

# PROCEEDINGS OF SPIE

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**Ryszard S. Romaniuk**

*Editor*

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**Michał Ramotowski**, Warsaw University of Technology (Poland)

## Introduction

The **SPIE-IEEE-PSP WILGA** Symposium [[wilga.ise.pw.edu.pl](http://wilga.ise.pw.edu.pl)] is a kind of international Forum of Young Science in Photonics, Advanced Electronics and Internet Engineering. It is organized twice a year under the eminent patronage of two big international engineering institutions SPIE [[www.spie.org](http://www.spie.org)] and IEEE [[www.ieee.org](http://www.ieee.org)] and their Polish counterparts: PSP—Photonics Society of Poland [[www.photonics.pl](http://www.photonics.pl)], successor of Polish Chapter of SPIE [[www.spie.pl](http://www.spie.pl)] and IEEE Poland Section [[www.ieee.pl](http://www.ieee.pl)], with participation of IEEE R8 [[ewh.ieee.org/reg/8/sac/cms](http://ewh.ieee.org/reg/8/sac/cms)]. The patrons of the symposium are: PAS—Polish Academy of Science (The Committee on Electronics and Telecommunication) [[keit.pan.pl](http://keit.pan.pl)], Association of Polish Electrical Engineers (SEP) [[www.sep.com.pl](http://www.sep.com.pl)], Polish Committee of Optoelectronics SEP [[pkopto.ise.pw.edu.pl](http://pkopto.ise.pw.edu.pl)], Warsaw University of Technology [[www.pw.edu.pl](http://www.pw.edu.pl)], Institute of Electronic Systems [[www.ise.pw.edu.pl](http://www.ise.pw.edu.pl)].

**WILGA Organizers:** The Symposium is organized by a group of devoted young people - photonics, mechatronics, and electronics researchers - gathered in the PERG/ELHEP Research Group [[Zespól Badawczy PERG](http://Zespól_Badawczy_PERG)] of the Institute of Electronic Systems at the Faculty of Electronics and Information Technology of WUT. Most of these young researchers are active members of PSP, SEP, SPIE, OSA and IEEE. The symposium is diligently done by young researchers for young fellow researchers and the main aim is to have a lot of fun and to learn a lot.

**WILGA Publications:** The WILGA Symposium publishes its papers in the following proceedings series, technical and peer-reviewed journals: Proceedings of SPIE, since 2002; IEEE eXplore, Internet publication data base; Photonics Letters of Poland, since 2009; Elektronika, SEP Journal, since 1998; JET—Intl. Journal of Electronics and Telecommunications, PAS.

**WILGA Proceedings of SPIE:** There has been now quite a long tradition of WILGA publishing its works in the Proceedings of SPIE. This volume is the 11th published of the WILGA-SPIE series. The WILGA-SPIE volume series contains more than 1000 papers; all WILGA Symposiums have published more than 2000 papers with around 4000 participants. This is an extraordinary achievement for a modest symposium oriented solely on young researchers. No one event of similar character could compare to this achievement. This success was only possible due to big involvement of young researchers in their work. The following WILGA SPIE Proceedings were published: Wilga 2002 – Proc. SPIE 5125; Wilga 2003 – Proc. SPIE 5484; Wilga 2004 – Proc. SPIE 5775; Wilga 2005 bis – Proc. SPIE 5948 (Warsaw SPIE COO'05); Wilga 2005 – Proc SPIE 6159; Wilga 2006 – Proc. SPIE 6347; Wilga 2007 – Proc. SPIE 6937; Wilga 2008 – Proc. SPIE 7124; Wilga 2009 – Proc. SPIE 7502; Wilga 2010 – Proc. SPIE 7745; WILGA 2011 – Proc. SPIE 8008.

**SPIE Poland 2005:** The SPIE Poland meetings in 2005 were very special because then the Polish Chapter of SPIE (predecessor of Photonics Society of Poland) hosted together with SPIE and some other regional SPIE Chapters, the SPIE Warsaw Congress on Optics and Optoelectronics – SPIE COO Warsaw 2005. WILGA 2005 Symposium was split to two parts – one held usually in WILGA and the second jointly with the COO'05.

**WILGA ways and topics:** The official language of the Symposium is English. Peer reviewed papers are published in a renowned, worldwide recognized series Proceedings of SPIE in USA. The symposium is designed mainly for for Ph.D., M.Sc., and B.Sc. students (from physics, electronics and mechatronics, as well as material research) and their tutors/mentors. WILGA has a number of main topical tracks. Historically, the first one was Photonics and Web Engineering. Generally, WILGA embraces advanced photonic, mechatronic and electronic systems, in the following aspects: theory, modeling, algorithms, simulations, emulations, design, hardware, software, hardware-software interaction and integration, measurements, testing, commissioning and exploitation. WILGA also addresses new research tendencies like 3D photonics and electronics design, micro- and nano-systems, material engineering including meta-materials.

Topical sessions are organized by leading experts. Sessions usually begin with current tutorials and are filled with contributed papers by students and young researchers. One of the most important session tracks in WILGA are photonics applications and systems for superconductive accelerator (and free electron laser) technology and high energy physics experiments. We warmly invite students, young researchers, and their tutors to participate in WILGA.

**WILGA 28th:** The WILGA 2011 Symposium January edition was held 28–30 January 2011 at WUT's FE&IT. WILGA 2011; the May edition took place 23–29 May 2011 in a resort owned by Warsaw University of Technology. Nearly 200 presentations were presented during both editions of Wilga, covering a broad area of photonics applications and web engineering, and nearly 250 persons participated. An exceptionally efficient chair of the Organization Committee of WILGA 2011 was Dr Maciek Linczuk [M.Linczuk@elka.pw.edu.pl].

The working research sessions of 28th WILGA 2011 were: general photonics, optical fiber technology, optical communications, optoelectronics, applications of optical fibers, integration of electronics, photonics and mechatronics, distributed measurement systems, LHC and CMS at CERN, optics and optoelectronics for astronomy, fundamentals of FPGA-DSP systems, object oriented design of hardware, terabit optical data links, software-hardware co-design, biomedical engineering, computational intelligence of advanced systems, development of photonics and electronics in Europe and Poland, radar technology, terahertz photonics, etc.

**WILGA 2011 - SPIE-PSP award for the best student paper presentation:** The WILGA 2011 Award Committee was managed skillfully by Dr Ryszard Kossowski of WUT [kossowski@ia.pw.edu.pl]. The awards were a single category intended for students having just finished their M.Sc (including B.Sc.) degrees. The winners of SPIE-PSP WILGA 2011 competitions, and the titles of their presentations were: M.Sc. and B.Sc. category: 1 – Robert Plaga, Faculty of Physics WUT, "Fiber optic structures for dynamic stress sensing"; 2 – Tomasz Janicki, PERG-ELHEP-ISE Lab., "FPGA mezzanine card DSP module," (prepared with Ph.D. student Radoslaw Cieszewski); 3 – Krzysztof Sielewicz, PERG-ELHEP-ISE Lab., "Intelligent thermal imaging camera with network interface." The winning papers are published in this volume.

**WILGA offsprings:** The WILGA Symposium gave birth to a few topical meetings and conferences which then flourished on their own. These include student regional meetings (Opole, Wrocław, Kielce, Białystok, Lublin, Toruń and other), of SPIE student chapters, IEEE student branches, but also stand-alone conferences. Some of these meetings are still held periodically with Wilga, while some of them gained complete independence. WILGA is very proud of this sort of partnership, since the very good idea of WILGA is proliferating elsewhere. One of such meetings is, now fully independent, SPS – Signal Processing Symposium which started at Wilga in 2003.

**SPIE – PSP WILGA 2012:** The organizers of WILGA 2012 Symposium, to be held on 28 May – 03 June 2012, warmly invite interested young researchers and students in photonics and related fields to participate in this exceptional and very friendly research event oriented to host young researchers from Poland and all over Europe.

#### References

1. **WILGA 2002:** R.S.Romaniuk, K.T.Poźniak (editors), Proc. SPIE **5125**; Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments; ISBN 9780819449856; 472 pages, 55 papers; (2003)
2. **WILGA 2003:** R.S.Romaniuk (editor), Proc.SPIE **5484**; Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments II; ISBN 9780819454157; 734 pages, 94 papers; (2004)
3. **WILGA 2004:** R.S.Romaniuk (editor). Proc. SPIE **5775**; Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments III; ISBN 9780819457561; 710 pages, 92 papers; (2005)
4. **WILGA 2005:** R.S.Romaniuk, S.Simrock, V.M.Lutkovski (editors), Proc. SPIE **5948**, Photonics Applications in Industry and Research IV; ISBN 9780819459558; 864 pages, 89 papers; (2005)
5. **WILGA 2005:** R.S.Romaniuk (editor), Proc. SPIE **6159**; Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments 2005; ISBN 9780819462114; 1244 pages, 172 papers; (2006)

6. **WILGA 2006:** R.S.Romaniuk (editor), Proc. SPIE **6347**; Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments 2006; ISBN 9780819464316; 874 pages, 111 papers; (2006)
7. **WILGA 2007:** R.S.Romaniuk (editor), Proc. SPIE **6937**; Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments 2007; ISBN 9780819471246; 1274 pages, 152 papers; (2008)
8. **WILGA 2008:** R.S.Romaniuk, T.R.Woliński (editors), Proc. SPIE **7124**; Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments 2008; ISBN 9780819473585; 312 pages, 35 papers; (2008)
9. **WILGA 2009:** R.S.Romaniuk, K.S.Kulpa (editors), Proc. SPIE **7502**; Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments 2009; ISBN 9780819478139; 786 pages, 100 papers; (2009)
10. **WILGA 2010:** R.S.Romaniuk (editor), Proc. SPIE **7745**; Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments 2010; ISBN 9780819482358; 626 pages, 73 papers; (2010)
11. **WILGA 2011:** R.S.Romaniuk (editor), Proc. SPIE **8008**; Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments 2011; ISBN 9780819485823; 614 pages, 71 papers; (2011)
12. J.Doros, R.Romaniuk, The role of regional developments in optical fiber technology and photonics, Proc. SPIE 5028, 2003, pp.xi-xii
13. R.Romaniuk, K.Pozniak, Foreword: Photonics and electronics for astronomy and high energy physics experiments in Poland, Proc.SPIE 5125, 2002, pp.xiii-xxxiv
14. W.Woliński, Z.Jankiewicz, R.Romaniuk, Proceedings of SPIE – The International Society for Optical Engineering: Introduction, Proc. SPIE 5230, 2003, pp.ix-x
15. R.Romaniuk, Proceedings of SPIE – The International Society for Optical Engineering: Introduction, Proc. SPIE 5775, 2005, pp.xxi-xxvii
16. R.Romaniuk, Proceedings of SPIE – The International Society for Optical Engineering: Introduction, Proc. SPIE 5848, 2005, pp.xvii-xxi
17. R.Romaniuk, Proceedings of SPIE – The International Society for Optical Engineering: Introduction, Proc. SPIE 6347, 2006, pp.xxix-xxxii
18. W.Wolinski, Z.Jankiewicz, R.Romaniuk, Proceedings of SPIE – The International Society for Optical Engineering: Introduction, Proc. SPIE 6598, 2007, pp.ix-xii
19. R.Romaniuk, Proceedings of SPIE – The International Society for Optical Engineering: Introduction, Proc. SPIE 6937, 2008, pp.xxix-xli
20. W.Woliński, Z.Jankiewicz, R.Romaniuk, Proceedings of SPIE – The International Society for Optical Engineering: Introduction, Proc. SPIE 5229, 2003, pp.xi-xii
21. J.Doros, R.Romaniuk, T.Wolinski, Eleventh conference on optical fibers and their applications, Proc. SPIE 7120, 2008, pp.xiii-xv
22. R.Romaniuk, K.Kulpa, Photonics applications in Astronomy, Communications Industry and High-Energy Physics Experiments 2009: Introduction, Proc. SPIE 7502, 2009, art no 750201, pp.xxiii-xxiv
23. R.Romaniuk, Photonics and Web Engineering in Poland, WILGA 2009, Proc. SPIE 7502, 2009, art no. 750202
24. R.Romaniuk, WILGA Symposium on photonics applications, Photonics Letters of Poland 1 (2), 2009, pp.46-48



25. R.S.Romaniuk, Wilga 2010, Photonics Applications, Proc.SPIE 7745, pp.xiii-xviii, 2010
26. R.S.Romaniuk, Wilga 2011, Photonics Applications, Proc.SPIE 8008, pp.xiii-xvii, 2011

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