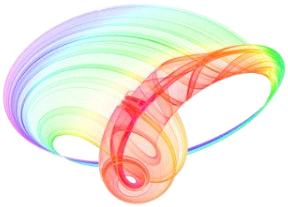
Book of abstracts



PHOTONICA2017

The Sixth International School and Conference on Photonics

& COST actions: MP1406 and MP1402

&H2020-MSCA-RISE-2015 CARDIALLY workshop

28 August – 1 September 2017

Belgrade, Serbia

Editors

Marina Lekić and Aleksandar Krmpot

Institute of Physics Belgrade, Serbia

Belgrade, 2017

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

of

The Sixth International School and Conference on Photonics PHOTONICA2017

28 August – 1 September 2017
Belgrade Serbia

Editors
Marina Lekić and Aleksandar Krmpot

Technical assistance
Marko Nikolić and Danica Pavlović

Publisher
Institute of Physics Belgrade
Pregrevica 118
11080 Belgrade, Serbia

Printed by
Serbian Academy of Sciences and Arts

Number of copies
300

ISBN 978-86-82441-46-5

PHOTONICA 2017 (The Sixth International School and Conference on Photonica - www.photonica.ac.rs) is organized by Institute of Physics Belgrade, University of Belgrade (www.ipb.ac.rs), Serbian Academy of Sciences and Arts (www.sanu.ac.rs), and Optical Society of Serbia (www.ods.org.rs).

Other institution that helped the organization of this event are: Vinča Institute of Nuclear Sciences, University of Belgrade (www.vinca.rs), Faculty 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).

PHOTONICA 2017 is organized under auspices and with support of the Ministry of Education, Science and Technological Development, Serbia (www.mpn.gov.rs). PHOTONICA 2017 is supported and recognized by The Integrated Initiative of European Laser Research Infrastructures LaserLab-Europe (www.laserlab-europe.eu) and European Physical Society (www.eps.org).

The support of the sponsors of PHOTONICA 2017 is gratefully acknowledged:

Committees

Scientific Committee

Aleksandar Krmpot, Serbia
Antun Balaž, Serbia
Arlene D. Wilson-Gordon, Israel
Bojan Resan, Switzerland
Boris Malomed, Israel
Branislav Jelenković, Serbia
Dejan Gvozdić, Serbia
Detlef Kip, Germany
Dragan Indjin, United Kingdom
Edik Rafailov, United Kingdom
Feng Chen, China
Francesco Cataliotti, Italy
Giannis Zacharakis, Greece
Goran Isić, Serbia
Goran Mašanović, United Kingdom
Isabelle Philippa Staude, Germany
Jelena Radovanović, Serbia
Jerker Widengren, Sweden
Jovana Petrović, Serbia
Laurent Sanchez, France
LjupčoHadžievski, Serbia
Marco Santagiustina, Italy
Milan Mashanović, United States of America
Milan Trtica, Serbia
Miloš Živanov, Serbia
Milutin Stepić, Serbia
Milivoj Belić, Qatar
Nikola Stojanović, Germany
Pavle Anđus, Serbia
Peđa Mihailović, Serbia
Radoš Gajić, Serbia
Schaaf Peter, Germany
Sergei Turitsyn, United Kingdom
Suzana Petrović, Serbia
Ticijana Ban, Croatia
Vladana Vukojević, Sweden
Zoran Jakšić, Serbia
Željko Šljivančanin, Serbia

Organizing Committee

Aleksandar Krmpot, (Chair)
Marina Lekić (Secretary)
Stanko Nikolić (webmaster)
Marko Nikolić,
Vladimir Veljić
Danica Pavlović

Technical Organizer

Application of multiparametric cardiac measurement system in ejection fraction calculation

Marjan Miletić[1], Marija D. Ivanović[1], Lana Popović Maneski[2],Boško Bojović[1]
[1]*Vinca Institute of Nuclear Sciences, Belgrade, Serbia*
[2] *Institute of Technical Sciences of the Serbian Academy of Sciences and Arts, Belgrade, Serbia*
e-mail:marjanmil@yahoo.com

Ejection fraction (EF) is the most used parameter for characterisation of Heart Failure (HF) condition. EF is commonly calculated using echocardiography, which is an expensive non–invasive method and not used in primary healthcare. Systolic time intervals (STI) represent a non-invasive and inexpensive method for determination of EF[1, 2].

Heart failure (HF) is the single most expensive diagnosis in medicine. 2–3% of adult population in developed countries have HF diagnosis. It is not detectable by ECG test and it is commonly detected in a late stage, when the process is irreversible [2-5].

In this paper, a multiparametric cardiac measurement system for determination of STI is presented. Measurement system consists of sensors for simultaneous acquisition of electrocardiographic (ECG), phonocardiographic (PCG), photopletysmographic (PPG) and cardiovascular (CV) pulsation signals. CV pulsation signals are measured by long period grating (LPG) fiber-optic sensors[6].

Two non-invasive methods for measuring systolic time intervals (STI) were applied on a set of 6 healthy volunteers, based on ECG, PCG and CV pulsation signals. CV pulsation signals were measured on carotide arthery with PPG and LPG sensors.

In the first method, EF was calculated from the obtained STI signals, using CV carotide pulsations measured with the PPG sensor, giving EF values in the range from 0.60 to 0.68, with maximal standard deviation of 0.05. In the second method, EF was obtained using CV carotide pulsations measured with LPG sensor, giving EF values in the range from 0.60 to 0.66, with maximal standard deviation 0.06. Calculated values of EF with both methods were in the 0.55 to 0.75 range which corresponds to normal EF range in healthy individuals.

REFERENCES

[1] M. D. Ivanović, "An optical Fiber-Grating device for measuring cardiovascular and respiratory pulsations", Ph.D. dissertation, University of Belgrade, Belgrade, Serbia,(2014).
[2] L. N. Katz, H. S. Feil, I. Auricular fibrillation. Arch Intern Med, vol. 32, p. 672, (1923).
Peacock WF et al. Congest Heart Fail. (2003).
[3] Stewart S, et al. Eur J Heart Fail. (2001).
[4] Lloyd-Jones D, et al. Circulation. (2010).
[5] Mosterd A, et al. Heart (2007).
[6] M. D. Petrović, A. Daničić, V. Atanasoski, S. Radosavljević, V. Prodanović, N. Miljković, J. Petrović, D. Petrović, B. Bojović, Lj. Hadžievski, T. Allsop, G. Lloyd and D. J. Webb, Phys. Scr. T, vol. T157, pp. 014022 (1-4) (2013).