

PROCEEDINGS OF SPIE

Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments 2015

Ryszard S. Romaniuk
Editor

25–31 May 2015
Wilga, Poland

Organized by
Institute of Electronic Systems, Faculty of Electronics and Information Technologies,
Warsaw University of Technology (Poland)

Sponsored by
PSP – Photonics Society of Poland • SPIE Europe • Committee of Electronics and
Telecommunications of Polish Academy of Sciences • EuCARD² – Enhanced European
Coordination of Accelerator R&D (CERN, EU FP7) • IEEE Poland Section • PKOpto – Polish
Committee of Optoelectronics of SEP – The Association of Polish Electrical Engineers •
EuroFusion Collaboration • EuroFusion Poland

Published by
SPIE

Part One of Two Parts

Volume 9662

Proceedings of SPIE 0277-786X, V. 9662

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments 2015*, edited by Ryszard S. Romaniuk, Proceedings of SPIE Vol. 9662 (SPIE, Bellingham, WA, 2015) Article CID Number.

ISSN: 0277-786X

ISBN: 9781628418804

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445

SPIE.org

Copyright © 2015, Society of Photo-Optical Instrumentation Engineers.

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/15/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

SPIE 
Digital Library

SPIDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print. Papers are published as they are submitted and meet publication criteria. A unique citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc.

The CID Number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages.

Contents

Part One

- xiii *Authors*
- xvix *Conference Committees*
- xxiii *Introduction*

CONFERENCE OVERVIEW

- 9662 02 **Photonics applications and web engineering: WILGA Summer 2015 (Invited Paper)** [9662-215]
- 9662 03 **Photonics applications and web engineering: WILGA Winter 2015** [9662-5]

OPTICS AND PHOTONICS

- 9662 04 **Modulation selection for visible light communications using lighting LEDs** [9662-1]
- 9662 05 **Influence of reverse bias on the LEDs properties used as photo-detectors in VLC systems** [9662-7]
- 9662 06 **A system for Ethernet signal transmission via VLC lighting LED link** [9662-14]
- 9662 07 **Adaptive optical interconnects: the ADDAPT project (Invited Paper)** [9662-19]
- 9662 08 **Low power laser driver design in 28nm CMOS for on-chip and chip-to-chip optical interconnect (Invited Paper)** [9662-22]
- 9662 09 **Software detection of characteristics data of optical signals received in multiparametric capillary sensors of diesel fuel** [9662-23]
- 9662 0A **Impact of transmission parameters on Nyquist WDM system** [9662-25]
- 9662 0B **Optoelectronic device for hematocrit measurements** [9662-26]
- 9662 0C **Experimental verification of distributed temperature sensor model based on spontaneous Raman scattering** [9662-27]
- 9662 0D **Multimode tapered optical light pipe for illumination systems** [9662-28]
- 9662 0E **Local liquid sample heating: integration and isolation of a micro-heater** [9662-29]

- 9662 OG **Simultaneous transmission of the IEEE 802.11 radio signal and optical Gbit ethernet over the multimode fiber link** [9662-45]
- 9662 OH **Measurement system for determination of current-voltage characteristics of PV modules** [9662-48]
- 9662 OI **Monitoring and control system of charging batteries connected to a photovoltaic panel** [9662-53]
- 9662 OJ **Analysis of the temperature impact on the performance of photovoltaic panel** [9662-54]
- 9662 OK **Monitoring combustion process with the vision diagnostic system** [9662-55]
- 9662 OL **Automatic measurement system for long term LED parameters** [9662-73]
- 9662 OM **Three-beam interferogram analysis method for surface flatness testing of glass plates and wedges** [9662-88]
- 9662 ON **Thermal, structural and spectroscopic properties of heavy metal oxide glass and glass-ceramics doped with Er³⁺ ions** [9662-92]
- 9662 OO **Broadband emission at NIR in double-core optical fiber co-doped with Nd³⁺/Yb³⁺ ions** [9662-105]
- 9662 OP **Cost-effective tunable 1310nm DWDM transmitter** [9662-107]
- 9662 OQ **On the architecture of the 1310nm Raman amplifier** [9662-113]
- 9662 OR **The research of multilevel transistor inverter for converting energy of solar panels** [9662-114]
- 9662 OS **Investigation of luminescent properties of LaF₃:Nd³⁺ nanoparticles** [9662-125]
- 9662 OT **Image-based specular component estimation using structured light illumination** [9662-126]
- 9662 OU **High order modulation of 850nm VCSELs** [9662-132]
- 9662 OV **4H-SiC photodiode model for DC SPICE circuit simulation** [9662-134]
- 9662 OW **Automatic actinometric system for diffuse radiation measurement** [9662-135]
- 9662 OX **The possibility of achieving fiberscope effect in disorder optical fiber bundle** [9662-139]
- 9662 OY **Thermal analysis and luminescence of phospho-tellurite glass doped with NdF₃** [9662-144]
- 9662 OZ **Capillary optical fibre with Sm³⁺ doped ribbon core** [9662-158]
- 9662 11 **Limitations to inverse problem based estimation of DGD in an optical fiber due to the use of the linear propagation model** [9662-200]
- 9662 12 **Improvement of FBG peak wavelength demodulation using digital signal processing algorithms** [9662-100]

ASTRONOMY, SPACE TECHNOLOGY, FLYING OBJECTS

- 9662 13 **VIPERS view of the star formation history of early-type galaxies (Invited Paper)** [9662-21]
- 9662 14 **A laboratory stand for research concerning drive units applied in unmanned flying micro vehicles** [9662-46]
- 9662 15 **Estimation of PV energy production based on satellite data** [9662-65]
- 9662 16 **Thermal analysis and simulation of the ChemiX instrument** [9662-86]
- 9662 17 **Simulation of signal induction in the Caliste-SO detector** [9662-131]
- 9662 18 **Algorithms for classification of astronomical object spectra** [9662-173]
- 9662 19 **Status of the Pi of the Sky telescopes in Spain and Chile** [9662-180]
- 9662 1A **Comparison of the period detection algorithms based on Pi of the Sky data** [9662-186]
- 9662 1B **White Rabbit in space related application** [9662-206]
- 9662 1C **Development of low noise CCD readout front-end** [9662-207]
- 9662 1D **Searching the short-period variable stars with the photometric algorithm implemented in LUIZA framework** [9662-93]
- 9662 1E **Prospects for satellite and space debris observations with Pi of the Sky (Invited Paper)** [9662-194]
- 9662 1F **Pi of the Sky preparations for LSC-Virgo's electromagnetic follow-up project** [9662-198]

BIOMEDICAL APPLICATIONS

- 9662 1G **Video markers tracking methods for bike fitting** [9662-15]
- 9662 1H **Absorption spectroscopy setup for determination of whole human blood and blood-derived materials spectral characteristics** [9662-16]
- 9662 1I **Analyzing non-respiratory movements of the chest: methods and devices** [9662-44]
- 9662 1J **Accelerometer recorder and display system for ambulatory patients (Invited Paper)** [9662-49]
- 9662 1K **Tissue electrical properties measured by bioelectrical impedance analysis among healthy and sportsmen population** [9662-64]
- 9662 1L **Advantages and disadvantages in usage of bioinformatic programs in promoter region analysis** [9662-97]

- 9662 1M **Bioinformatics pipeline for functional identification and characterization of protein** [9662-104]
- 9662 1N **Individualization of the parameters of the three-elements Windkessel model using carotid pulse signal** [9662-121]
- 9662 1O **Semi-automatic microdrive system for positioning electrodes during electrophysiological recordings from rat brain** [9662-146]
- 9662 1P **Human ECG signal parameters estimation during controlled physical activity** [9662-148]
- 9662 1Q **Development of implantable optoelectronic module for optical brain tissue stimulation in freely moving mice** [9662-152]
- 9662 1R **Optoelectronic set for measuring reflectance spectrum of living human skin** [9662-171]
- 9662 1S **Numerical and analytical assessment of the influence of blood flow through arterial perforators on the pulse pressure shape** [9662-184]
- 9662 1T **Layer measurement in high frequency ultra-sonography images for skin (Invited Paper)** [9662-199]

COMMUNICATIONS AND DIGITAL MEDIA

- 9662 1U **Reducing interferences in wireless communication systems by mobile agents with recurrent neural networks-based adaptive channel equalization** [9662-3]
- 9662 1V **Finding the best equalizer structure for carrierless amplitude-phase modulation using minimax criteria** [9662-31]
- 9662 1W **On some limitations of adaptive feedback measurement algorithm** [9662-66]
- 9662 1X **Analysis and improvement of post-threshold mode of adaptive cyclic ADC operation** [9662-78]
- 9662 1Y **Indoor inertial navigation application for smartphones with Android** [9662-91]
- 9662 1Z **Simplifications in inter-frame prediction in the H.265/HEVC encoder** [9662-162]
- 9662 20 **Optimal AFCS: particularities of real design (Invited Paper)** [9662-183]
- 9662 21 **Building polymer fiber optic network** [9662-213]
- 9662 22 **Advanced image reconstruction and visualization algorithms for CERN ALICE high energy physics experiment** [9662-8]
- 9662 23 **An objective method for a video quality evaluation in a 3DTV service** [9662-51]
- 9662 24 **Detection of characteristic eye points in non-ideal light conditions** [9662-56]
- 9662 25 **Realization of guitar audio effects using methods of digital signal processing** [9662-74]

- 9662 26 **Application of curvelet transform for denoising of CT images** [9662-82]
- 9662 27 **Error analysis for creating 3D face templates based on cylindrical quad-tree structure** [9662-103]
- 9662 28 **Performance evaluation of the intra compression in the video coding standards** [9662-109]
- 9662 29 **Diagnostics of combustion process based on flame images analysis and genetic programming** [9662-128]
- 9662 2A **Nonlinear dynamic macromodeling techniques for audio systems** [9662-136]
- 9662 2B **Real-time RGBD SLAM system** [9662-168]
- 9662 2C **Exploring the feasibility of iris recognition for visible spectrum iris images obtained using smartphone camera** [9662-185]
- 9662 2D **Does restorer need a scanner? Optical methods in canvas painting diagnostic** [9662-192]

Part Two

NUCLEAR AND HIGH ENERGY PHYSICS, HOT PLASMA DIAGNOSTICS

- 9662 2E **Passive multi-layer neutron spectrometer for neutron radiation dosimetry** [9662-18]
- 9662 2F **Study of elastic proton-proton scattering with the STAR detector at RHIC** [9662-33]
- 9662 2G **Using singular value decomposition for neutron-gamma discrimination** [9662-41]
- 9662 2H **Laser system for testing radiation imaging detector circuits** [9662-50]
- 9662 2I **Machine learning: how to get more out of HEP data and the Higgs Boson machine learning challenge** [9662-57]
- 9662 2J **Fast data transmission from serial data acquisition for the GEM detector system** [9662-59]
- 9662 2K **FPGA based charge acquisition algorithm for soft x-ray diagnostics system** [9662-71]
- 9662 2L **Distributed diagnostic system for tokamaks high-voltage power supply section** [9662-72]
- 9662 2M **On algorithmic optimization of histogramming functions for GEM systems** [9662-77]
- 9662 2N **Introducing parallelism to histogramming functions for GEM systems** [9662-80]
- 9662 2O **Management and protection system for superconducting tokamak** [9662-83]
- 9662 2P **Object oriented hardware-software model implementation for OMTF diagnosis** [9662-89]
- 9662 2Q **Internal monitoring of GBTx emulator using IPbus for CBM experiment** [9662-110]

- 9662 2R **Feasibility studies of the exclusive diffractive bremsstrahlung measurement at RHIC energies (Invited Paper)** [9662-116]
- 9662 2S **The GBT-based readout concept for the Silicon Tracking System of the CBM experiment** [9662-122]
- 9662 2T **Optimization of the microcable and detector parameters towards low noise in the STS readout system** [9662-127]
- 9662 2U **Energy- and time-resolved measurements of fast ions emitted from Plasma-Focus discharges by means of a Thomson spectrometer** [9662-138]
- 9662 2V **Time and clock synchronization with AFCK for CBM** [9662-143]
- 9662 2W **On line separation of overlapped signals from multi-time photons for the GEM-based detection system** [9662-145]
- 9662 2X **The prototype readout chain for CBM using the AFCK board and its software components** [9662-150]
- 9662 2Y **Results of neutron irradiation of GEM detector for plasma radiation detection** [9662-166]
- 9662 2Z **Signal acquisition in Cherenkov-type diagnostics of electron beams within tokamak facilities** [9662-167]
- 9662 30 **Design of a control system for ultrafast x-ray camera working in a single photon counting mode** [9662-172]
- 9662 31 **GEM detector development for tokamak plasma radiation diagnostics: SXR poloidal tomography** [9662-211]
- 9662 32 **How to measure the size of Quark-Gluon plasma? And why is it important? (Invited Paper)** [9662-58]
- 9662 33 **Review and present status of preparation of thin layer lead photocathodes for e-injectors of superconducting RF linacs (Invited Paper)** [9662-76]
- 9662 34 **Mechanical aspects of installation of integrated magnets at Solaris synchrotron storage ring** [9662-130]
- 9662 35 **The CMS fast beams condition monitor back-end electronics based on MicroTCA technology: status and development** [9662-169]
- 9662 36 **Calculation algorithm for determination of dose versus LET using recombination method** [9662-212]

COMPUTATIONAL INTELLIGENCE, HIGH PERFORMANCE COMPUTING

- 9662 37 **Methodology of decreasing software complexity using ontology** [9662-9]

- 9662 38 **Positivity and stability of time varying discrete-time and continuous-time linear systems and electrical circuits (Invited Paper)** [9662-10]
- 9662 39 **Context aware adaptive security service model** [9662-24]
- 9662 3A **Data quality system using reference dictionaries and edit distance algorithms** [9662-30]
- 9662 3B **Comparing fault susceptibility of multiple ISAs and operating systems** [9662-34]
- 9662 3C **Applying time series analysis to performance logs** [9662-37]
- 9662 3D **Discovering of execution patterns of subprograms in execution traces** [9662-47]
- 9662 3E **Filtering decision rules using generators and closed itemsets** [9662-67]
- 9662 3F **An implementation of tautological analysis of some three-valued logic** [9662-70]
- 9662 3G **Improvement of FPGA control via high speed but high latency interfaces** [9662-75]
- 9662 3H **Reducing the agreement cost of BFT replication** [9662-84]
- 9662 3I **Versatile method to increase speed of external control with scatter-gather method in peripheral device** [9662-94]
- 9662 3J **Algorithmic synthesis using Python compiler** [9662-117]
- 9662 3K **Multi-variants synthesis of Petri nets for FPGA devices** [9662-118]
- 9662 3L **On modified boosting algorithm for geographic data applications** [9662-123]
- 9662 3M **Using assertions with trace** [9662-129]
- 9662 3N **Petri nets SM-cover-based on heuristic coloring algorithm** [9662-140]
- 9662 3O **Consistent model driven architecture** [9662-155]
- 9662 3P **Principal component analysis implementation in Java** [9662-163]
- 9662 3Q **Statechart-based design controllers for FPGA partial reconfiguration** [9662-165]
- 9662 3R **Rule induction based on frequencies of attribute values** [9662-175]
- 9662 3S **Parallelization of Apriori algorithm using Charm++ library** [9662-181]
- 9662 3T **Fast algorithm for feature extraction** [9662-182]
- 9662 3U **Novel approach to data discretization (Invited Paper)** [9662-188]
- 9662 3V **Unit testing-based approach for reconfigurable logic controllers verification** [9662-193]
- 9662 3W **The method of measurement system software automatic validation using business rules management system** [9662-197]

- 9662 3X **Using recurrence plot analysis for software execution interpretation and fault detection** [9662-204]
- 9662 3Y **Petri net-based dependability modeling methodology for reconfigurable field programmable gate arrays** [9662-208]
- 9662 3Z **Novel fast multiplier implemented using FPGA** [9662-209]
- 9662 40 **Difficulties with assessment of adaptive cyclic ADC nonlinearity** [9662-177]
- 9662 41 **OMTF firmware overview** [9662-216]

MATERIAL ENGINEERING; TECHNOLOGIES OF SENSORS, CIRCUITS, AND SYSTEMS

- 9662 42 **The influence of graphene screen printing pastes composition on its viscosity** [9662-35]
- 9662 43 **Influence of temperature and humidity on titanium electrodes intended for an above normative conditions sensors** [9662-39]
- 9662 44 **Influence of plasma spraying deposition process on optical properties of hydroxyapatite** [9662-52]
- 9662 45 **Reliability tests of ultrasonic and thermosonic wire bonds** [9662-68]
- 9662 46 **Optimal control of blending and melting of copper concentrates** [9662-79]
- 9662 47 **Analogue linearization of transfer function of resistive temperature transducers** [9662-81]
- 9662 48 **Sensitivity of the stagnation region in the vortex meter to mechanical disturbances (Invited Paper)** [9662-98]
- 9662 49 **Raman studies of C-Ni/Ti films deposited on Si (100)** [9662-99]
- 9662 4A **Comparison of absolute and relative air humidity sensors fabricated with inkjet printing technology** [9662-111]
- 9662 4B **Frequency and time domain modeling of high speed amplifier** [9662-112]
- 9662 4C **Estimation of the object orientation and location with the use of MEMS sensors** [9662-115]
- 9662 4D **Phenomena of non-coil inductance in diamagnetic metal-dielectric nanocomposites $Cu_x(SiO_2)_{(100-x)}$** [9662-120]
- 9662 4E **Electric properties of nanostructure $(FeCoZr)_x(CaF_2)_{(100-x)}$ produced in argon Ar atmosphere** [9662-133]
- 9662 4F **C-Pd and C-Pd-Ni films for optical sensing** [9662-141]
- 9662 4G **Structure of CNT thin films for cold cathode emitters** [9662-142]

- 9662 4H **Stabilization of glucose-oxidase in the graphene paste for screen-printed glucose biosensor** [9662-153]
- 9662 4I **Deposition of silver layer on different substrates** [9662-154]
- 9662 4J **Field emission from CNT films deposited on porous Si** [9662-156]
- 9662 4K **AC conductivity of $(\text{FeCoZr})_x(\text{PZT})_{(100-x)}$ nanocomposites produced in vacuum chamber** [9662-159]
- 9662 4L **Analysis of deformations of thin wall parts in machining** [9662-160]
- 9662 4M **Influence of substrate type on structure of C-Pd thin films** [9662-161]
- 9662 4N **The influence of tool inclination angle on the free form surface roughness after hard milling** [9662-174]
- 9662 4O **Nonlinear phenomena in the constant electric field in insulation pressboard** [9662-187]
- 9662 4P **Microstructural studies and surface analysis of laser irradiated Ni-TiC sample** [9662-189]
- 9662 4Q **Tool deflection in the milling of titanium alloy: case study** [9662-190]
- 9662 4R **Simple optical method for recognizing physical parameters of graphene nanoplatelets materials** [9662-191]
- 9662 4S **Comparison of measurement methods for capacitive tactile sensors and their implementation** [9662-108]

Authors

Numbers in the index correspond to the last two digits of the six-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first four digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Abbas, U., 13
Abramowski, Andrzej, 28
Adami, C., 13
Agustin, Mikel, 0U
Andrzejewska, Antonina, 2C
Araszkiewicz, Agnieszka, 2E
Arnouts, S., 13
Baranowska, Agata, 0Z
Barday, Roman, 33
Barlak, Marek, 33
Bartuzi, Ewelina, 2C
Barylak, A., 17
Barylak, J., 17
Batsch, T., 19, 1E
Bel, J., 13
Belfiore, Guido, 08
Belka, Radosław, 3P, 44, 49
Bereś-Pawlik, E., 21
Beritelli, Francesco, 1U
Berka, Martin, 1J, 1N
Bienias, P., 21
Bienkowska, B., 2Y
Bieńkowski, Piotr, 2A
Bluj, Michał, 2P, 41
Boiko, Oleksandr, 4D, 4E, 4K
Bolzonella, M., 13
Bondariev, Vitalii, 4D, 4E, 4K
Borawski, Mateusz, 0H
Borawski, Wojciech, 0J
Borecki, M., 09, 0E
Borowik, Grzegorz, 3R, 3T, 3U
Bottini, D., 13
Boyko, O., 47
Branchini, E., 13
Bruszewski, Artur, 0O
Budzynski, Łukasz, 0I, 0L
Bukowiec, Arkadiusz, 3K, 3V
Bulira, Paweł, 34
Bunkowski, Karol, 2P, 41
Burden, A., 13
Buś, Szymon, 25
Bykowski, Kamil, 0O
Byszuk, Adrian, 2J, 2K, 2M, 2N, 2P, 41
Capizzi, Giacomo, 1U
Cappi, A., 13
Castro-Tirado, A. J., 19
Cevrero, Alessandro, 07
Chaciński, H., 20
Charalambides, Savvas, 07
Chattopadhyay, Subhasis, 2Q
Chernyshova, Maryna, 2J, 2K, 2M, 2N, 2W, 2Y, 31
Chkrabarti, Amlan, 2Q
Chorchos, Łukasz, 0P
Chorchos, Lukasz, 0U
Chwastowski, Janusz, 2R
Chytek, Sławomir, 3B
Cieśllicki, Krzysztof, 1S
Cieszewski, Radosław, 2G, 3J
Cimaszewski, Dominik, 0O
Coupon, J., 13
Craciunoiu, Florea, 4J
Cucciati, O., 13
Ćwiek, A., 19, 1E
Ćwiok, M., 19
Cybulski, Gerard, 1I, 1J, 1N
Cybulski, Robert, 0C
Cygan, Szymon, 1G
Cyz, Antoni, 2R
Czajkowski, Rafał, 1Q
Czarnacka, Karolina, 4D, 4E, 4K
Czarnecki, Tomasz, 0C
Czarski, Tomasz, 2J, 2K, 2M, 2N, 2W, 31
Czaus, K., 2U
Czerwosz, Elżbieta, 43, 49, 4G, 4J, 4M
Czupryński, Błażej, 2B
Czyrkowski, H., 19
Czyżak, Paweł, 0Q
Dąbrowska-Kubik, Katarzyna, 37
Dąbrowski, Anne E., 35
Dąbrowski, Piotr, 1O
Dąbrowski, R., 19
Davidzon, I., 13
de la Torre, S., 13
De Lucia, G., 13
Di Porto, C., 13
Dłużewski, Piotr, 4F
Dobrzyńska, Magdalena, 36
Doligalski, Michał, 3K, 3N, 3V
Domański, Szymon, 2E
Doroba, Krzysztof, 2P, 41
Dorosz, Dominik, 0D, 0N, 0O, 0S, 0Y, 0Z
Drabik, Paweł, 2P, 41
Drozdov, Ievgenii, 3I
Duis, Jeroen, 07
Duk, Mariusz, 09, 0V
Dworecki, Konrad, 2E
Dybowska-Sarapuk, Ł., 42
Dzida, Grzegorz, 1P

Eddie, Iain, 07
 Ellinger, Frank, 07, 08
 Emscherman, David, 2X
 Firek, Piotr, 43, 49, 4M
 Franzetti, P., 13
 Fritz, A., 13
 Fulek, Łukasz, 2R
 Fumana, M., 13
 Galiński, Grzegorz, 24
 Garilli, B., 13
 Gąsiorowska, Anna, 1N
 Geca, M., 0E
 Georgiades, Michael, 07
 Gilewski, Marian, 1R
 Gnyba, M., 1H
 Golinski, Pawel, 14
 Golnik, Natalia, 2E
 Górecka, Katarzyna, 2D
 Górski, Maciej, 2P, 4I
 Grabski, Waldemar, 3S
 Graczyk, Rafał, 3Y
 Granett, B. R., 13
 Granowski, Wojciech, 33
 Gratkowski, Tomasz, 3V
 Grybos, Pawel, 30
 Gryko, Lukasz, 1R
 Gulbahar, Yussupova, 12
 Gumiński, M., 1B, 2V
 Gutfeter, Weronika, 27
 Guzzo, L., 13
 Hałabiś, Magdalena, 1K
 Halmo, Leos, 07
 Harasim, Damian, 12
 Henker, Ronny, 07, 08
 Hotra, Oleksandra, 46, 47
 Hryniewicz, K., 18
 Idzkowski, Adam, 0H, 0I, 0J, 4C
 Ilbert, O., 13
 Imanbekova, Ulzhan, 46
 Iovino, A., 13
 Issemergenov, N. T., 0R
 Iwanowicz, Kamil, 0Y
 Iwanowski, Michał, 3L
 Jabłoński, Janusz, 3Z
 Jakubiak, Monika, 1K
 Jakubowska, Małgorzata, 42, 4H, 4I, 4R
 Jakubowski, Lech, 2Z
 Jakubowski, Marcin J., 2Z
 Jamroży, M., 1B, 1C
 Janczak, Daniel, 42, 4H
 Jankowski, Cezary, 3U
 Jankowski, Jan, 3T
 Janusz, Sosnowski, 3C
 Jednorog, S., 2Y
 Jędrzejewski, Konrad, 1X, 25, 40
 Jelen, Piotr, 0N, 0S
 Jelínek, M., 19
 Johansson, Martin, 34
 Juszczyk, Bartłomiej, 2K, 2L, 2M, 2N, 2O
 Kaczorek, Tadeusz, 38
 Kalenik, Jerzy, 43
 Kalinowski, Artur, 2P, 4I
 Kamiński, Ł., 1Y
 Kapiça, Dominik, 1K
 Karaś, Krzysztof, 34
 Karbarz, Radosław, 3A
 Karpienko, K., 1H
 Kasinski, Krzysztof, 2H, 2T, 30
 Kasprowicz, Grzegorz, 19, 1B, 1C, 2J, 2K, 2L, 2M, 2N, 2O, 2V, 2W, 3I
 Kaszubkiewicz, Urszula Z., 16
 Kaźmierczak, Andrzej, 1Q
 Keczowska, J., 49
 Khafaji, Mahdi, 07
 Kiełbasiński, K., 4I
 Kierkowski, Krzysztof, 2P, 4I
 Kisiel, Adam, 32
 Kleczek, Rafal, 2T
 Kochanowicz, Marcin, 0D, 0N, 0O, 0S, 0Y, 0Z
 Kociubiński, Andrzej, 0E, 0V, 45
 Kolasiński, Piotr, 2J, 2K, 2M, 2N, 2W, 3I
 Komorowska, Agnieszka, 3E
 Komorowski, Michał, 3D
 Konecki, Marcin, 2P, 4I
 Korolczuk, Stefan, 2G
 Korona, Mateusz, 0V
 Korwin-Pawłowski, M. L., 09, 0E
 Koshimbayev, Shamil, 46
 Kosińska, Anna, 33
 KostECKI, J., 4P
 Kostin, Denis, 33
 Kotyra, Andrzej, 0K, 29
 Kowalczyk, Agnieszka, 0A
 Kowalczyk, Marcin, 05
 Kowalska, Ewa, 43, 4M
 Kowalska-Strzęciwiłk, Ewa, 3I, 4P
 Kowalski, Karol, 3R, 3T, 3U
 Kowalski, Szymon, 44
 Kozłowski, Mirosław, 43, 4G, 4J, 4M
 Krawczyk, Rafał D., 2J, 2K, 2M, 2N, 2W, 3I
 Krawczyk, Sławomir, 4F
 Królikowski, Jan, 2P, 4I
 Kropp, Joerg-R., 07
 Krywulft, J., 13
 Krzemiński, J., 4I
 Krzesłowski, Jakub, 0T
 Krzywkowski, Tomasz, 1M
 Kubacki, Marcin, 3C
 Kubkowska, M., 4P
 Kublik, Ewa, 1O
 Kulesza, Ewa, 0X, 1R
 Kwiatkowski, R., 2U
 Kycia, Radosław, 2R
 Łabiak, Grzegorz, 3Q
 Lach, Zbigniew T., 1I
 Łaszynska, E., 2Y
 Ławicki, Tomasz, 26
 Le Brun, V., 13
 Le Fèvre, O., 13
 Ledentsov, Nikolay, 07

Lehnert, Jörg, 2S, 2X
 Leoniuk, Katarzyna, 0I
 Łepkowska, Katarzyna, 1G
 Linczuk, Maciej, 2G, 2M, 2N, 3J
 Litwiniuk, Agnieszka, 0W
 Lizak, T., 45
 Lo Sciuto, Grazia, 1U
 Loizeau, Pierre-Alain, 2X
 Lorenc, Zofia, 4R
 Lorkiewicz, Jerzy, 33
 Maccagni, D., 13
 Maciak, Maciej, 2E
 Maciejewski, Marcin, 1P
 Maj, Piotr, 30
 Majcher, Ariel, 19, 1F
 Maksymiuk, Lukasz, 06, 0G
 Małeczka-Massalska, Teresa, 1K
 Małek, K., 13, 19
 Malinowski, Karol, 2W, 31
 Malinowski, Karol, 2Z
 Małkiewicz, Łukasz, 1X, 40
 Mandal, Swagata, 2Q
 Mankiewicz, Lech, 19, 1A, 1E
 Marchetti, A., 13
 Marinoni, C., 13
 Marulli, F., 13
 Marzęcki, M., 4A
 Matras, A., 4N
 Mazikowski, A., 0B
 Mazurek, G., 15
 McCracken, H. J., 13
 Mellier, Y., 13
 Meredith, Wyn, 07
 Michowska, Katarzyna, 2C
 Milewska, D., 0B, 1H
 Miluski, Piotr, 0N, 0O, 0S, 0Z
 Mirowski, Robert, 2Z, 33
 Mitura, K., 1H
 Mlak, Radosław, 1K
 Młóżniak, A., 4I
 Młyńczak, Marcel, 1I
 Młyńczak, Marcel, 1N
 Moscardini, L., 13
 Mosdorf, M., 3X
 Mozaryn, Jakub, 1O
 Mroczkowski, Mateusz, 43
 Mrozek, T., 17
 Mulawka, Jan, 3A, 3F, 3L
 Müller, Walter F. J., 2S, 2X
 Muzyka, Krzysztof, 0V
 Myrcha, Julian, 22
 Napoli, Christian, 1U
 Nawrocki, K., 19
 Nazimek, Piotr, 3M
 Nichol, R. C., 13
 Niepostyn, Stanisław Jerzy, 3O
 Nietubyć, Robert, 33, 34
 Niewiadomski, Wiktor, 1J, 1N
 Obara, Łukasz, 19, 1D, 1F
 Oezkaya, Ilter, 07
 Offrein, Bert, 07
 Ogrodzki, Jan, 2A
 Okliński, Wojciech, 2P, 41
 Oldziej, Daniel, 14
 Olszewski, Michał, 2P, 41
 Opalska, Katarzyna, 4B
 Opalski, Leszek J., 1W
 Opiela, Rafał, 19, 1A, 1F
 Orleański, Piotr, 3Y
 Paduch, M., 2U
 Paioro, L., 13
 Pakula, Anna, 4R
 Pal, Sushanta Kumar, 2Q
 Pankanin, Grzegorz L., 48
 Parian, Mahnaz, 3P
 Pariaszewska, Katarzyna, 1I
 Patorski, Krzysztof, 0M
 Pawełkowicz, Magdalena Ewa, 1L, 1M
 Pawlik, Bogdan, 2R
 Peacock, J. A., 13
 Peptowski, Andrzej, 4H
 Percival, W. J., 13
 Perdesch, Khairullina, 0K
 Perlicki, Krzysztof, 0A, 0C
 Phleps, S., 13
 Piechna, Adam, 1S
 Pięniak, Marcin, 1S
 Pietrzycki, Marcin, 0D
 Piotrowski, L. W., 19
 Pląder, Wojciech, 1L, 1M
 Platonov, Anatolij, 1X, 20
 Pliva, Jan, 07
 Pluta, M., 0B
 Podgórski, P., 17
 Podziwski, A., 0G
 Polletta, M., 13
 Pollo, A., 13
 Popiel, Piotr, 46
 Posyniak, Kacper, 1L
 Poźniak, Krzysztof T., 1B, 1C, 2J, 2K, 2L, 2M, 2N,
 2O, 2P, 2V, 2W, 31, 35, 3J, 3Y, 41
 Prokopowicz, R., 2Y
 Prus, P., 09
 Przybecki, Zbigniew, 1L, 1M
 Puścian, Marek, 3S
 Rabiński, Marek, 2Z
 Radomska, Joanna, 49, 4J
 Ragin, Tomasz, 0N, 0O
 Rajkiewicz, Piotr, 1G
 Rauza, Jacek, 3O
 Rogalski, Przemysław, 4O
 Roguński, Daniel, 3F
 Rokita, Przemysław, 22
 Romańczuk, Patryk, 0D
 Romaniuk, Ryszard S., 02, 03, 1B, 1C, 2O, 2V, 3J
 Rosado Muñoz, Alfredo, 3Q
 Rusakov, Konstantin, 1Q
 Rymarczyk, Joanna, 4F
 Rzeszutek, Aleksandra, 2D
 Sadowski, Marek J., 2U, 2Z

Saini, Jogender, 2Q
 Salbut, Leszek, 4R
 Sau, Suman, 2Q
 Sawicki, Aleksander, 0H, 4C
 Sawicki, Daniel, 0K
 Schlagenhauer, H., 13
 Schmidt, Christian J., 2S, 2T
 Ścisłowski, D., 17
 Scodeggio, M., 13
 Seifried, Marc, 07
 Sekutowicz, Jacek, 33
 Selegraf, Monika, 2C
 Selma, R., 4A
 Serwin, Jakub, 0C
 Shchukin, Vitaly, 07
 Shegebaeva, Jibek, 29
 Sienkiewicz, Rafał, 4S
 Sikora, Rafał, 2F, 2R
 Siłarz, Maciej, 0N, 0S
 Siudek, M., 13, 19
 Siuzdak, Jerzy, 04, 05, 06
 Skąta, Aleksander, 2P, 41
 Skarzyńska, Agnieszka, 1L, 1M
 Składnik-Sadowska, E., 2U
 Skrzeczanowski, W., 4P
 Stawiński, Tomasz, 3P
 Słoma, Marcin, 42, 4R
 Ślusarczyk, Ł., 4L
 Sobczak, K., 4G
 Sokołowski, Marcin, 19, 1F
 Stępińska, I., 4G
 Stępińska, Izabela, 4J
 Stepniak, Grzegorz, 1V
 Stęślicki, M., 17
 Strasz, Anna, 1N
 Strupczewski, Adam, 2B
 Strzęciwilk, D., 4P
 Suchańska, Małgorzata, 44, 49
 Sunderland, Zofia, 0M
 Surtel, Wojciech, 1P
 Świerkula, Katarzyna, 1M
 Szatapak, J., 4I
 Szilagyí, Laszlo, 08
 Szmidt, Jan, 43
 Szuppe, J., 18
 Szyszka, Michał, 1T
 Taissariyeva, K. N., 0R
 Tanaś, Jacek, 29, 46
 Tarapata, Grzegorz, 1Y, 4A, 4S
 Tasca, L. A. M., 13
 Teter, Mariusz, 1K
 Tkacz, Jacek, 3N, 3V
 Toifl, Thomas, 07
 Tojeiro, R., 13
 Tomczewski, Sławomir, 4R
 Tramontana, Emiliano, 1U
 Trochimiuk, Maciej, 1Z
 Trokielewicz, Mateusz, 2C
 Tulik, Piotr, 2E
 Tunia, Marcin A., 39
 Turkiewicz, Jarosław Piotr, 07, 0P, 0Q, 0U
 Turnau, Jacek, 2R
 van Leeuwen, Pieter, 07
 Vergani, D., 13
 Walendziuk, Wojciech, 0H, 0I, 0J, 14, 4C
 Warchulińska, Joanna, 1K
 Wasiewicz, P., 18
 Waszuk, Stanisław, 4J
 Wawrzaszek, R., 19
 Wawrzyniak, Adriana, 34
 Wawrzyniak, Zbigniew M., 1T
 Wesserling, Janusz, 3F
 Węgrzyn, Marek, 3Q, 3Z
 Wiechecki, Jarosław, 34
 Wilczewski, Grzegorz, 23
 Wiśniewska, Joanna, 24
 Witkowski, Jan, 33
 Wójcik, Waldemar, 1K
 Wojeński, Andrzej, 2J, 2K, 2L, 2M, 2N, 2O, 2W, 31
 Wójtowicz, Sebastian, 3P
 Wolk, M., 13
 Wolter, Marcin, 2I
 Wozniak, Marcin, 1U
 Wróbel, M. S., 1H
 Wroblewski, Grzegorz, 42, 4R
 Wrochna, G., 19, 1E
 Wronka, Halina, 49, 4F, 4J
 Wyrwas, Marek, 0S
 Xiang, Rong, 33
 Yang, Junfeng, 2X
 Zabołotny, Wojciech M., 2J, 2K, 2M, 2N, 2P, 2Q, 2V, 2W, 31, 3G, 3I, 41
 Zadrożny, Adam, 1E, 1F
 Zagozdzińska, Agnieszka A., 35
 Zaitsev, Ie., 20
 Zajac, Andrzej, 0X, 1R
 Zajkowski, Maciej, 0L, 0W
 Zaloga, Dobromil R., 2U
 Zamorani, G., 13
 Zanichelli, A., 13
 Zaremba, M., 19
 Żarnecki, A. F., 19, 1E
 Żarnecki, Aleksander Filip, 1A
 Żarnecki, Aleksander Filip, 1D
 Zawistowski, Krystian, 2P, 41
 Zawistowski, Piotr, 3W
 Zbierski, Maciej, 3H
 Zębala, W., 4Q
 Żebrowski, Jarosław, 2U, 2Z
 Zhirnova, Oxana, 26
 Ziąbska, Karolina, 1L
 Zielinska, E., 2U
 Zienkiewicz, P., 2K, 2L, 2O
 Ziółkowski, A., 2Y
 Ziółkowski, Adam, 31
 Żmojda, Jacek, 0D, 0N, 0O, 0S, 0Y, 0Z
 Zoladz, Mirosław, 30
 Zoldak, Martin, 07
 Żórawski, Wojciech, 44
 Zubrzycka, Weronika, 2H

Zwierko, Piotr, 06
Zwierkowska, E., 4I
Żyliński, Marek, 1J, 1N

Conference Committees

WILGA 2015 Symposium Steering Committee

Andrzej W. Domański, Warsaw University of Technology (Poland)
Jan Dorosz, Białystok University of Technology (Poland)
Dominik Dorosz, Białystok University of Technology (Poland)
Tadeusz Kaczorek, Białystok University of Technology (Poland)
Jerzy Klamka, Elektronika, Association of Polish Electrical Engineers (Poland)
Lech Mankiewicz, Mikołaj Kopernik Astronomical Center (Poland)
Ryszard S. Romaniuk, Warsaw University of Technology (Poland)
Tomasz R. Woliński, Warsaw University of Technology (Poland)
Waldemar Wójcik, Lublin University of Technology (Poland)
Grzegorz Wrochna, National Center for Nuclear Research (Poland)
Filip A. Żarnecki, Warsaw University (Poland)

WILGA 2015 Symposium Chair

Ryszard S. Romaniuk, Warsaw University of Technology (Poland)

WILGA 2015 Symposium Committee

Tomasz Adamski, Warsaw University of Technology (Poland)
Michał Borecki, Warsaw University of Technology (Poland)
Grzegorz Borowik, Warsaw University of Technology (Poland)
Elżbieta Czerwosz, ITR Warsaw (Poland)
Dominik Dorosz, Białystok University of Technology (Poland)
Piotr Gawkowski, Warsaw University of Technology (Poland)
Zbigniew Gołębiowski, National Center for Nuclear Research (Poland)
Antoni Grzanka, Warsaw University of Technology (Poland)
Janusz J. Chwaśkowski, Institute of Nuclear Physics (Poland)
Małgorzata Jakubowska, ITME Warsaw (Poland)
Stanisław Jankowski, Warsaw University of Technology (Poland)
Kazimierz Jędrzejewski, Warsaw University of Technology (Poland)
Konrad Jędrzejewski, Warsaw University of Technology (Poland)
Mirosław Karpierz, Warsaw University of Technology (Poland)
Grzegorz Kasprowicz, Warsaw University of Technology (Poland)
Adam Kisiel, Warsaw University of Technology (Poland)
Andrzej Kotyra, Lublin University of Technology (Poland)
Maciej Linczuk, Warsaw University of Technology (Poland), Coordinator
Piotr Malecki, Kraków University of Technology (Poland)
Lech Mankiewicz, Polish Academy of Sciences (Poland)
Jan Mulawka, Warsaw University of Technology (Poland)
Robert Nietubyć, National Center for Nuclear Research (Poland)

Robert Nowak, Warsaw University of Technology (Poland)
Jan Ogrodzki, Warsaw University of Technology (Poland)
Leszek Opalski, Warsaw University of Technology (Poland)
Grzegorz Pankanin, Warsaw University of Technology (Poland)
Anatoli Płatonow, Warsaw University of Technology (Poland)
Krzysztof Poźniak, Warsaw University of Technology (Poland)
Michał Ramotowski, Warsaw University of Technology (Poland)
Ryszard S. Romaniuk, Warsaw University of Technology (Poland)
Marek Scholz, Institute of Nuclear Physics (Poland)
Jerzy Siuzdak, Warsaw University of Technology (Poland)
Władysław Skarbek, Warsaw University of Technology (Poland)
Janusz Sosnowski, Warsaw University of Technology (Poland)
Piotr Turkiewicz, Warsaw University of Technology (Poland)
Zbigniew Wawrzyniak, Warsaw University of Technology (Poland)
Jerzy Weremczuk, Warsaw University of Technology (Poland)
Urszula Woźnicka, Institute of Nuclear Physics (Poland)
Andrzej Wróbel, Nencki Institute of Experimental Biology (Poland)
Wojciech Zabołotny, Warsaw University of Technology (Poland)
Filip A. Żarnecki, Warsaw University (Poland)

Session Chairs

- 1 Photonics Applications and Web Engineering, XXXIVth Wilga 2015
Symposium Opening
Ryszard S. Romaniuk, Warsaw University of Technology (Poland)
- 2 Pi of the Sky: A Network of Astronomical Telescopes
Filip A. Żarnecki, Warsaw University (Poland)
Lech Mankiewicz, Polish Academy of Sciences (Poland)
- 3 Satellite and Space Technology
Piotr Orleański, Space Research Center (Poland)
- 4 High Energy Physics Experiments
Krzysztof Poźniak, Warsaw University of Technology (Poland)
- 5 Communications and Multimedia Technology
Władysław Skarbek, Warsaw University of Technology (Poland)
- 6 Optoelectronics Technologies, Components, Devices, and Systems
Michał Borecki, Warsaw University of Technology (Poland)
- 7 Materials and Technologies
Małgorzata Suchańska, Kielce University of Technology (Poland)
Elżbieta Czerwosz, Tele and Radio Institute (Poland)

- 8 Components and System Modelling
Leszek Opalski, Warsaw University of Technology (Poland)
Jan Ogrodzki, Warsaw University of Technology (Poland)
- 9 Biomedical and DNA Computing
Antoni Grzanka, **Krzysztof Cieřlicki**, Warsaw University of Technology (Poland)
- 10 Computational Intelligence
Janusz Sosnowski, Warsaw University of Technology (Poland)
Piotr Gawkowski, Warsaw University of Technology (Poland)
- 11 Artificial Intelligence, Cryptography, Software and Ontological ITC Systems
Jan Mulawka, Warsaw University of Technology (Poland)
- 12 WILGA 2015 SPIE – PSP Best Student Paper Awards
Maciej Linczuk, **Ryszard Kossowski**, **Michal Ramotowski**, **Daniel Paczesny**, **Patrycja Hojczyk**, Warsaw University of Technology (Poland)

Introduction

The SPIE-IEEE-PSP WILGA symposium [wilga.ise.pw.edu.pl] is a multi-conference event, and is a kind of international Forum of Young Science in Photonics, Advanced Electronics and Internet Engineering. It is organized two times a year under the eminent patronage of two big international engineering institutions SPIE – The International Society for Optical Engineering [www.spie.org] and IEEE [www.ieee.org] and their Polish Counterparts: PSP - Photonics Society of Poland [www.photonics.pl], successor of Polish Chapter of SPIE [www.spie.pl] and IEEE Poland Section [www.ieee.pl], with participation of IEEE R8 [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], Association of Polish Electrical Engineers (SEP) [www.sep.com.pl], Polish Committee of Optoelectronics SEP [pkopto.ise.pw.edu.pl], Warsaw University of Technology [www.pw.edu.pl], Faculty of Electronics and Information Technology [www.elka.pw.edu.pl], Institute of Electronic Systems [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 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: 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; IJET - Intl. Journal of Electronics and Telecommunications, PAS [ijet.pl].

WILGA Proceedings of SPIE: There has been a long tradition of WILGA publishing its works in the Proc. SPIE. This volume of Proc. SPIE is the 14th published with WILGA papers. All of the WILGA-SPIE volumes contain around 1500 papers. All WILGA Symposiums published more than 2500 papers with around 5000 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 Proc. SPIE were published: Wilga 2002 – Proc. SPIE 5125; Wilga 2003 – Proc. SPIE 5484; Wilga 2004 – Proc. SPIE 5775; Wilga 2005 bis – Proc. SPIE 5948; 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; WILGA

2012 – Proc. SPIE 8454, WILGA 2013 – Proc. SPIE 8903, WILGA 2014 – Proc. SPIE 9290; WILGA 2015 – Proc. SPIE 9662.

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: Official language of the Symposium is English. Peer reviewed papers are published in a renowned, world wide recognized series Proceedings of SPIE in USA. Symposium is designed mainly 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 invite warmly students, young researchers and their tutors to participate in WILGA.

WILGA XXXth Jubilee Symposium: WILGA 2012, January Edition was held on 26-29.01.2012 at WUT's FE&IT. WILGA 2012, May edition was held on 28.05 – 02.06.2012 in a resort owned by Warsaw University of Technology. There were delivered above 300 presentations during both editions of Wilga, covering a broad area of photonics applications and web engineering. Nearly 350 persons participated. An exceptionally efficient chair of the Organization Committee of WILGA 20121 was traditionally dr Maciek Linczuk [M.Linczuk@elka.pw.edu.pl].

WILGA 2015: Wilga 2015 Symposium was held during the last whole week of may 2015, plus two adjacent weekends. The working research Sessions of 36th WILGA 2015 were traditionally as in previous years: 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, JET and ITER tokomaks, 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, free electron lasers, E-XFEL and POLFEL lasers, EuCARD2 – Enhanced European Coordination of Accelerator Research and Development, TIARA, EuroFusion Project, etc.

WILGA offsprings: WILGA Symposium gave birth to a few topical meetings and conferences which then struck out on their own. These include students regional meetings (Opole, Wrocław, Kielce, Białystok, Lublin, Toruń and other), of SPIE student chapters, IEEE student branches, but also standalone 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 parenthood, since the very good idea of WILGA is proliferating elsewhere. One of such meetings is, now fully nondependent, SPS – Signal Processing Symposium which started at Wilga in 2003.

SPIE – PSP WILGA 2016: The organizers of WILGA 2016 Symposium, to be held on 21 – 29 May 2016, 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 from all over Europe.

References

1. R.S.Romaniuk, K.T.Pozniak, WILGA 2002; Foreword: Photonics and electronics for astronomy and high energy physics experiments in Poland, Proc. SPIE 5125, 2002, pp.xiii-xxxiv
2. R.S.Romaniuk, WILGA 2012, Photonics Applications, Proc. SPIE 8454, pp.vii-x, 2012

Ryszard S. Romaniuk

