University of Porto SPIE Student Chapter

ANNUAL ACTIVITY REPORT
2015

President: Ana Rita Ribeiro
Vice-President: Ricardo André
Secretary: Marta Ferreira
Treasurer: Ivo Nascimento

Advisor: José Luís Santos, Full Professor at Faculty of Sciences of University of Porto
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- Web page management and Facebook

5. Financial information
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1. List and contact information of elected Officers for the year 2016

The new officers were elected on October 28th of 2015.
President – Ricardo Melo André, rmeloandre@gmail.com, SPIE number: 3361605
Vice-President – Nuno Azevedo Silva, nunoazevedosilva@gmail.com, SPIE number: 3527391
Secretary – Catarina Monteiro, catarina.smonteiro@hotmail.com, SPIE number: 3716263
Treasurer – André Gomes, ardcgomes@gmail.com, SPIE number: 3692390

2. List of current Student Chapter Members

17 regular members and 1 alumni
Luís Carlos Costa Coelho - 3363190
Marta Sofia dos Anjos Ferreira - 3380993
Ana Rita da Silva Rodrigues Ribeiro - 3468226
Manuel Jorge Monteiro Marques - 3481367
Ivo Maciel Nascimento - 3481892
Ricardo Melo André - 3361605
Hamed Moayyed - 3531994
Nuno Azevedo Silva - 3527391
Miguel Ferreira – 3716264
André Gomes – 3692390
Catarina Monteiro – 3716263
Simão Pedro Teixeira Sá – 3688077
António Vaz Rodrigues – 3716437
Narsireddy Anugu
Hamid Hosseiny

Alumni Members:
Hugo Fidalgo Martins – 3381593
3. Details of Chapter activities in the year 2015

3.1 Organization of regular meetings during school year

These meetings aimed the interaction between student chapter members and discussion of the activities that the chapter proposed to organize along the year. The Chapter organized several meetings along the year, more or less once per month. The average of student members present in the meetings was around 80%. The students abroad participated through skype calls.

3.1.1 Pizza lunch with new Students

With this special lunch, the SPIE Student Chapter aimed to show the goals and main activities to the new students of the lab. During the lunch Professor José Luís dos Santos, UP SPIE Advisor was present, helping to spread the word about the Chapter activities.
3.2 Scientific meetings

3.2.1 Dr. Francesco Chiavaioli, Institute of Applied Physics (IFAC), Sesto Fiorentino (FI), Italy, “Long Period Gratings at IFAC”

**Short CV:** Francesco Chiavaioli received the MEng degree *summa cum laude* in Telecommunications Engineering in 2008 and got the PhD in Information Engineering in 2012 from the University of Siena (Siena, Italy) by discussing the PhD dissertation entitled “Design, Development and Testing of a Refractometer based on Optical Fiber Gratings: Physical and Biochemical Applications”. He worked as employer-coordinated freelance work at the Institute of Applied Physics ”Nello Carrara” (IFAC) of the National Research Council of Italy (CNR) in the theoretical and experimental study of optical fiber long period gratings (LPGs). He is currently working as Post-Doc Fellowship at the same institute in the design and characterization of optical fiber sensors, especially those based on LPGs, to be used for the detection of physical, chemical and biochemical parameters. He is author of more than twenty publications on the subject in International Journals and in International and National Conference Proceedings. He his member of OSA, SIOF and EOS.

**Summary of the talk:** The presentation is focused on the use of long period gratings, mainly for sensing applications. Three different configurations of LPG-based sensors are described. In the first configuration, the grating plane is tilted at increasing angles, leading to a simulation of fibre bending on a straight portion of optical fiber. This internally manufactured structure, increases the RI sensitivity of an LPG to the external medium. Then, standard and turn around-point LPGs are used as platforms for optical biosensing and their performances are compared by means of the implementation of an IgG-antiIgG bioassay. Finally, a new method for coupling light to high-Q silica whispering gallery mode resonators (WGMs), which is based on the use of LPGs and a “thick” taper along the same fiber, is described. The suggested approach is much more robust and useful especially for practical applications. Moreover, by cascading LPGs with different periods, a wavelength selective addressing of different resonators along the same fiber is also possible.

**Place of event:** INESC Porto at FCUP.

**Date:** March 9th, 2015.
3.2.2 Dr. Francesco Baldini, Institute of Applied Physics (IFAC), Sesto Fiorentino (FI), Italy, “Optical chemical and biochemical sensors for diagnostics”

**Short CV:** Francesco Baldini graduated in physics from the University of Florence magna cum laude in 1986. In 1986 he joined the Optical Fiber Group at IROE-CNR (now IFAC-CNR) in Florence. Active in the field of optical sensors and devices for chemical and biochemical parameters, he is author of more than 150 publications on the subject in International Journals, scientific books and International Conference Proceedings. He is/was coordinator and/or responsible of many international and national project in the field of optical chemo- and biosensors. He is associated editor of Journal of Sensors and was member of the International Advisory Board of Analytical & Bioanalytical Chemistry from 2005 to 2013. He is Chairman of the ASCOS (Advanced Study Course on Optical Chemical Sensors) Series (www.ascos.org). In 2009 he was nominated fellow of SPIE for achievements in biological and chemical sensing in biomedicine. He is President of the Italian Society of Optics and Photonics for the biennium 2015-2016.

**Summary of the talk:** Chemical and biochemical sensing is under the extensive research all over the world and many chemical and biochemical sensors are finding increasing number of applications in industry, environmental monitoring, medicine, biomedicine and chemical analysis. This is evidenced by each-year-growing number of international scientific conferences, in which advances in the field of the sensors are reported. One of the main reason why only a few sensors reaches the international market, notwithstanding the high number laboratory prototype described in many peer reviewed papers, lies in the fact that a biochemical sensor is a highly interdisciplinary “object” the realization of which requires the team work of scientists coming from different areas such as chemistry, physics, optoelectronics, engineering, biochemistry, and medicine. And this peculiarity is not easily found in the research teams.

Health-care is surely the application field which seems to have the best future development perspectives, not only considering invasive applications (the high degree of miniaturisation of optical fibre sensors,
their considerable geometrical versatility, and extreme handiness make it possible to perform a continuous monitoring of numerous parameters, thus enabling performances which are often unique) but also taking into account the development of optical multi-array biochips for the analysis of multiple parameters, essential in view of an immediate rapid screening of the patient pathology. As a matter of fact, optical biosensors, integrated within an optical biochip, can play a leading role in another emerging area of clinical applications: point of care testing (POCT). In clinical practice, the great many of the analytes are measured with large and cumbersome equipments located in central laboratories. On the other hand, there is a need for appropriate instruments able to provide efficiently results in which the traditional laboratory testing is performed at or near the patient site, usually by non-laboratory employees (e.g., nurses, respiratory therapists and perfusionists). Because of its miniaturization, low cost, and potential for large-scale automation, optical biochip can perform analysis more efficiently than currently available laboratory equipment, satisfying all the requirements of physicians for a fast and rapid determination of the clinical parameters at the patient's bedside. Differently from genomics and proteomics, where thousands of sensing spots are monitored simultaneously by means of fluorescence scanners, in many POCT applications, there is very often the necessity of measuring only a limited number of parameters in order to identify the correct pathology or to monitor the administrated therapy.

In recent years, the importance of optics in the biomedical area has been increasing owing to the advent of nanophotonics, which is opening completely new perspectives. Thanks to the reduction of the probe size to nanoparticles, optical nanosensors have been developed, which penetrate the cell membrane and measure chemical and biochemical analytes directly inside the cell.

The fundamental basis of chemical and biochemical optical sensing are summarised and the new trends in biophotonics are described.

**Place of event:** INESC Porto at FCUP.

**Date:** March 9th, 2015.
3.2.3 Dr. Jayanta Haldar, Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Jakkur, Bangalore, India “Bacterial cell membrane: Targeting the Achilles’ heel to combat drug-resistance and infections”

**Summary of the talk:** Cell membrane, the Achilles’ heel of bacteria is vital for its various cellular processes such as cell division, energy generation/metabolism/respiration, cell wall and lipid biosynthesis, transport systems, membrane-bound proteins and enzymes, and permeability of ions. Targeting the bacterial cell membrane is a promising approach to combat drug resistance as it is expensive for the bacteria to develop resistance against the membrane-active molecules. At our laboratory, we develop molecular strategies/platforms to target bacterial cell membranes for the prevention and treatment of bacterial infections. For the prevention of bacterial infections, we develop antimicrobial polymeric coatings which can be applied on day-to-day surfaces that humans touch. Development of novel membrane-active molecules is taken as one approach to develop future antibiotics. An interesting approach for incorporating membrane-active properties into the known antibiotics like vancomycin and tetracyclines has been adopted to re-instate their efficacy against several multi-drug resistant pathogens. We strongly believe that targeting the Achilles’ heel of bacteria is the way to win the war against microbes.

**Place of event:** INESC Porto at FCUP.

**Date:** April 23rd, 2015.

3.2.4 Dr. Susana Barbosa, INESC TEC, Porto, Portugal, “Radon: Where, how and why?”

**Short CV:** Susana Barbosa graduated in Physics/Applied Mathematics from University of Porto in 1998. In 2006 she obtained her PhD from the University of Porto in Surveying Engineering. Nowadays she is a Senior Researcher at INESC TEC. Before she was a senior researcher at IDL in University of Lisbon, and a Postdoctoral Researcher at the Geological Survey of Israel and at Danish National Space Center (DTU). Her research is highly interdisciplinary, with a strong emphasis on time series analysis and
methodological approaches for the analysis of environmental data. In recent years she has been focused on the study of natural radioactivity phenomena and the application of radon as an ultra-trace component for tracking temporally varying processes in the geologic environment and in the atmosphere. She is editor of one book and three topical volumes. Author of 3 book chapters and more than 35 peer reviewed articles in international (ISI) journals.

**Summary of the talk:** Radon (222Rn) is a naturally occurring colourless, odourless and radioactive noble gas. It is generated within solid mineral grains by the radioactive decay of radium (226Ra). Since radium is present in virtually every mineral material, radon is ubiquitous in the natural environment, constantly produced in every rock, soil or aquifer matrix. Radon atoms generated inside mineral grains can escape into the air or water-filled pore space, and further migrate by diffusion and/or advection to the subsurface air or water medium/phase. Radon is a potential health hazard when inhaled, as its short-lived decay products can be deposited on respiratory tract tissues and damage the cells, contributing to an increased risk of lung cancer. Its radioactive nature makes radon easily measurable by nuclear techniques, even in very small amounts. Furthermore, its half-life of 3.8 days, its widespread occurrence in nature, and its unique characteristics as a non-reactive (noble) element make it particularly suitable for tracking time-varying environmental phenomena. During the last decades, radon has found a variety of geoscientific applications, ranging from its utilization as a potential earthquake precursor and as a proxy of tectonic stress, to a wide range of applications as a tracer in air, soil and water, and in diverse natural environments, from volcanic to marine and hydrological settings. This talk will focus on the where, how and why of radon monitoring, the potential for sensor development, and further practical applications.

**Place of event:** INESC Porto at FCUP.

**Date:** April 23rd, 2015.
3.2.5 Dr. Miguel González-Herráez, Universidad de Alcalá, Spain, “Slow light in optical fibers: from very slow to faster than light speed.”

Short CV: Miguel González-Herráez received the M.Eng. and D.Eng. degrees from the Polytechnic University of Madrid, Madrid, Spain, in 2000 and 2004, respectively. While working towards the D.Eng. degree, he worked first as a Research Assistant and then as a Postdoctoral Fellow in the Applied Physics Institute at the Spanish Council for Research, Madrid, Spain, and had several long stays in the Nanophotonics and Metrology Laboratory, Ecole Polytechnique Federale de Lausanne, Switzerland. In October 2004, he was appointed Assistant Professor in the Department of Electronics, University of Alcalá, Madrid, Spain, where he was promoted to Associate Professor in June 2006. He is the author or coauthor of over 90 papers in international refereed journals and >100 conference contributions and has given several invited/plenary talks at international conferences. His research interests cover the wide field of nonlinear interactions in optical fibers. Dr. González-Herráez has received several important recognitions to his research career, including the European Research Council Starting Grant, the "Miguel Catalan" prize for young scientists given by the Comunidad de Madrid and the "Agustin de Betancourt" prize of the Spanish Royal Academy of Engineering.

Summary of the talk: Slow light is the field of photonics research that has to do with the manipulation of the group velocity of light in certain optical media. Although photonic scientists are used to thinking on the speed of light as a constant, certain media can exhibit strong control and tenability of this parameter. Striking experiments have been developed along the last years, showing from very slow group velocities (even close to the acoustic speed) to faster than light and even negative group velocities. We will review some of our work concerning the first demonstrations on group velocity manipulation in optical fibers, including the principles, experiments and intriguing results. Most of this work will be explained in simple terms, showing no contradiction with well-established relativity theories. The application of these results will also be addressed.

Place of event: INESC Porto at FCUP.

Date: June 23rd, 2015.
3.2.6 Dr. Roman Dauliat, Xlim research institute, France, “Striving towards strictly singlemode very-large-modearea fibers”

Short CV: Romain Dauliat was born in Brive-la-gaillarde, France, in 1987. He received its Ph.D. degree in Optics from the University of Limoges in 2013 for his work on the development of innovative microstructured optical fibers for high-power applications at the Xlim Institute. He spent 15 months as a post-doctoral researcher at the Leibniz Institute of Photonic Technology in Jena, Germany, for the production of these novel fibers. Currently he is a Post-doctoral researcher at the Xlim research institute, pursuing his work on high power fiber lasers operating either at 1 or 2 µm (either Ytterbium or Thulium doped fibers).

Summary of the talk: Over the last two decades, significant efforts have been devoted to the development of Very-Large-Mode-Area (VLMA) fibers enabling for singlemode high power operation. However, enlarging the fiber core size to fend-off non-linear effects comes at the cost of an increasing number of guided modes. Thus, various kind of microstructured optical fibers have been devised to get a singlemode emission. Among them, active Large-Pitch-Fibers have enabled singlemode operation with core size reaching up to 135 µm and outstanding performances both in continuous and pulsed regimes. This lecture will focus on the last achievements made in this field for ensuring a strictly singlemode propagation and increase the resilience to thermal-induced phenomenon that degrades the beam quality. As an outcome, an original aperiodic structure will be presented from its modelling to its first experimental validation as a fiber laser.

Place of event: INESC Porto at FCUP.

Date: October 18th, 2015.
3.2.7 Let's Talk About Science! (2nd Edition)

An afternoon dedicated to Science, where we had the pleasure to welcome the SPIE Invited Lecturer, Prof. Silvano Donati, who gave a talk about self-mixing interferometry. Different perspectives about Science, development of new technologies and ethics were addressed by Prof. Alípio Jorge and Dr. Rui Vieira da Cunha.

- **Prof. Silvano Donati, Department of Electronics, Faculty of Engineering, Univ. of Pavia, Italy, "Self-Mixing Interferometry: a Universal Yardstick to Measure Almost Everything"

**Short CV:** Silvano Donati graduated in Physics cum laude in 1966 at University of Milan, Italy. In 1980 he became a full Professor of Optoelectronics at the Department of Electronics, Faculty of Engineering, University of Pavia, Italy, where he leads the Group of Optoelectronics active on photodetector and noise, and electro-optical instrumentation (gyroscopes, interferometry, etc.). He is the credited inventor of self-mixing interferometry and of chaos-shift-keying (CSK) cryptography, the topics acknowledged in his Fellow citation and the subject covered in his Distinguished Lecture given in 21 LEOS Chapters in two terms, 2007/08 and 2007/08. Author of two books, ‘Photodetectors’ published by Prentice Hall, 1999, and 'Electro-Optical Instrumentation', published by Prentice Hall, 2004, this last translated in Chinese (Jiao Tong University Press, 2006) and available as paperback and e-book (2008). He authored or co-authored about 300 papers on peer-reviewed Journals He was the founder (1996) and the past Chairman (1997-01) of the Italian LEOS Chapter. Has been LEOS Vice President Region 8 Membership (2002-04), LEOS Board of Governors Elected Member (2004-06), Treasurers of the Italian LEOS Chapter (2002-06), Counselor of the IEEE Student Branch in Pavia (2001-07) and LEOS Distinguished Lecturer. Member of the Nanotechnology Council Fellow Board. Has been chairing the IEEE Italy Section on the term 2008/09. He acted as Guest Editor of several Special Issues, on Fiber Optics and Passive Components (JSTQE Sept. 1999), on Laser Interferometry (J. Optics A 1998 and 2002, Opt. Engineer. 2001) for a Feature Issue of IEEE Journal Quantum Electronics, Sept. 2002, on Optical Chaos and Applications to Cryptography and of
one on Photodetectors (2004). He has been a Visiting Professor at National Taiwan University (2005) and National Sun Yat Sen University (2007, 200, 2010). He is a Member of SPIE, Life Fellow of the IEEE, Meritorios Member of AEIT, and Fellow of OSA.

Summary of the talk: We start with a theoretical introduction to mutual- and self-coupling phenomena in laser oscillator, and then describe in details the principle of operation of self-mixing interferometer, a new coherent configuration for the measurement of dimensional and kinematic quantities such as: displacement, distance, vibration amplitude, thickness, and angle, and also physical quantities like: coupling factors, line width, alfa-facto index of refraction. In the measurement arrangement, the laser undergoes self-injection at weak level, leading to an amplitude and frequency modulation driven by external optical path length. Then we will describe the developments of a displacement-measuring instrument, first by using the up/down counting of mode hops, then extending the principle of measurement to the case of a diffuse target, reflecting back a field affected by the speckle-pattern statistics. Third, we will report on the successful implementation of two-channel (or, referenced) vibrometer, based on analogue processing of the self-mix signal, in which the speckle-related amplitude errors are removed thanks to a servo-loop concept, and the instrument is capable of true differential operation, on diffuse surface, like a normal optical interferometer operates on legs ending with reflective surfaces. A survey of performances achieved in different design will conclude the talk.

- **Prof. Alípio Jorge, Department of Computer Science, Faculty of Sciences, Univ. of Porto, and LIAAD – INESC TEC, Portugal, "Things Like Us"**

**Short CV:** Alípio Jorge is an associate professor at the Department of Computer Science of the Faculty of Science of the University of Porto and the coordinator of LIAAD, the Artificial Intelligence and Decision Support Lab of UP. LIAAD is a unit of INESC TEC (Laboratório Associado) since 2007. He is PhD in Computer Science by U. Porto, MSc. on Foundations of Advanced Information Technology by the Imperial Collegeand BSc. in Applied Maths and Computer Science, currently Computer Science (U. Porto). His research interests are Data Mining and Machine Learning, in particular association rules, web intelligence and data mining for decision support. His past research also includes Inductive Logic Programming and Collaborative Data Mining. He lectures courses related to information processing, data mining, decision support and database marketing. While at the Faculty of Economics, where he stayed from 1996 to 2009, he launched, with other colleagues, the MSc. on Data Analysis and Decision Support Systems, which he coordinated from 2000 to April 2008. He lead research projects on data mining and web intelligence. He was the director of the Masters in Computer Science at DCC-FCUP from June 2010 to August 2013. He co-chaired international conferences (ECML/PKDD 2015 and 2005, Discovery Science 2009 and EPIA 01),
workshops and seminars in data mining and artificial intelligence. He was Vice-President of APPIA the Portuguese Association for Artificial Intelligence.

He lectures Data Structures with Python (lectures and tutorials) and Data Mining (MSc).

Summary of the talk: Things can now run software, have access to sensors and to a wealth of information. Things can sense, infer, learn, decide. Things can study us, predict our actions and interfere with our lives. Virtually, they can program themselves and even self-replicate. Is this a sci-fi movie from the eighties? No. It’s just the starting point for a talk about computing and technology with more questions than answers.

- Dr. Rui Vieira da Cunha, Institute of Philosophy, Faculty of Arts, Univ. of Porto, Portugal, "A Man Can Die but Once": On Enhancement, Identity and Immortality

Short CV: Rui Vieira da Cunha’s first degree was in Law (2003) and he was a Lawyer for 5 years, before a licentiate degree in Philosophy (2008). He has a post-graduation in Forensic Medicine (2004) and one in Teaching (2009).

He is currently finishing his PhD. on metaphysics and ethics and has published several articles on personhood, personal identity, and connected topics that constitute the bulk of his thesis’ area of specialization. He is also interested in a number of related but different issues in the intersection of philosophy and law (free will, human dignity, human enhancement, punishment, etc.).

Summary of the talk: Science and technology's pace is relentless and we are being provided everyday with more accurate explanations of how the universe and ourselves work and with applications that can take advantage of such breakthroughs to help us understand our selves better - and maybe, to some extent, redefine our identity and our nature. Beyond what is possible today and what we can envisage for tomorrow, lie fictional futures, utopian dreams and dystopian nightmares: there are amazing opportunities but also risks to be discussed. What will we be like in 50 years? Will we be cyborgs? Enhanced humans? And in 100 years? Will machines take over and rule us? Or will we be the machines? Will we live forever? All of us? And will we want to?

Place of event: INESC Porto at FCUP.

Date: October 12th, 2015.
3.3 Student Officer Travel Grant

3.3.1 SPIE Optics + Optoelectronics 2015

Ivo Nascimento, as officer (Treasurer), was at the SPIE Optics + Optoelectronics conference in Prague, Czech Republic, with a grant from SPIE. He presented a poster at the Optical Sensors conference. After the conference he gave a small talk to the UP SPIE Student Chapter members about what was learned during the conference, including an oral presentation of his poster.
3.3.2 Photonics West 2015

Ana Rita Ribeiro participated in Photonics West 2015. She attended the leadership workshop, representing the UP SPIE Student Chapter.

3.4 Organization of activities for undergraduate and graduate students

3.4.1 Participation in “Open Days 2015” to schools

Summary: The Faculty of Science of University of Porto (FCUP) hosts the "Open Days" to schools. This initiative is aimed at secondary school students, especially those who are in the process of vocational guidance. These students had the opportunity to take a close look at a group of activities divided into FCUP's several knowledge areas, participating in guided tours to the facilities of the different departments and research centers. The goal is to provide students with a direct contact with the FCUP training opportunities and information on the professional outputs given by graduations and master degrees. The “Open Days” are performed during two days, organized by tours to the various laboratories of the Faculty.

The visits are organized by area and require prior registration in each area who are interested in visiting [Biology, Physics and Astronomy, Geosciences, Environment and Spatial Planning (Geology, Environment, Geographic Engineering, Food Engineering, Agricultural Engineering, Landscape Architecture); Computing, Mathematics, Chemistry and Biochemistry]. All students and teachers have informational materials about the courses available at FCUP. This activity aims to set up an informal table in the department stand with SPIE promotional materials, handouts, and membership applications during the event.

The FCUP Open Days took place in February 19th and 20th. The UP SPIE Student Chapter was represented by its members through a series of outreach activities closely related to the research areas of INESC Porto.

Place of event: Department of Physics and Astronomy, Faculty of Sciences of University of Porto.
Date: February 19\textsuperscript{th} and 20\textsuperscript{th}, 2015.

3.4.2 Co-Organization of ASCOS Summer School

The objective of this advanced study course - the 9th in the framework of the ASCOS series - is to provide young scientists from various disciplines, a privileged atmosphere where they can learn and interact with
leading Scientists of different fields related to nanotechnology, optical chemical and biochemical sensors and its applications.

Organized by INESC TEC and the University of Porto under the heading "Nanotechnology for (bio)chemical sensors", ASCOS 2015 covered the latest developments as well as basic principles of the diverse range of sensor techniques, probes and bioassays which rely on opto-chemical sensing principles, as well as applications and commercial aspects of sensor development. This year's edition gave a special focus on the role of nanotechnology and its impact in the field of optical sensors and included special sessions at the International Iberian Nanotechnology Laboratory, located in Braga, Portugal.

ASCOS courses follow a model that strongly stimulates interaction among the different students and the expert tutors. Besides fundamental theory and basics at a level accessible for every participant, lectures covered also latest exciting development of related technologies. In addition, the students were challenged to apply their knowledge in solving specific real life problems using optical sensors systems. Small groups of participants from different countries worked together during the course duration, with the collaboration of expert tutors, and presented their solution to an audience representing the international scientific community, in the last day.

In addition to the scientific programme, there was ample opportunity for socialising and networking, which is the other major aim of ASCOS: to form a network of interdisciplinary and international contacts and cooperation. The latter is probably the greatest asset in modern science.

The University of Porto SPIE Student Chapter attributed two awards in a Photo Contest in the framework of the International Year of Light. Besides this, some members of the Chapter helped organizing the event.
During the summer school there was a short presentation about the UP SPIE Student Chapter, and some guides on how to form a chapter were also given. This presentation was made by Ana Rita Ribeiro the president of the Chapter and by Dr. Robert Lieberman (SPIE President).

**Place of event:** Faculty of Sciences UP, Porto.

**Date:** July 22nd to 29th, 2015

*SPIE and Student Chapter presentation:*

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**Photo Contest:** 1º and 2º awarded photos:

**Prizes:** 25 € Amazon vouchers
3.5 Other events:

3.5.1 COST MP1205 General Meeting and Conference – Advances in Optofluidics

The aim of this Cost Action MP1205 is to establish active interlinks between laboratories working in the fields of micro and optofluidics, optical tweezers, nanoscience and photonics, bio and soft materials, focusing their work towards lab-on-a-chip systems and at promoting long-term development of these fields in Europe. The goal is to increase the knowledge in basic physics and biology from the micro-down to the nano-scale, and to develop the future generation of lab-on-a-chip devices for portable and inexpensive, but accurate and reliable equipment for: diagnostics, detection, identification and manipulation of biomolecules and nanomaterials, biomedical and environmental micro sensing, advanced imaging and energy generation.

The General Meeting and two days conference took place at INESC TEC, and the UP SPIE Student Chapter supported the event, concerning some extra help on the organization.

Date: May 2015
Place: Faculty of Sciences UP, Porto

3.5.2 Co-organization of Light Talks

The Lighttalks - Lighting the Future session at the University of Porto was a great success. Over 50 people were in attendance including students (undergraduate, graduate and doctoral), young researchers, and professors. The president of the Portuguese optical society, Manuel Filipe Costa, welcomed the audience and showed a short video from the EOS about the international year of light. After this welcoming session, professors and researchers from the universities of Porto, Lisboa, Aveiro and Minho presented topics related to light. The short nature of the presentations gave the whole afternoon a brisk tone, never
allowing the audience to bore. The afternoon started off with two classical topics on the history of light and its dual nature. Then a presentation about the many applications of light whether in industry or in science gave an overview of how important and omnipresent light is in our lives and our society. After this, two state of the art quantum optics topics followed: quantum effects in photosynthesis and quantum plasmonics. The last lecture gave an insight to black holes and how the absence of light can help us see them by detecting their shadow. In the end, a very productive discussion ensued about these and other topics related to light and its applications. The audience was very attentive and interactive throughout the whole session leading to the conclusion that this Lighttalks – Lighting the Future was a success.

Date: November 6th, 2015
Place: Faculty of Sciences UP, Porto

3.6 International Year of Light Documentary

In the framework of the International Year of Light, the UP SPIE Student Chapter produced a documentary about Light entitled ‘Light: Crossing Generations’. The documentary is based on interviews done to the general public concerning light. Therefore, some elements of the UP Chapter interviewed several people in Porto downtown concerning Light.

The questions were:

1) What is light? And where does it come from?
2) Which is the speed of light?
3) How long does it take for light from the Sun to reach the Earth? Which is the speed of light?
4) Why is the sky blue during the day and red at sunset?
5) How do rainbows form? How many colors does it have?
6) Did you know that there is light you cannot see?
7) Where is light used besides illumination?
8) Can you imagine the world without light?

In this documentary contributions from children and adults were collected. Also professors from the University of Porto gave their contribution.

The documentary has a length of ~30 minutes and is in Portuguese. At the moment, it is being subtitled in English and when ready will be sent to SPIE and shared on the SPIE Web page and Facebook.

Team responsible for the interviews and video production:

Ana Rita Ribeiro
Ricardo André
Marta Ferreira
Ivo Nascimento
Nuno Silva
Luís Coelho
André Gomes
3.7 Web page and Facebook account maintenance of University of Porto SPIE Student Chapter and its promotion

The official website was maintained (http://upspiechapter.inescporto.pt/) and it has been regularly updated about the activities that the University of Porto SPIE Student Chapter has developing during the year.

The official Facebook has been updated frequently aiming that our activities reach people from all over the world.
4. Details of planned activities for the future

Activities proposed by the University of Porto SPIE Student Chapter for the year 2016:

- **Organization of the Third Edition of 'Let's talk about science'**
  With this initiative the Chapter aims to promote a special scientific meeting with the SPIE invited speaker and other lecturers invited by the Chapter.
  
  Venue: Faculty of Sciences, University of Porto
  
  Date: To be announced

- **Organization of regular meetings during the school year**
  The main goal of these meetings are the interaction among the student chapter members, as well as the discussion of activities that the chapter proposes to organize along the year.
  
  Venue: Faculty of Sciences, University of Porto
  
  Date: Bimonthly

- **Scientific meetings**
  The objective of these activities is to promote scientific meetings between students (from undergraduate to graduate students) and research scientists, with researchers from industry or academia, enabling an open debate and the assessment of new concepts, technologies and applications in the domain of optical technology, as well as the establishment of new collaborations and networks.
  
  Venue: Faculty of Sciences, University of Porto
  
  Date: During the year 2016 (whenever possible)

- **Lab meetings with flash presentations**
  Create a monthly meeting where, students (undergraduate, graduate, doctoral and post-doctoral) discuss their work, ask questions and have to present their work in a succinct manner (5-10min). In these meetings, a senior researcher would also make a small presentation (15-20min) about research in their group. Students and researchers that attend conferences will also be invited to present what they found the most interesting and new at the conference.
  
  Venue: Department of Physics and Astronomy, Faculty of Sciences, University of Porto
  
  Date: Monthly

- **Scientific workshops**
  Organization of workshops where an experienced researcher talks about a specific aspect of research. Topics such as the act of reviewing a paper for a journal, writing a paper, preparing a topical review, preparing a poster, preparing a presentation, etc.
Venue: Department of Physics and Astronomy, Faculty of Sciences, University of Porto

Date: During the year 2016

• **Co-organization of a Topical Meeting of the European Optical Society**

An EOS topical meeting will be organized at the Department of Physics, Faculty of Science, University of Porto by the Portuguese optical society and INESC TEC. The exact topic is still to be determined but will revolve around optical sensors. The chapter will help with the organization of this meeting.

Venue: Department of Physics and Astronomy, Faculty of Sciences, University of Porto

Date: September/October 2016

• **(3rd) Participation in “Open Days” to schools**

The Faculty of Science of University of Porto (FCUP) hosts the “Open Days” for schools. This initiative is aimed at secondary school students, especially those who are in the process of vocational guidance. The goal is to provide students with a direct contact with the FCUP training opportunities and information on the professional outputs given by graduations and master degrees.

The “Open Days” last for two days, where tour to the several labs of the faculty are organized. The visits are organized by area and require prior registration in each area by those interested [Biology, Physics and Astronomy, Geosciences, Environment and Spatial Planning (Geology, Environment, Geographic Engineering, Food Engineering, Agricultural Engineering, Landscape Architecture); Computing, Mathematics, Chemistry and Biochemistry]. All students and teachers have informational materials about the courses available at FCUP. This activity aims to set up an informal table in the department stand with SPIE promotional materials, handouts, and membership applications during the event.

Venue: Faculty of Sciences, University of Porto

Date: February, 2016

• **(4th) Participation in “Mostra de Ciência da U. Porto”**

The Science, Teaching and Innovation Display at the UP (Mostra de Ciência, Ensino e Inovação da U. Porto) is the ideal space to realize the diversity of degrees of University of Porto, but also to explore several aspects of the scientific knowledge. Thought as a space for informal exchange of views, where it is possible to question, experiment and participate. The Science, Teaching and Innovation Display at the U. Porto is directed to high school students that are considering their future but also for all those interested in knowledge (scientific, technological, humanistic and artistic). This fair is also an ideal opportunity to understand the impact that the University of Porto has in our society and in the countries development. This activity aims to set up an informal table in the department stand of “Mostra de Ciência” with SPIE promotional materials, handouts, and membership applications during the event.

Venue: Pavilhão Rosa Mota - Porto.
Date: March, 2016

- **Web page management and Facebook**

As in the previous year, the website/Facebook will be used to inform the students of the activities developed by the University of Porto SPIE Student Chapter.

## 5. Financial information

### 5.1 Annual budget

All figures are presented in Euros, at the conversion rate considered at the time of the transaction.

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
<th>Value (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/12/14</td>
<td>Balance from 2014</td>
<td>9.75</td>
</tr>
<tr>
<td>09/03/15</td>
<td>20th Scientific Meeting: Coffee Break</td>
<td>-9.42</td>
</tr>
<tr>
<td>29/04/15</td>
<td>22th Scientific Meeting: Coffee Break</td>
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</tr>
<tr>
<td>01/05/15</td>
<td>Activity Grant ($500)</td>
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<td>23/06/15</td>
<td>23th Scientific meeting: Coffee Break</td>
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</tr>
<tr>
<td>23/09/15</td>
<td>Interview: Transportation</td>
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<tr>
<td>23/09/15</td>
<td>Interview: Coffee Break</td>
<td>-13.06</td>
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<tr>
<td>23/09/15</td>
<td>Interview: Printouts</td>
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<td>05/10/15</td>
<td>Photography contest award ASCOS Summer School</td>
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<td>08/10/15</td>
<td>Let's talk about science: Coffee Break</td>
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<td>12/10/15</td>
<td>Let's talk about science: Lunch</td>
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<td>12/10/15</td>
<td>Let's talk about science: Dinner</td>
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<td>19/10/15</td>
<td>24th Scientific meeting: Coffee Break</td>
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<tr>
<td><strong>Balance in December 1st</strong></td>
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<td><strong>16.37 €</strong></td>
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