PHOTONICA2015

V International School and Conference on Photonics
& COST actions: MP1204 and BM1205
& the Second international workshop "Control of light and matter waves propagation and localization in photonic lattices“
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Book of Abstracts

Editors
Suzana Petrović, Goran Gligorić and Milutin Stepić

Belgrade, 2015.

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24 August – 28 August 2015

Belgrade, Serbia

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Suzana Petrović, Goran Gligorić and Milutin Stepić

Vinča Institute of Nuclear Sciences, Belgrade, Serbia

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ABSTRACTS OF TUTORIAL, KEYNOTE AND INVITED LECTURES AND CONTRIBUTED PAPERS

of

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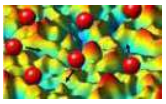
Conference Topics

1. Quantum optics
2. Nonlinear optics
3. Ultrafast phenomena
4. Laser spectroscopy
5. Devices and components
6. Biophotonics
7. Optical communications
8. Sensing: plasmonics, fiber optics and interferometers
9. Holography and adaptive optics
10. Optical materials

BMBS COST Action BM1205
European Network for Skin Cancer Detection using Laser Imaging
(24-28 August)

MPNS COST Action MP1204
TERA-MIR Radiation: Materials, Generation, Detection and Applications
(24-28 August)



WORKSHOP
Control of light and matter waves propagation and localization in photonic lattices
(28-29 August)

The **International School and Conference on Photonics- PHOTONICA**, is a biennial event held in Belgrade since 2007. The first meeting in the series was called ISCOM (International School and Conference on Optics and Optical Materials), but it was later renamed to Photonica to reflect more clearly the aims of the event as a forum for education of young scientists, exchanging new knowledge and ideas, and fostering collaboration between scientists working within emerging areas of photonic science and technology.

A particular educational feature of the program is to enable students and young researchers to benefit from the event, by providing introductory lectures preceding most recent results in many topics covered by the regular talks. In other words, apart from the regular lectures, the plenary speakers will also give tutorial lectures specifically designed for students and scientists starting in this field.

The Conference consists of oral presentations and vibrant poster sessions. The wish of the organizers is to provide a platform for discussing new developments and concepts within various disciplines of photonics, by bringing together researchers from academia, government and industrial laboratories for scientific interaction, the showcasing of new results in the relevant fields and debate on future trends. This year our conference will contribute celebration of the International Year of Light as a global initiative which will highlight to the citizens of the world the importance of light and optical technologies. This PHOTONICA 2015 will include two COST Action meetings and one workshop with the main objective to promote knowledge in various disciplines of photonics. In additional to the lectures and seminars, a Round Table "Scientific publishing: Editors et altera" will be organized where the editors will present editorial and publishing policies of their journals and share their experiences. Following the official program, the participants will also have plenty of opportunity to mix and network outside of the lecture theatre with planned free time and social events.

This book contains 219 abstracts of all presentations at the **5th International School and Conference on Photonics, PHOTONICA2015**. Authors from 50 countries from all continents will present their work at the conference. There will be six tutorial and seven keynote lectures to the benefits of students and young researches. Twenty four invited lectures, five progress reports of young Serbian researchers and thirty one contributed talks will present most recent results in their research fields. Within the two poster sessions, students and young researches will present 146 poster presentations on their new results in a cozy atmosphere of the Serbian academy of science and arts.

Belgrade, July 2015
Editors

Table of Contents

Nonlinear optics

Devices and components

Optical communication

A long-period fibre grating sensor for respiratory monitoring

M. D. Ivanović[1], J. Petrovic[1], A. Daničić[1], M. Miletić[1], M. Vukčević[2], B. Bojović[1], Lj. Hadžievski[1], T. Allsop[3] and D. J. Webb[3]
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In the current clinical practice of non-invasive mechanical ventilation (NIV), continuous monitoring of respiratory volumes is based on the measurement of air flow through an oronasal mask or mouthpiece. Errors in respiratory-volumes monitoring and patient-ventilator asynchrony due to the inevitable air leaks from the mask may lead to insufficient ventilation and/or damage of the airway system. Therefore, clinician's observations of the chest wall expansions are required, but they are subjective, time consuming and strongly dependent on clinician's experience [1].

We present and validate a method for the measurement of respiratory volumes by a single long period fibre-grating (LPG) sensor of bending. This method is grounded on the hypothesis that the volume of the inhaled air can be correlated with the change in a local torso curvature in a ribs area with stiff underlying tissues. Here, we explain the working principle of the LPG sensors, a monochromatic interrogation scheme, a two-step calibration-test measurement procedure and present results that establish a linear correlation between the change in the local rib-cage curvature and the change in the lung volume. Results also show good sensor accuracy in measurements of tidal and minute respiratory volumes for all clinically relevant breathing volumes [2].

Additionally, we examine the possibility of using the rib-cage movement signal measured by a single LPG sensor as a new way to provide a trigger to the ventilator. Our preliminary results on healthy volunteers provide the statistical evidence of the 200 ms lag of the pneumotechometer with respect to the fibre-optic signal.

The proposed single-sensor method is non-invasive, simple, low-cost and easy to implement. Moreover this method does not suffer from the flaws of air-flow measurements, it eliminates the need for chest movement observation by clinicians and can be implemented on both male and female patients. The preliminary results are promising and indicate that the method proposed here could be used in NIV.

REFERENCES
[1] S. Baudouin et al., Thorax 57, 192 (2002).
[2] M. D. Petrović et al., Biomed. Opt. Exp. 5, 1136 (2014).