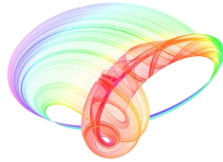


Book of abstracts



PHOTONICA2019

The Seventh International School and Conference on
Photonics, 26 August – 30 August 2019, Belgrade, Serbia

& Machine Learning with Photonics Symposium
(ML-Photonica 2019)



& ESUO Regional Workshop



& COST action CA16221



Editors: Milica Matijević, Marko Krstić and Petra Beličev

Belgrade, 2019

ABSTRACTS OF TUTORIAL, KEYNOTE, INVITED LECTURES,
PROGRESS REPORTS AND CONTRIBUTED PAPERS

of

The Seventh International School and Conference on Photonics
PHOTONICA2019, 26 August – 30 August 2019, Belgrade, Serbia

and

Machine Learning with Photonics Symposium

and

ESUO Regional Workshop

Editors

Milica Matijević, Marko Krstić and Petra Beličev

Technical Assistance

Danka Stojanović and Goran Gligorić

Publisher

Vinča Institute of Nuclear Sciences
Mike Petrovića Alasa 12-14, P.O. Box 522
11000 Belgrade, Serbia

Printed by

Serbian Academy of Sciences and Arts

Number of copies

300

ISBN 978-86-7306-153-5

PHOTONICA2019 (The Seventh International School and Conference on Photonics-www.photonica.ac.rs) is organized by Vinča Institute of Nuclear Sciences, University of Belgrade (www.vinca.ac.rs), Serbian Academy of Sciences and Arts (www.sanu.ac.rs), and Optical Society of Serbia (www.ods.org.rs).



Institute of Nuclear Sciences Vinča



Serbian Academy of Sciences and Arts



Optical Society of Serbia

Other institutions that helped the organization of this event are: Institute of Physics Belgrade, University of Belgrade (www.ipb.ac.rs), School of Electrical Engineering, University of Belgrade (www.etf.bg.ac.rs), Institute of Chemistry, Technology and Metallurgy, University of Belgrade (www.ihtm.bg.ac.rs), Faculty of Technical Sciences, University of Novi Sad (www.ftn.uns.ac.rs), Faculty of Physics, University of Belgrade (www.ff.bg.ac.rs), and Faculty of Biology, University of Belgrade (www.bio.bg.ac.rs). Joint event “Machine learning with Photonics Symposium” has been co-organized with programme partners H2020-RISE-CARDIALLY, H2020 – MULTIPLY and H2020-EID-FONTE.

PHOTONICA2019 is organized under auspices and with support of the Ministry of Education, Science and Technological Development, Republic of Serbia (www.mpn.gov.rs). PHOTONICA2019 is supported and recognized by OSA - The Optical Society (www.osa.org), Integrated Initiative of European Laser Research Infrastructures Laser Lab-Europe (www.laserlab-europe.eu) and European Physical Society (www.eps.org).



Ministry of Education, Science and Technological Development of the Republic of Serbia



The support of the sponsors of PHOTONICA2019 is gratefully acknowledged:



Development Center Serbia



Optical Society of Serbia



CENTER FOR THE PROMOTION OF SCIENCE

Long-period grating sensors for the measurement of apexcardiogram

M. Miletic¹, J. Krsic¹, V. Atanasoski², M. Ivanovic¹ and B. Bojovic¹

¹*Vinca Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia*

²*University of Belgrade, Belgrade, Serbia*

e-mail: marjanmil@vin.bg.ac.rs

Apexcardiogram (ACG) represents record of low-frequency vibrations of the precordium caused by heart contractions. The information obtained from ACG is mostly related to left ventricular contractions. The most common position for its measurement is in parasternal area of chest wall, above the apex of the heart. The measurement of ACG can provide date significant in timing of systolic events of the cardiac cycle. Particulary, ACG is used as aid in timing of the opening snap of the cardiac valves, for the identification of the exact timing of the third (S3) and fourth heart sounds (S4) and for early diagnosis of the mitral valve stenosis or regurgitation [1].

The frequently used methods for non-invasively recording of ACG include using of electro manometer sensor, piezoelectric microphone sensor and crystal-microphone sensor for measuring mechanical displacements of chest wall [2]. The disadvantages of these sensors are potential noise caused by electrical interference and technical difficulties in their application on body surface. The goal of this study is to evaluate possibility of using long-period grating (LPG) sensor as potential non-invasive method for ACG recording. The advantages of utilizing LPG sensors are their low cost, utilization simplicity, and insensitivity to electrical interference.

The study protocol includes measurements on group of healthy volunteers utilizing a single LPG sensor. LPG sensor is positioned in parasternal area of chest wall, above the apex of the heart and fixed with the elastic bandage. It is used as a sensor of mechanical pulsation on the body surface. All healthy volunteers are asked to hold their breath in mid-expiration phase for at least 10 seconds in order to avoid the interference of the ACG with a breathing signal. Our results show that we are able to record signals with morphology of normal ACG repeatably on each healthy volunteer, and with the significant signal-to-noise ratio. Hence, we can conclude that LPG sensors can be used for recording ACG by measuring mechanical low-frequency vibrations of the precordium on the body surface above the apex of the heart.

REFERENCES

- [1] E. Tafur, L. S. Cohen, H. D. Levine, *Circulation* 30, 381 (1964).
- [2] N. Coulshed, E. J. Epstein, *Br Heart J.* 25, 697 (1962).