHOTODETECTOR, S.Kondovych, H.Gomonay, National Technical University of Ukraine «KPI», Institute of Physics and Technology , 03056 Kyiv, Peremogy av., 37.	12

12.45-13.00	**Nataliia Krasnova** КВАНТОВЫЙ КРИПТОГРАФИЧЕСКИЙ ПРОТОКОЛ COW (COHERENT ONE WAY): ДЕТЕКТИРОВАНИЕ КОГЕРЕНТНЫХ КВАНТОВЫХ СОСТОЯНИЙ ПРИ НАЛИЧИИ ШУМА. Н.В. Краснова, Е.В. Гомонай, НТУ «КПІ»	13
13.00-13.15	**Andrey Sotnikov** SOME EFFECTS IN THE ULTRASLOW LIGHT PHENOMENON IN BOSE-EINSTEIN CONDENSATES OF ALKALI-METAL ATOMS , A. Sotnikov, Akhiezer Institute for Theoretical Physics, NSC KIPT,1 Akademichna Street, 61108 Kharkiv, Ukraine	14
13.15-13.45	Excursion to Institute's departments	
13.45-14.45	**Lunch**	
14.45-16.15	Round Table. Discussion about supporting of young scientist investigations. Chairman - **Mariia Pashchenko, PhD student** , ILTPE NASU (room 607 – theory building)	

	Optics and Photonics. Posters session.	
P25	**Natalia Masalitina** LUMINESCENCE-KINETIC ANALYSIS OF RADIATION-INDUCED PROCESSES OF ATOMIC CRYOCRYSTALS STRUCTURE ODIFICATION N. Yu. Masalitina, A. N. Ogurtsov, National Technical University "KhPI" 61002 Kharkov, Frunse Str. 21	15
P26	**Ivan Katrunov** ПРОЦЕССЫ АВТОЛОКАЛИЗАЦИИ В J-АГРЕГАТАХ КАК СЛЕДСТВИЕ ЭКСИТОН-ФОНОННОГО ВЗАИМОДЕЙСТВИЯ Катрунов Иван, Малюкин Юрий, Сорокин Александр, Институт сцинтилляционных материалов, Харьков	16

P27	**Ruslana Udovitska** ION IMPLANTATION OF B IONS INTO CMT SUBSTRATES AND DETERMINATION OF OPTIMUM OPTICAL CHARACTERISTICS FOR MAKING PHOTODIODE P-N STRUCTURES IN NARROW (-BAND-) GAP SEMICONDUCTOR MATERIAL. Ruslana S. Udovitska, Genadiy V. Kalisty, Vladimir V. Fedulov, Institute of Semiconductor Physics, Ukraine	17
P28	**Olga Paseka** COMPRESSION OF QUADRATICALLY PHASE-MODULATED FEW-CYCLE PULSES IN DISPERSIVE MEDIUM Olga Paseka, Valery Lobanov, Anatoly Sukhorukov Lomonosov Moscow State University, Russian Federation	18
P29	**Tatyana Krivorutchenko** MEASUREMENT OF PERMITTIVITY OF METAMATERIAL BY INVESTIGATION OF BAND STRUCTURE OF PHOTONIC CRYSTAL, Krivorutchenko T.N.[1], Nedukh S.V.[2], Khodzitsky M.K.[2], [1]KhNURE, [2]IRE NASU	19
P30	**Mikhail. Khodzitsky** INCREASING OF EHF TRANSPARENCY OF MANGANITE-PEROVSKITE IN NEGATIVE CONSTRUCTIVE PARAMETERS FREQUENCY RANGE, Khodzitsky M. K. IRE NASU	20
P31	**Andrij Heneral** STUDY SPECTRAL AND ENERGY FEATURES OF THE LAMP OF THE CAPACITIVE DISCHARGE ON VAPOUR OF HEAVY WATER A. A. Heneral , Institute of Electron Physics NAS Ukraine, 88017 Uzhgorod, Universitetska Str. 21	21

5. Travel Grants for chapter members participating in conferences 2-nd half-year

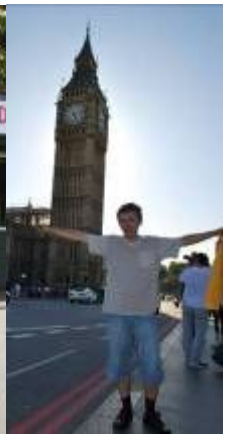
Due to SPIE support, Student Chapter members were able to go on the Ukrainian and Russian conferences on optics and photonics using IRE SPIE SC travel grants

Mikhail Khodzitskiy, Anna Vozianova and Alexey Girich

("Metamaterials 2009", London, United Kingdom, 30 August – 4 September, 2009)

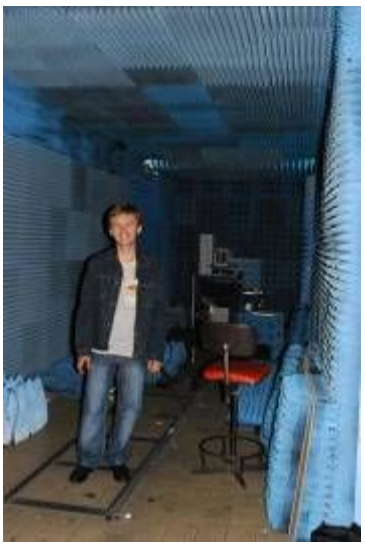
British Museum

Queen Mary's Gardens



Big Ben

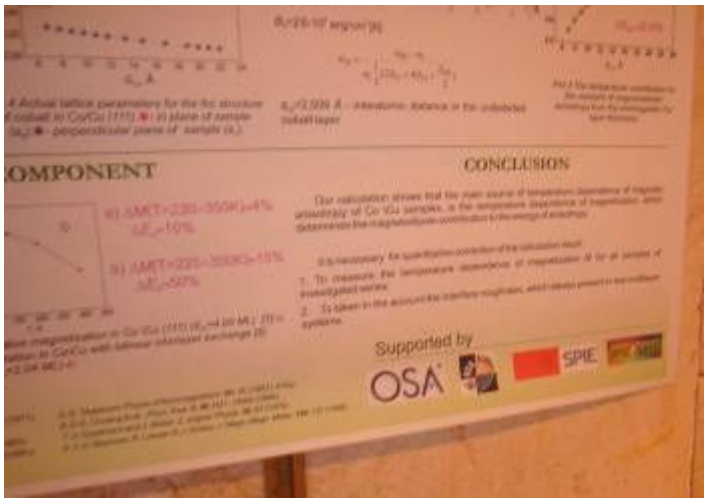
We were on the conference



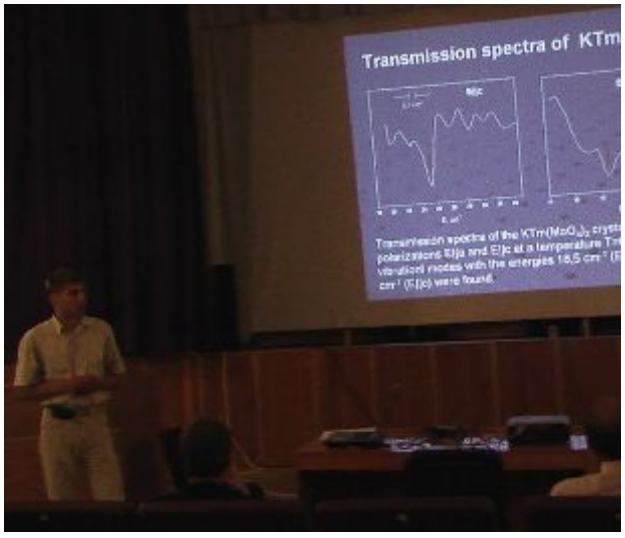
Ukrainian Conferences

19 International school-seminar "Spectroscopy of Molecules and Crystals", village Beregovoe, Krim, September 20-27, 2009.

Khrystyna Kutko presented poster report «The mechanism of magnetic anisotropy temperature dependences formation in Co/Cu (111) superlattices» :



Sergiy Poperezhay presented his oral report:



The XIVth International Seminar/Workshop on Direct and Inverse Problems of Electromagnetic and Acoustic Wave Theory (DIPED-2009)

Lviv, September 21-24, 2009

Ekaterina Yarko and Mikhail Vidil represented our IRE SPIE Student Chapter on DIP ED-2009

6. International Young Scientist Workshop on "Optics, Photonics and Metamaterials" -2009, September 25-27, 2009, Kharkiv, Ukraine

This year members of IRE SPIE Student Chapter at first time organized of International Young Scientists Workshop on "Optics, Photonics and Metamaterials"-2009 (http://www.ysc-meta.org/pages/welcome) which was held in collaboration mostly with IRE OSA Student Chapter and with other different OSA, SPIE and IEEE student chapters.

The objective of the workshop was to bring together experienced and young scientists working on various aspects of optics, photonics and metamaterials areas, to discuss the most recent developments in these areas. This workshop attracted participants from many different institutions from Ukraine, Belarus, Russia, Armenia, European Community and USA. Students had opportunity to present their research both oral and poster presentations.

During the workshop the following activities was held:

- Invited Talks (distinguished OSA/SPIE/IEEE lecturers),
  Special Invited Speaker - Prof. Yuri Kivshar, Australia
- Young Scientists Talks
- OSA, SPIE and IEEE Ukrainian student chapters with collaboration with different Student Chapters around the world organized a meeting for the leaders of OSA, SPIE and IEEE student chapters;
- Seminar with Representatives of Editorial Boards of Scientific Ukrainian Journals;
- Photography Contest Optical Image
- Excursion around Kharkiv City

Our IRE SPIE Student Chapter takes an active part especial in Leaders meeting with special Lecture on OSA/SPIE/IEEE Benefits. The lecture about SPIE Benefits for young scientist was made by Mariia Pashchenko – President of IRE SPIE Student Chapter. The lecture about OSA Benefits was made by Alex Simachov – President of V. Karazin Kharkiv National University (KNU) OSA Student Chapter. Other participants from SPIE Lomonosov Moscow Sate University, Taurida National V.Vernadksy University SPIE Student Chapter and Nizhny Novgorod SPIE Student Chapter presented their Chapters and their activity.

Several photos from OPAM-2009:

Mariia Pashcenko during lecture about SPIE benefits

Tatiana Mikhailova – representative of Taurida National V.Vernadksy University SPIE SC

Olga Paseka - representative of SPIE Lomonosov Moscow Sate Univercity and other participants Chapter at coffee-break

Roman Noskov – representative of Nizhny Novgorod SPIE Student

General photo OPAM-2009

	Amount, USD	Description
13.	**30**	Stationery and printing materials
14.	**250**	Trevel grants for participants
15.	**70**	Coffee-breaks
16.	**150**	Banquet

Total spent: 500 USD

Amount Requested and spent by IRE SPIE SC: 100 USD

(instead Contest for the Best Young Scientist of Institute of Radiophysics and Electronics NAS of Ukraine)

7. IX Kharkiv Young Scientists Conference on "Electromagnetics, photonics and Biophysics" IRE-YSC-2009 (December 1-3, 2009)

Program of Event

The IX Kharkiv Young Scientists Conference on "Electromagnetics, Photonics and Biophysics" (IRE-YSC-2009) was held in December 1-3 at the Institute of Radiophysics and Electronics of the National Academy of Sciences of Ukraine (IRE NASU). Usikov Institute for Radiophysics and Electronics of the NAS of Ukraine (IRE NASU) is the first Academic Institute of Radiophysics in Ukraine, it was founded in September in 1955. The institute became the leading research center with deep expertise in various fields, such as: millimeter and submillimeter wave radiophysics and electronics, interaction of electromagnetic waves with solid states and biological objects, radiowave propagation in the environment, radiophysics sensing of artificial and natural objects. The most important achievements of the institute for last years are following: - development of new methods of radiolocation used for designing of radiolocation systems for territories control, detection of alive people under ruins, subsurface remote sensing, monitoring of buildings condition; - designing of radiolocation monitoring from aerospace satellites used for monitoring and forecasting of floods, flowages and emergencies, and also for monitoring of vegetation, erosive processes and pollution of water surfaces.

The Institute is a founder of the following widely known scientific conferences: International Symposium „*Physics and Engineering of Millimeter and Submillimeter Waves*" (MSMW), International Conference „*Mathematical Methods in Electromagnetic Theory*" (MMET), and Annual Kharkiv Young Scientists Conference on "Electromagnetics, Photonics and Biophysics" which traditionally gather over 100 young scientists from different parts of Ukraine as well as from FSU and European Countries. All these conferences are aimed at development of favorable conditions of communication between Ukrainian scientist and the worldwide electromagnetic community. These events are traditionally supported by IEEE, OSA, SPIE, and URSI, EuMA societies.

This year the IRE-YSC-09 conference gathered over 140 young scientists from different parts of Ukraine as well as from FSU, European Countries, USA and China.

In frame of the conference SPIE/OSA IRE Student Chapter carried out following activities:

1) Organization of lectures of SPIE Visiting Lecturers :

Prof. I. S. Nefedov (Helsinki University of Technology, Finland)
Dr. D. V. Kholodnyak (St. Petersburg Electrotechnical University, St. Petersburg, Russia)
Dr. Yu. A. Tuchkin (Gebze Institute of Technology, Kocaeli, Turkey)
Prof. G. N. Georgiev (University of Veliko Tirnovo "St. Cyril and Methodius", Bulgaria)

2) IV Young Researcher Career Development Workshop

Conference website: www.yscq.org.ua

YSC-2009 December 1-3, Kharkiv, Ukraine		Conference hall of "NIOCHIM"[1]	Conference hall of hotel "Poliot"[2]	Conference hall of hotel "Aurora"[3]
Tuesday 01.12. 2009	8:00 - 9:00	Registration of participants		
	9:00 - 9:15	Opening Ceremony		
	9:15 - 10:00 10:00-10:45 10:45-11:30 11:30-12:15	Plenary Session-I: Prof. I. Alexeev, Prof. K. Simovsky, Prof. K. Lukin, Prof. G. Georgiev		
	12:30-14:00	Time for Lunch and Accommodation		
	14:00-16:00	Solid-state Radiophysics	Geoscience and remote sensing -1	
	16:00-16:30	Coffee break	Coffee break	
	16:30-18:30	Nano and Metamaterials	Geoscience and remote sensing -2	
Wednesday 02.12. 2009	9:00 - 9:15	IV YSCD Workshop Opening		IEEE Workshop Opening
	9:15 - 10:00 10:00-10:45	Workshop Session-I: Prof. I. Nefedov, Prof. V. Boria		Dr. Kurt Richter
	11:00-11:30 11:30-12:00 12:00-12:30	Workshop Session-II IEEE benefits OSA benefits SPIE benefits		IEEE Workshop Session- I Development of Leadership Skills
	12:30-13:00	Chapters meeting	Biophysics -1	
	13:00-14:00	Lunch		Lunch
	14:00-14:30			IEEE Workshop Session- II:
	14:30-15:00		Coffee break	
	15:00-17:00	Workshop Session-3 Prof.Boria, Dr. Marta Martinez) Optics&Photonics -1	Biophysics -2	"Reading and Understanding Body Language" Tesla's European Time" "Energy- and Environmental Crises A Challenge for Everbody"
	17:00-18:00		Poster Sesion	
	18:00-20:00	Welcome party		
Thurs Day 03.12. 2009	9:00 - 9:45 9:45-10:30 10:30-11:00	Plenary Session-II: Dr.Marta Martinez, Dr. Kholodnyak, Prof. Maleev	Microwave and THz Electronics - 1	
	11:00-11:15		Coffee-break	
	11:15-11:30	Coffee-break		
	11:30-13:30	Comput.&experim. electromagnetics-1	Microwave and THz Electronics - 2	
	13:30-14:30	Lunch	Lunch	
	14:30-16:30	Comput.&experim. electromagnetics-2	Optics&Photonics -1	
	16:30-17:00	Coffee-break	Coffee-break	
	17:00-18:00	Comput.&experim. electromagnetics-3	Optics&Photonics -2	
	18:00-18:30			
	18:45-19:00	Awards and Closing Ceremony		

[1]State Research and Design Institute of Basic Chemistry (NIOCHIM) – 25 Mironositska St., (www.niochim.kharkov.ua/)
[2]Hotel "Poliot" – 31 Profesorskaya St.
[3]Hotel "Aurora" – 10/12 Artema St.,(www.hotel-aurora.com.ua)

The YSC -2009 Conference Schedule

SPIE Visiting lecturer Prof. I. S. Nefedov (Helsinki University of Technology, Finland)

In the frame of SPIE Visiting Lecturer Program, Prof. I. S. Nefedov, from Helsinki University of Technology, Finland was invited by National Technical Univ. of Ukraine SPIE Chapter and presented lecture on “Electrodynamics of carbon nanotubes and carbon nanotube arrays” at SRDI “NIOCHIM” in frame of the IRE YS conference (December 2 2009). His lecture attracted the attention of many conference participants (students, PhD students, young scientists etc.)

Prof. Nefedov during the lecture

ELECTRODYNAMICS OF CARBON NANOTUBES AND CARBON NANOTUBE ARRAYS

I. S. Nefedov

Department of Radio Science and Engineering /SMARAD Center of Excellence
Helsinki University of Technology, P.O. Box 3000, FI-02015 TKK, Finland

e-mail: igor.nefedov@tkk.fi

This lecture is devoted to electrodynamical properties of carbon nanotubes. Carbon nanotubes are obtained by rolling graphene sheets. Depending how the graphene sheet is rolled, carbon nanotubes can possess semiconductor or metallic properties. Carbon nanotubes (CNs) can consist of one shell (single-wall CNs) or several shells (multi-walled CNs). We restrict our consideration by single-wall metallic nanotubes as better studied and possessing lower losses. Carbon nanotubes exhibit such electrophysical properties, caused by their quantum nature, as the quantum resistance, the quantum capacitance and the kinetic inductance. Transmission line model of the CN [1] includes these parameters in addition to macroscopic electromagnetic capacitance and electromagnetic inductance.
High-frequency properties of single-wall metallic CNs are caused by frequency-dependent complex conductivity. It is known, that in single-wall metallic CNs can propagate strongly delayed surface waves (with the slow-wave factor $n = \beta/k \sim 30 - 100$, where β is the propagation constant and k is the wave number in free space) [2]. New properties, caused by electromagnetic interaction between nanotubes, were found in structures, composed of closely packed bundles of parallel identical metallic CNs [3], and in two-dimensional periodic arrays of CNs. Our electrodynamical description of the CN array is based on Green's function formulation. As a model of the metallic nanotube, we take impedance cylinder, characterized by the complex dynamic conductivity. We have found, that a slow-wave factor of eigenwaves in infinitely long arrays of nanotubes strongly depends on a transversal wave vector and it varies from unit to more than 200, that is considerably higher than observed in single nanotubes. Arrays of metallic CNs look similar to wire media (WM). Common properties and differences between WM and CN arrays are discussed.
Surface waves in finite-thickness slabs of CN arrays were investigated. It was found, that backward waves can propagate in a very wide frequency range. Thus, such CN array slabs can be considered as perfect planar metamaterials. Influence of a dielectric substrate and possible tunability is considered. Losses at gigahertz and terahertz frequencies are analyzed. Possible applications as slow-wave structures and other tunable devices at terahertz frequencies are discussed.

[

[1] P. J. Burke, "An rf circuit model for carbon nanotubes," *IEEE Transactions on Nanotechnology*, vol. 2, no. 1, p. 5, March 2003.

[

[2] Slepyan, S. A. Maksimenko, A. Lakhtakia, O. Yevtushenko and A. V. Gusakov, "Electrodynamics of carbon nanotubes: Dynamic conductivity, impedance boundary conditions, and surface wave propagation," *Phys. Rev. B*, vol. 60, p. 17136, Dec. 1999.

[3]

M. V. Shuba, S. A. Maksimenko, A. Lakhtakia, "Electromagnetic wave propagation in an almost circular bundle of closely packed metallic carbon nanotubes," *Phys. Rev. B*, vol. 76, p. 155497, 2007.

SPIE Visiting lecturer Dr. D. V. Kholodnyak (St. Petersburg Electrotechnical University, St. Petersburg, Russia)

In the frame of SPIE Visiting Lecturer Program, Dr. D. V. Kholodnyak, from St. Petersburg Electrotechnical University, St. Petersburg, Russia was invited by Ivan Franko National Univ. of Lviv SPIE Student Chapter and presented lecture on “Advanced passive microwave devices based on metamaterial transmission lines” at SRDI “NIOCHIM” in frame of the IRE YS conference (December 2 2009). His lecture attracted the attention of many conference participants (students, PhD students, young scientists etc.)

Prof. Kholodnyak during the lecture

ADVANCED PASSIVE MICROWAVE DEVICES BASED ON METAMATERIAL TRANSMISSION LINES

D. V. Kholodnyak

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St. Petersburg Electrotechnical University 'LETI'
5 Prof. Popov Str., 197376, St. Petersburg, Russia
e-mail: DVKholodnyak@mail.eltech.ru

Electromagnetic metamaterials (MMs) are defined as artificial effectively homogeneous structures with specific properties, which cannot be observed in natural materials. A classical example of the MM is the structure exhibiting negative values of the dielectric permittivity ($\varepsilon < 0$) and/or the magnetic permeability ($\mu < 0$). Since the electric field, the magnetic field, and the propagation vector form the left-handed triad in the case of MMs, they are also called the left-handed (LH) materials. Very often the concept of "left-handedness" is used for the structures with backward electromagnetic waves in contrast to conventional materials with forward electromagnetic waves where the electric field, the magnetic field, and the propagation vector form the right-handed triad.

Left-handed transmission lines (LH TLs), which are characterized by negative dispersion and backward wave propagation, are considered as one dimensional case of MMs. The use of such metamaterial TLs gives additional degrees of freedom for designing novel microwave devices with non-conventional and practically useful properties that lead to performance improvement and functionality enhancement. This paper discusses the design of advanced passive microwave devices offering the following advantages: broadening the operational bandwidth; device miniaturization; dual-band and multiple-band operability.

To achieve these attractive properties, the LH TLs are used in combination with the conventional TLs with positive dispersion also known as the right-handed (RH) TLs. Since the LH TLs do not directly appear in nature, they can be only designed as artificial TLs based on lumped or quasi-lumped elements. At the same time the RH TL sections can be either natural (distributed) or artificial ones. The low-temperature co-fired ceramics technology (LTCC) suits well for practical implementation of the artificial LH and RH TLs and the miniaturized microwave devices based thereof.

Since the dispersion in the LH TLs is negative, a phase incursion along the LH TL section is positive that corresponds to a negative electrical length. Hence, a conventional RH TL section with the electrical length longer than 180° can be replaced by a more electrically short LH TL section. Such a substitution results in a reduced frequency dependence of the electrical length and therefore leads to a broadening the operational frequency band.

Using different dispersion characteristics of the RH and LH TLs, one can also design dual-band directional couplers and filters for two arbitrary central frequencies and with higher harmonic response shifted faraway on frequency.

Further benefits can be achieved by using tuneable capacitors in artificial RH and LH TL sections. Combining the above mentioned properties with tunability or reconfigurability would make future wireless communications equipment flexible to support many different interface standards.

The following advanced devices based on a combination of RH and LH TL sections are under consideration in this paper: directional couplers with enhanced operational bandwidth and reduced size; broadband digital phase shifters; dual-band directional couplers and filters; tuneable directional coupler and tuneable dual-band filters. All the devices were designed as multilayer structures mainly by means of the LTCC technology. Experimental verification of the design approach was carried out and fully-functional prototypes were demonstrated

SPIE Visiting lecturer Dr. Yu. A. Tuchkin (Gebze Institute of Technology, Kocaeli, Turkey)

In the frame of SPIE Visiting Lecturer Program, Dr. Yu. A. Tuchkin from Gebze Institute of Technology, Kocaeli, Turkey was invited by Taurida National V. I. Vernadsky Univ. SPIE Student Chapter and presented lecture on “Numerical calculation methods of photonic structures” at SRDI “NIOCHIM” in frame of the IRE YS conference (December 3 2009). His lecture attracted the attention of many conference participants (students, PhD students, young scientists etc.)

Prof. Tuchkin during the lecture

ANALYTICAL REGULARIZATION METHOD: THE MODERN STATE AND PERSPECTIVES

Yu. Tuchkin

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P.O. Box 141, 41400, Gebze, Kocaeli, Turkey

An accurate and efficient simulation of arbitrary shaped waveguides is in demand for practical applications in the area of microwave engineering. Today the most popular direct approaches for finding of cutoff wave numbers of such waveguides are methods like FDM and FEM. They have very important property such as universality; also they can have a number of disadvantages, such as slow convergence, relatively poor algorithm conditionality, and numerical instability and so on. It is noteworthy, that most of them are based on solving of algebraic system of the first kind, which always creates unstable numerical process, when increasing of dimension of corresponding algebraic system leads to the destruction of the correct solution by to amplification of round off errors. In diffraction theory there is a direction, referred in general as "Analytical Regularization Method" (ARM), which reduces boundary value problem to a functional equation of the second kind [1]. This method produces an algebraic system with uniformly bounded condition numbers, when system's dimension tends to infinity. This fact guarantees numerical stability of solving process of every truncated algebraic system of arbitrary big dimension. The core of this method is solution of boundary integral equations of the potential theory and a special parameterization of the contour bounding the waveguide cross-section. In the present work numerical features of the ARM are illustrated with the waveguides both standard and complicated cross sections. Computational results show that it is possible to get the all cutoff wave numbers with, in principal, any required accuracy, which is bounded by memory volume and productivity of computer CPU only.

[1] Ye. Poyedinchuk, Yu. A. Tuchkin and V. P. Shestopalov, "New Numerical-Analytical Methods in Diffraction Theory," *Mathematical and Computer Modeling*, vol. 32, no. 4, p. 1029-1046, 2000.

SPIE Visiting lecturer Prof. G. N. Georgiev (University of Veliko Tirnovo "St. Cyril and Methodius", Bulgaria)

In the frame of SPIE Visiting Lecturer Program, Prof. G. N. Georgiev from University of Veliko Tirnovo "St. Cyril and Methodius", Bulgaria was invited by Chernivtsi National Univ. SPIE Student Chapte and presented lecture on "Iterative method for differential phase shift computation in the azimuthally magnetized circular ferrite waveguide" at SRDI "NIOCHIM" in frame of the IRE YS conference (December 1 2009). His lecture attracted the attention of many conference participants (students, PhD students, young scientists etc.)

Prof. Georgiev during the lecture

A MICROWAVE APPLICATION OF THE COMPLEX CONFLUENT HYPERGEOMETRIC FUNCTIONS

Georgi Nikolov Georgiev[1], Mariana Nikolova Georgieva–Grosse[2]

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BG–5000 Veliko Tirnovo, Bulgaria
[2]*Meterstrasse 4, D–70839 Gerlingen, Germany*
e-mail: gngeorgiev@yahoo.com

The theory of the circular waveguides with azimuthally magnetized ferrite, propagating normal nTE0 modes, is presented as a field of application of the complex confluent hypergeometric functions [1-6]. The discussion is restricted to the Tricomi representation of the latter [7]. Three configurations are considered: a circular [1] and a coaxial [2] ones, entirely filled with the anisotropic medium referred to, and a circular one in which the same takes the outer ring-shaped area only, while its interior is occupied by dielectric [3-6]. A numerical investigation of the functions pointed out is performed in the complex plane and some of its results are portrayed graphically [1,5]. The choice of general integral of the Kummer equation [7], adapted to the circle of problems examined, is debated. A possibility to write it in various ways, is established. In view of this, different forms of the complex characteristic equations of the second and third geometries are obtained, expressed either in terms of the complex Kummer and Tricomi functions [7], or through the complex Tricomi function and its complex conjugate, multiplied by an exponent. The equation in question of the first structure is stated in one form solely – by the complex Kummer function. Numerical methods for the solution of equations mentioned are developed, yielding the eigenvalue spectrum of the waves. Iterative techniques are elaborated for computation of the phase and differential phase shift characteristics of transmission lines in normalized form. The influence of the parameters involved on the phase portraits is analyzed. Special attention is paid on the effect of dielectric load on the behaviour of the third configuration [3-6]. Based on the iterative study, simple formulae for finding the differential phase shift due to the first two set-ups, are proposed.

[1] G. N. Georgiev, M. N. Georgieva–Grosse, "A new property of the complex Kummer function and its application to waveguide propagation," *IEEE Antennas Wireless Propagat. Lett.*, vol. 2, pp. 306–309, Dec. 2003.

[2] G. N. Georgiev, M. N. Georgieva–Grosse, "A property of the L(c, ρ, n) numbers and its application to waveguide propagation," in *Proc. XXIX URSI General Assembly*, in CDROM, BK.6(120), Chicago, IL, USA, Aug. 7–16, 2008.

[3] G. N. Georgiev, M. N. Georgieva–Grosse, "Propagation in an azimuthally magnetized circular ferrite-dielectric waveguide," in *Proc. 3rd Europ. Conf. Antennas Propagat. EuCAP 2009*, Berlin, Germany, Mar. 23–27, 2009, pp. 345–349, in CDROM.

[4] G. N. Georgiev, M. N. Georgieva–Grosse, "Phase behaviour of a two-layered circular ferrite-dielectric waveguide with azimuthal magnetization," in *Proc. 26th Progr. In Electromagn. Res. Symp. PIERS 2009*, p. 742, in Abstracts, pp. 1473–1477, also in CDROM, Moscow, Russia, Aug. 18–21, 2009.

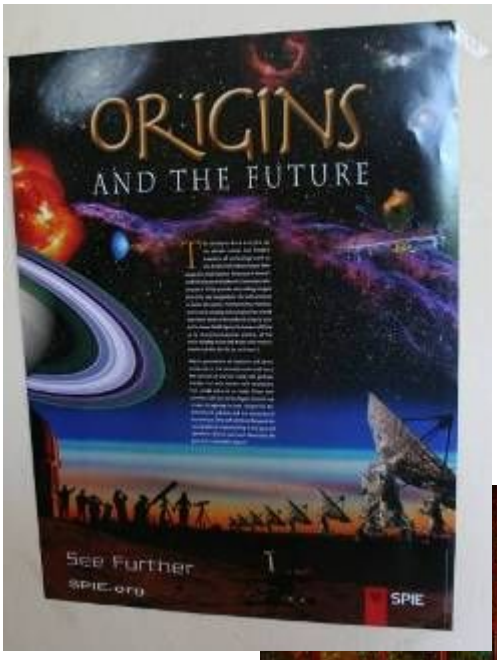
[5] G. N. Georgiev, M. N. Georgieva–Grosse, "An application of the complex Tricomi function," in *Proc. Eleventh Int. Conf. Electromagn. Adv. Applicat. ICEAA'09*, Turin, Italy, pp. 819–822, in CDROM, Sept. 14–18, 2009.

[6] G. N. Georgiev, M. N. Georgieva–Grosse, "Effect of the dielectric filling on the phase be-haviour of the circular waveguide with azimuthally magnetized ferrite toroid and dielectric cylinder," in *Proc. Asia–Pacific Microwave Conf. APMC–2009*, Singapore, Dec. 7–10, 2009, in print.

[7] F. G. Tricomi, *Funzioni Ipergeometriche Confluenti*, Edizioni Cremonese, Rome, Italy, 1954.

Social program

During the IRE-YSC-2009 special coffee-breaks were organized by IRE SPIE Student Chapter. During these coffee-breaks with light foods, beverages were served. The opportunity was used to advertise the SPIE and local SPIE/OSA Student chapters by distributing the IRE SPIE/OSA SC poster and leaflets, SPIE/OSA promoting materials and information leaflets. The foods and beverages were free for all the participants of the conference – thanks to support of SPIE



Participants of the IRE-YSC-2009, photos taken during the SPIE/OSA coffee break.

IX Kharkiv Young Scientist Conference "Electromagnetics, Photonics and Biophysics", 1-3 December 2009

IV Young Researcher Career Development Workshop

«bridging a gap between education and career in photonics and electromagnetics»

organized in the frame of YSC-2009, Kharkiv, Ukraine

Date&Venue: ***Wednesday, December 2, 2009, State Research and Design Institute of Basic Chemistry (NIOCHIM)***

Organized by :

IEEE Student Branch "IRE-KHARKIV"

Joint OSA/SPIE Student Chapter of Institute of Radiophysics and Electronics NAS Ukraine

MTT-S Student Chapter "IRE-KHARKIV-MTT"

AP/MTT/ED/AES/GRS/NPS/EMB Societies East Ukraine Joint Chapter

Joint OSA/SPIE Student Chapter of V. Karazin Kharkiv National University

National Technical University of Ukraine SPIE Chapter

Supported by :

Advancing the Science of Light.

Connecting minds. Advancing light.

Program of the Event

9:15 – 10:45 Session I: ***Lectures on electromagnetics and photonics of IEEE MTT and SPIE Visiting lecturers***

WAVEGUIDE FILTERS FOR SATELLITES
Prof. V. E. Boria, *Institute for Telecom. and Multimedia Applications, Technical University of Valencia, Valencia, Spain*

ELECTRODYNAMICS OF CARBON NANOTUBES AND CARBON NANOTUBE ARRAYS
Prof. I. S. Nefedov, *Department of Radio Science and Engineering, Helsinki University of Technology, Finland*

11:00 – 13:00 Session II: ***Societies benefits***

IEEE BENEFITS FOR STUDENTS

SPIE BENEFITS FOR STUDENTS

OSA BENEFITS FOR STUDENTS

PRESENTATION OF OSA/SPIE/IEEE STUDENT CHAPTERS *in the format of "Round table"*

13:00 – 15:00 ***Lunch***

15:00 – 17:00 Session III: ***Career Development Masterclass***

THE CRAFT OF SCIENTIFIC PRESENTATIONS: A LECTURE ON TECHNICAL PRESENTATIONS
Prof. V. E. Boria, *Institute for Telecom. and Multimedia Applications, Technical University of Valencia, Valencia, Spain*

AN OVERVIEW OF EUROPEAN COOPERATION ON ANTENNA RESEARCH
Dr. Marta Martínez-Vázquez, *Department of Antennas & EM Modelling, IMST GmbH, Germany*

IX Kharkiv Young Scientist Conference "Electromagnetics, Photonics and Biophysics", 1-3 December 2009

WAVEGUIDE FILTERS FOR SATELLITES

V. E. Boria

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An overview of all-metal waveguide filters for satellite payloads is offered in this talk [1]. Initially, an historical evolution of this filtering technology, including typical electrical and mechanical requirements, is outlined. Next, recent advancements in full-wave analysis methods and automated design procedures of these filters are reviewed. Then, a Computer-Aided Design (CAD) tool based on such techniques (i.e. FEST3D "Full-Wave Electromagnetic Software Tool for 3D Waveguide Components") is introduced, and its practical application to the analysis and design of several examples of satellite filters is presented. In particular, direct-coupled rectangular waveguide filters, E-plane waveguide technology, dual-mode filtering prototypes and evanescent mode waveguide filters are considered. Classical topologies, as well as more novel configurations for each filter class, are discussed.

[1] Vicente E. Boria and Benito Gimeno, "Waveguide Filters for Satellites," *IEEE Microwave Magazine*, vol. 8, no. 5, pp. 60-70, Oct. 2007.

THE CRAFT OF SCIENTIFIC PRESENTATIONS: A LECTURE ON TECHNICAL PRESENTATIONS

V. E. Boria

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This course provides attendees with an overview of what distinguishes the best scientific presentations. The course introduces a new design for presentation slides that is both more memorable and persuasive from what is typically shown at conferences. After completing this course, attendees will be able to:

- account for the audience, purpose, and occasion in a presentation/poster;
- logically structure the introduction, middle, and ending of a scientific presentation/poster;
- create a memorable and persuasive set of presentation slides;
- deliver a presentation/poster with more confidence.

This material is intended for anyone who needs to present scientific research. Those who either have not yet presented or have made several presentations/posters will find this lecture valuable.

ELECTRODYNAMICS OF CARBON NANOTUBES AND CARBON NANOTUBE ARRAYS

I. S. Nefedov

Department of Radio Science and Engineering /SMARAD Center of Excellence
Helsinki University of Technology, P.O. Box 3000, FI-02015 TKK, Finland
e-mail: igor.nefedov@tkk.fi

This lecture is devoted to electrodynamical properties of carbon nanotubes. Carbon nanotubes are obtained by rolling graphene sheets. Depending how the graphene sheet is rolled, carbon nanotubes can possess semiconductor or metallic properties. Carbon nanotubes (CNs) can consist of one shell (single-wall CNs) or several shells (multi-walled CNs). We restrict our consideration by single-wall metallic nanotubes as better studied and possessing lower losses. Carbon nanotubes exhibit such electrophysical properties, caused by their quantum nature, as the quantum resistance, the quantum capacitance and the kinetic inductance. Transmission line model of the CN [1] includes these parameters in addition to macroscopic electromagnetic capacitance and electromagnetic inductance.

High-frequency properties of single-wall metallic CNs are caused by frequency-dependent complex conductivity. It is known, that in single-wall metallic CNs can propagate strongly delayed surface waves (with the slow-wave factor $n = \beta/k \sim 30 - 100$, where β is the propagation constant and k is the wave number in free space) [2]. New properties, caused by electromagnetic interaction between nanotubes, were found in structures, composed of closely packed bundles of parallel identical metallic CNs [3], and in two-dimensional periodic arrays of CNs. Our electrodynamical description of the CN array is based on Green's function formulation. As a model of the metallic nanotube, we take impedance cylinder, characterized by the complex dynamic conductivity. We have found, that a slow-wave factor of eigenwaves in infinitely long arrays of nanotubes strongly depends on a transversal wave vector and it varies from unit to more than 200, that is considerably higher than observed in single nanotubes. Arrays of metallic CNs look similar to wire media (WM). Common properties and differences between WM and CN arrays are discussed.

Surface waves in finite-thickness slabs of CN arrays were investigated. It was found, that backward waves can propagate in a very wide frequency range. Thus, such CN array slabs can be considered as perfect planar metamaterials. Influence of a dielectric substrate and possible tunability is considered. Losses at gigahertz and terahertz frequencies are analyzed. Possible applications as slow-wave structures and other tunable devices at terahertz frequencies are discussed.

[2] P. J. Burke, "An rf circuit model for carbon nanotubes," *IEEE Transactions on Nanotechnology*, vol. 2, no. 1, p. 5, March 2003.
[3] Slepyan, S. A. Maksimenko, A. Lakhtakia, O. Yevtushenko and A. V. Gusakov, "Electrodynamics of carbon nanotubes: Dynamic conductivity, impedance boundary conditions, and surface wave propagation," *Phys. Rev. B*, vol. 60, p. 17136, Dec. 1999.
[4] M. V. Shuba, S. A. Maksimenko, A. Lakhtakia, "Electromagnetic wave propagation in an almost circular bundle of closely packed metallic carbon nanotubes," *Phys. Rev. B*, vol. 76, p. 155497, 2007.

SPIE Ukrainian Student Chapter meeting

The last part of YS Development Workshop was SPIE Ukrainian Student Chapter meeting

AWARDS

Financial Report

	Amount, USD	Description
1	**500**	5 Travel grants per 100$ for SPIE Student members and young scientists from RUSSIA, BIELORUSSIA
2	**500**	25 Travel grants per 20$ for SPIE Student members and young scientists from UKRAINE
3	**300**	30 Accommodation grants per 10 $ for 3 days for SPIE Student members and young scientists
4	**200**	Equipment (rent of conference hall, laptops, LCD projectors) for YS conference sessions at the State Research and Design Institute of Basic Chemistry "NIOCHIM" for December1-3, 2009
5	**310**	Equipment (rent of conference hall, laptops, LCD projectors) for IV Young Scientist Career Development Workshop and Special SPIE Coffee Break at the hotel "Aurora" for December 2, 2009
6	**200**	Rent of conference hall for YS conference sessions and room for Welcome party at the hotel "Poliot" for December 1-3, 2009
7	**550**	150 (conference folders, conference pens, conference abstract proceedings, conference CD etc.) for 150 participants
8	**450**	Welcome party (meals and beverages) + 3 coffee-breaks
9	**50**	Site hosting and support (www.ysc.org.ua) sponsored by SPIE
10	**80**	8 Awards (SPIE Student membership) for best presentation on Conference
11	**45**	3 Awards (OSA Student membership) for best presentation on Conference
12	**160**	5 Awards (IEEE Student membership) for best presentation on Conference
13	**345**	Banquet for SPIE, OSA, IEEE lectors
14	**100**	Meals and taxi for 3 IEEE lectors and orgcommittee
15	**60**	SPIE regular membership award for two lecturers (Dr. Kholodnyak and Dr. Georgiev)
16	**100**	OSA regular membership award for Prof. Simovski
17	**450**	Accommodation for 3 IEEE lectors

Total spent: 4400 USD

Amount Requested and spent by IRE SPIE SC: 2500+300=2800 USD

Provided by IEEE MTT IRE Kharkiv Student Chapter: 500 USD

Provided by IEEE East Ukrainian Chapter: 500 USD

Provided by IEEE IRE Kharkiv Student Branch: 300 USD

Provided by OSA Karazin Student Chapter: 200 USD

Provided by OSA Kharkiv Local Section: 100 USD

8. Summary Annual Financial Report

	Amount, USD	Description
1	**250**	Contest for the Best master's thesis in Optics&Photonics field (Jun 1, 2009)
2	**250**	Optics and Photonics Session in frame of V Kharkiv Young Scientists Conference on "Low Temperature Physics"(Jun 1-5, 2009)
4	**100**	International Young Scientist Workshop on "Optics, Photonics and Metamaterials" - 2009, (September 25-27, 2009)
5	**300**	IX Kharkiv Young Scientists Conference on "Electromagnetics, photonics and Biophysics" IRE-YSC-2009 (December 1-3, 2009)
6	**2500**	IX Kharkiv Young Scientists Conference on "Electromagnetics, photonics and Biophysics" IRE-YSC-2009 + SPIE Workshop (December 1-3, 2009)
7	**250**	Trevel grants for IRE SPIE SC members (4x45=180$ - International Conferences (Latvia, UK); 70$ -Ukrainian and Russian conferences

Amount Requested by IRE SPIE SC: 3650 USD

Amount Spent by IRE SPIE SC: 3650 USD

Appendix C: YSC-LTP-2009 + YSC-IRE-2009 Conference and Workshop materials

YSC-LTP-2009

Conference Books in Russian and English and prizes for Best reporters

YSC-IRE-2009 Conference and Workshop materials

Conference Books and CD in Russian/Ukrainian with SPIE logo

IRE SPIE/OSA Student chapter booklets with SPIE logo