Front Matter: Volume 10808
## Contents

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>xvii</td>
<td>Authors</td>
</tr>
<tr>
<td>xxiii</td>
<td>Conference Committees</td>
</tr>
<tr>
<td>xxvii</td>
<td>Introduction</td>
</tr>
</tbody>
</table>

## Part One

### CONFERENCE OVERVIEW

| 10808 02 | Photonics Applications and Web Engineering: WILGA 2018 (Invited Paper) [10808-1] |

### PHOTONICS APPLICATIONS

| 10808 03 | Channel modeling and characterization for VLC indoor transmission systems based on MMC ray tracing method (Invited Paper) [10808-4] |
| 10808 04 | On the modeling of lighting LED dynamic nonlinearity [10808-6] |
| 10808 05 | Fiber optic sensor for measuring currents with mains frequencies [10808-8] |
| 10808 06 | Facial expressions recognition by animated motion of Candide 3D model (Invited Paper) [10808-9] |
| 10808 07 | Personalization of Candide 3D model for human computer interfacing [10808-193] |
| 10808 08 | Application of optical fiber connections in low voltage distribution network management systems [10808-12] |
| 10808 09 | Deep alignment network: from MIMD to SIMD platform [10808-15] |
| 10808 0A | Automatic detection of outlier data received in multi-parametric capillary sensors of diesel fuels fit for use [10808-19] |
| 10808 0B | Overview of the measuring systems where a continuously altered light source plays a key role: Part I (Invited Paper) [10808-20] |
Analysis of feasibility and capabilities of RTLS systems in tourism industry

Texturing method of the full pixel dynamic range

Numerical modeling of transmission in step index polymer optical fibers using matrix exponential method

Autonomic drone landing system based on LEDs pattern and visual markers recognition

Comprehensive analysis of the ability to monitor selected optical network parameters in the physical layer using convolutional neural networks

Mobile robot to create a room map

Stability evaluation of polarization pulling based on stimulated Raman scattering

Color correction by color mapping using color temperature constraints

The method of improving the dynamic range of jitter analyzers in optical-fiber transmission systems

Digital image transmission simulation using the PL-log-MAP turbo decoding algorithm

Absolute calibration of LIBS data

Degree of local depolarization of laser radiation fields sorted by multi-layer birefringence networks of protein crystals

Optical absorption of sandwich structure (Ag3AsS3)0.6(As2S3)0.4 thin film-gold nanoparticles prepared by pulse laser deposition

Optoelectronic neuron on c-negatron

Image steganography for increasing security of OTP authentication

Development of the construction sketch of N-channel MOS-phototransistor with bilateral illumination of channel and operation card of its making

Interior lightning system sensors placement optimization

Quality control automation of electric cables using machine vision

Spectroscopic ellipsometry measurements and nanocharacterization of conductive graft copolymer thin films

Technology and characterization of HgCdTe photodiode with a strengthened passivation
The output signal of a digital optoelectronic processor

Realistic stereo visualization system architecture using ray tracing

Optical method to determine the quantity of water in milk using the visible radiation range

Multiparametric capillary sensor: stabilization of local heating

Precision measurement of coordinates of power center of extended laser path images

Colorimetric characterization of the tunable LED-based light source at the output of the homogenizing rod

Functionally integrated sensors of thermal quantities based on optocoupler

Multifractal spectra classification of flame luminosity waveforms

Determining of combustion process state based on optical flow flame image sequences

Averaged EMG signal models obtained in cyclic processes (Invited Paper)

Design of an automated rice grain sorting system using a vision system

Development of an automated quality control system of confectionery using a vision system

Application of fiber Bragg gratings for stress analysis of high mobility vehicle frame

Data transmission with 1.3um VCSEL

Tuning deep learning algorithms for face alignment and pose estimation

An intelligent system of neural networking recognition of multicolor spot images of laser beam profile

Analytical method for processing digital images of technical objects

Temperature-independent fiber Bragg grating strain sensor system

Automatization of workspace control based on ToF technology

Selected applications of Fourier transform in the diagnostics of the pulverized coal combustion process
<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Title</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1G</td>
<td>Evaluation of the possibility of using fractal analysis to study the flame in the co-firing process</td>
<td>[10808-233]</td>
</tr>
<tr>
<td>1H</td>
<td>Modeling the intensity of scattered light and fog using graphics processing units</td>
<td>[10808-252]</td>
</tr>
<tr>
<td>1I</td>
<td>Some extensions of the Cayley-Hamilton theorem and their applications (Invited Paper)</td>
<td>[10808-2]</td>
</tr>
<tr>
<td>1J</td>
<td>Integrated visitor support system for tourism industry based on IoT technologies</td>
<td>[10808-5]</td>
</tr>
<tr>
<td>1K</td>
<td>Application of a statically configured FPGA in the digital control system of the NQR radio spectrometer</td>
<td>[10808-13]</td>
</tr>
<tr>
<td>1L</td>
<td>Implementation of an expert system based on fuzzy logic to support stock market decisions</td>
<td>[10808-23]</td>
</tr>
<tr>
<td>1M</td>
<td>Computer implementation of a chosen version of strong belief logic</td>
<td>[10808-24]</td>
</tr>
<tr>
<td>1N</td>
<td>Methods and techniques for evaluating effectiveness of information technology implementation into business processes</td>
<td>[10808-25]</td>
</tr>
<tr>
<td>1O</td>
<td>Analysis of parallel computational models for clustering</td>
<td>[10808-31]</td>
</tr>
<tr>
<td>1P</td>
<td>Correlating software metrics with software defects</td>
<td>[10808-33]</td>
</tr>
<tr>
<td>1Q</td>
<td>Tracing project development in Scrum model</td>
<td>[10808-38]</td>
</tr>
<tr>
<td>1R</td>
<td>Anomaly detection in discussion forum posts using global vectors</td>
<td>[10808-40]</td>
</tr>
<tr>
<td>1S</td>
<td>Differences that make a difference: comparing implementations of selected optimization algorithms in R language</td>
<td>[10808-46]</td>
</tr>
<tr>
<td>1T</td>
<td>Analysis the conformable fractional derivative and Caputo definitions in the action of an electric circuit containing a supercapacitor</td>
<td>[10808-49]</td>
</tr>
<tr>
<td>1U</td>
<td>Probabilistic in power engineering</td>
<td>[10808-53]</td>
</tr>
<tr>
<td>1V</td>
<td>Symmetric block encoder based on reversible circuits</td>
<td>[10808-60]</td>
</tr>
<tr>
<td>1W</td>
<td>Novel algorithm for symmetric encryption</td>
<td>[10808-61]</td>
</tr>
<tr>
<td>1X</td>
<td>Instruction trace analysis and enhanced debugging in embedded systems</td>
<td>[10808-68]</td>
</tr>
</tbody>
</table>
Methods and means of processing discrete information in networks with a high level of noise [10808-79]

Genetic ANFIS for scheduling in telecommunication networks [10808-80]

Implementation complexity analysis of the turbo decoding algorithms on digital signal processor [10808-81]

Neural network modelling by rank configurations [10808-93]

Analysis of computational processes of pyramidal and parallel-hierarchical processing of information [10808-94]

SilentPaths: IoT in the application for moving in silence in urban areas [10808-100]

Model for the analysis and optimization of the efficiency and survivability of an enterprise based on optimal aggregation methodology [10808-103]

Part Two

Software-defined anti-DDoS: Is it the next step? [10808-107]

A new piecewise linear modification to log-map turbo decoding algorithm: comparative analysis, numerical estimations, and simulation [10808-109]

Common CNVs detection by artificial intelligence methods [10808-116]

Automated generation of the design solution of the assembly in instrument engineering [10808-128]

Principles of fast count in modified Fibonacci numerical system [10808-130]

Heuristic hyperparameter optimization for multilayer perceptron with one hidden layer [10808-131]

On the modeling of wave processes in unbounded domains by problem with two-point conditions in time [10808-132]

Method of evaluating the level of confidence based on metrological risks for determining the coverage factor in the concept of uncertainty [10808-133]

Dependability issues of parallel programming in measurement systems [10808-134]

A new approach to assessing the dynamic uncertainty of measuring devices [10808-135]

Solution of travelling salesman problem applied to Wireless Sensor Networks (WSN) through the MST and B&B methods [10808-136]
Compromising an IoT device based on Harvard architecture microcontroller

Partially homomorphic encryption algorithm based on elliptic curves

Comparison of deep neural network fooling methods on the accuracy of classification

The influence of the characteristics of the measuring instrument on the reliability of decision making in the assessment of conformity

Analysis of the possibilities of using IPSec on a Linux system for wireless networks

Computer theorem proving in some extended logic

Newton binomial in the generalized Cauchy problem as exemplified by electrical systems

Exploiting random perturbations to defend against adversarial attacks

Parallel-hierarchical network as the model of neurocomputing

Indirect measurements of the parameters of inhomogeneous natural media by a multispectral method using fuzzy logic

The method of multi-criteria ranking of monitoring stations for water discharge in rivers for determining priorities of their location

Estimation of the impact of quality of service parameters on multimedia transmissions

Parametric approximation of electrical circuit responses

Multi-domain model for simulating smart IoT-based theme parks

Multimodal social media video classification with deep neural networks

The automated speaker recognition system of critical use

Concurrent frequent itemsets mining in a shared prefix tree using the Apriori algorithm

Methods of stochastic diagnostic type observers

Offsetting and blending with perturbation functions

New method for information hiding in open social networks
| 10808 30 | Flexible humidity sensors impedance modeling [10808-7] |
| 10808 31 | Wireless optogenetic modules for mice [10808-10] |
| 10808 32 | Thermal and mechanical properties of bioactive glass fibers for nanocomposites [10808-17] |
| 10808 33 | Effect of biodegradation on spectroscopic properties of Sm³⁺ doped 45S5 bioglass [10808-18] |
| 10808 34 | Comparison of bioinformatics programs for analysis of single nucleotide variants [10808-39] |
| 10808 35 | The construction of genomic libraries in BAC and its practical application and bioinformatic usage [10808-42] |
| 10808 36 | Application of bioinformatics techniques for protein interaction analysis [10808-43] |
| 10808 37 | MAVLink-based communication for air pollution measurement system [10808-45] |
| 10808 38 | Low power wearable device for elderly people monitoring [10808-52] |
| 10808 39 | Audio style transfer in non-native speech recognition [10808-74] |
| 10808 3A | Scaffolding algorithm using second- and third-generation reads [10808-82] |
| 10808 3B | An approach to determination of the criteria of harmony of biological objects [10808-108] |
| 10808 3C | De Novo DNA assembler for third generation sequencers’ reads based on BLASR algorithm [10808-111] |
| 10808 3D | De Novo genome assembly for third generation sequencing data [10808-112] |
| 10808 3E | Fetal phonocardiography signal processing from abdominal records by non-adaptive methods [10808-118] |
| 10808 3F | Quantum effects of electric potential hysteresis in biological macro objects [10808-122] |
| 10808 3G | Means for measuring relative humidity of municipal solid wastes based on the microcontroller Arduino UNO R3 [10808-125] |
| 10808 3H | Information model for the evaluation of the efficiency of osteoplasty performing in case of amputations on below knee [10808-126] |
| 10808 3I | Vital signs monitoring using fuzzy logic rules [10808-140] |
10808 3J  Galvanic skin response probe for emotion interpretation in real condition [10808-142]

10808 3K  Multispectral measurement of parameters of particles in heterogeneous biological media [10808-144]

10808 3L  Development of the methodology for the management of the electromobile system and the family house system [10808-146]

10808 3M  Determination of sanitary sewer pipe use in day by audio recording analysis [10808-174]

10808 3N  The using of thermal imaging technique to evaluate the temperature field of hand [10808-175]

10808 3O  Development of automated cage for optogenetic experiments with electromagnetic positioning system [10808-181]

10808 3P  Justification of the electromagnetic impulse method destruction of insect pests in gardens [10808-203]

10808 3Q  Analysis of vertebrae segmentation methods in computed tomography images [10808-207]

10808 3R  Common configurations and challenges in screen-printed enzymatic electrochemical biosensors [10808-231]

10808 3S  Sensors with potential application in artificial skin structure: review [10808-235]

10808 3T  iGAP: Interactive Genomic Analysis Platform [10808-239]

ASTRONOMY, PLASMA, AND HIGH ENERGY PHYSICS

10808 3U  Quasar parallel parametrization [10808-36]

10808 3V  High voltage generator module for high energy physics experiments [10808-51]

10808 3W  The methodology of development of real-time and high-throughput heterogeneous devices for plasma confinement fusion diagnostics [10808-56]

10808 3X  CRI board for CBM experiment: preliminary studies [10808-57]

10808 3Y  VHDL-based parameterized clock manager simulator for FPGA [10808-65]

10808 3Z  Matlab-based modeling of GEM diagnostic data sequencer [10808-66]

10808 40  Prospects for improving top-quark mass measurement precision at future e+e- colliders [10808-69]
10808 41  Data distribution and dispatching software for processing measurement data acquired with SXR GEM-based system [10808-86]

10808 42  Advanced real-time data quality monitoring model for tokamak plasma diagnostics [10808-101]

10808 43  Diagnostic system for video concentration device [10808-123]

10808 44  Hardware JTAG debugger module with ethernet interface for MicroTCA architecture [10808-214]

10808 45  Driver module for quantum computer experiments: Kasli [10808-223]

10808 46  Geant4-based simulations of the x-ray luminescence background in the rotating drum spectrometer/SOLPEX [10808-225]

10808 47  MCORD: MPD cosmic ray detector for NICA [10808-229]

10808 48  Investigation of cosmic ray and solar energetic particle background of STIX using GEANT4 simulation [10808-230]

10808 49  Readout of a prototype CBM-STS silicon sensor module with STS-XYTERv2 ASIC [10808-236]

10808 4A  Study of plasma-wall interactions using pulsed lasers (Invited Paper) [10808-238]

10808 4B  Polish involvement in experimental campaigns at European tokamaks in context of plasma impurity studies (Invited Paper) [10808-240]

10808 4C  Implementation of heapsort in programmable logic with high-level synthesis [10808-245]

10808 4D  Widely parameterizable high-level synthesis [10808-246]

10808 4E  Charge cluster identification for multidimensional GEM detector structures [10808-247]

10808 4F  GEM-based plasma radiation diagnostics development: design aspects affecting its performance [10808-248]

Part Three

MATERIAL ENGINEERING

10808 4G  Effect of alkali content on spectroscopic properties of Er/Ag co-doped antimony-germanate glasses [10808-16]


10808 4I  Carbon nanotube fibers doped with iron via Fenton reaction [10808-34]
Graphene nano-flakes and carbon nanotube-based sensors via screen printing technology for acetone gases detection [10808-37]

CuO nanowires sensor of gases [10808-47]

High-speed camera application in the analysis of the chip flow direction [10808-48]

Correlation of cutting forces measurements and high-speed camera registration in the analysis of the chip breaking process [10808-50]

Rapid prototyping in printed electronics [10808-54]

Measurement of wear level of Qubitron II grinding wheels with using 3D vision system [10808-55]

Application of the Monte Carlo method for the optimization of surface roughness during precise turning of NiTi shape memory alloy [10808-58]

Modeling of dielectric to metal conduction transition in nanocomposites by using high voltage discharge [10808-62]

Determination of nanocapillaries radii statistical distribution in electrotechnical pressboard [10808-63]

Modeling of the materials superplasticity based on damage summation theory [10808-70]

Selection of optimal path of strain rate change in the process of multistage hot deformation under the condition of the equal duration of stages [10808-71]

Temperature distribution in the machining zone during precise turning of NiTi alloy [10808-73]

Aerosol jet printing head for printed microscale electronics [10808-75]

Optical studies of nanocrystalline and amorphous TiO$_2$ thin films deposited by HITUS technique [10808-84]

CuO nanowires film for sensors [10808-90]

Dynamic and mathematical models of the hydraulic-pulse device for deformation strengthening of materials [10808-91]

Inkjet-printed structures for paper-based packages [10808-98]

Automatic system for modeling of working processes in pressure generators of hydraulic vibrating and vibro-impact machines [10808-102]

Simulation of burr formation during machining: case study [10808-105]
Technology of field effect transistor with DLC layer in gate area [10808-106]

The impact of education in 3D product design and printing to primary and high school students [10808-110]

Computer aided design and 3D printing for STEAM education: a technical reference guide for teachers (Invited Paper) [10808-256]

Function-based interactive editing of decoration and material properties [10808-113]

Electrically conductive acrylonitrile butadiene styrene (ABS)/copper composite filament for fused deposition modeling [10808-115]

Design and technology of titanium comb capacitor [10808-119]

Correction of dynamic characteristics of temperature measuring devices [10808-121]

Modeling and simulation of nichrome microheater on polycarbonate substrate [10808-124]

Quality control system of well-bonded coupling fitting onto high pressure gas-main pipelines [10808-148]

The influence of temperature on the AC conductivity of a composite pressboard-synthetic ester-water nanoparticles [10808-160]

Distortion of geometric elements in the transition from the imaginary to the real coordinate system of technological equipment [10808-172]

Temperature transducer based on metal-pyroelectric-semiconductor structure with negative differential resistance [10808-173]

Statement and solution of new problems of deformability theory [10808-183]

New ultrasound approaches to measuring material parameters [10808-185]

The active surface of the sensor at a contact to the technological object [10808-187]

Analysis of the detection of welded joints [10808-189]

Determination and analysis of friction coefficient during turning a cylindrical workpiece made of stainless steel [10808-195]

Current state of tools and methods of control of deformations and mechanical stresses of complex technical systems [10808-201]

AC dielectric properties of SiO2 thin layers implanted with In and Sb ions [10808-204]

Analysis of the material model to simulation of the machining process [10808-206]
### ADVANCED APPLICATIONS

| 10808 SM | Hoping conductance in nanocomposites \( \text{(FeCoZr) }_x \text{(SiO}_2\text{)}_{(100-x)} \text{ produced in mixed Ar and O}_2 \text{ atmosphere} \) [10808-209] |
| 10808 SN | Design and technology of copper comb capacitors [10808-232] |
| 10808 SO | Cheap quartz crystal microbalance humidity sensors based on Nafion as sensing component [10808-237] |
| 10808 SP | Optimization of the selection of partition points in the MV network [10808-3] |
| 10808 SQ | Voltage control methods in LV networks with dispersed generation [10808-11] |
| 10808 SR | The impact of power transformer in a low-voltage network on voltage profiles with a large generation of microsources [10808-21] |
| 10808 SS | Non-invasive method of car wheel rim examination [10808-26] |
| 10808 ST | The ultrasonic converter mathematical model of flow rate of flowing environment [10808-27] |
| 10808 SU | Monoimmittance priority encoder [10808-29] |
| 10808 SV | Experimental testing of the law of conservation and transformation of energy [10808-32] |
| 10808 SW | Evaluating energy consumption in wireless sensor networks [10808-41] |
| 10808 SX | Unmanned aerial vehicle as a measurement tool in engineering and environmental protection [10808-44] |
| 10808 SY | Transient state features selection method in the non-intrusive load monitoring [10808-85] |
| 10808 SZ | Multifrequency phase method for measuring the radial velocity of targets [10808-88] |
| 10808 60 | Automatic system for modeling vibro-impact unloading bulk cargo on vehicles [10808-97] |
| 10808 61 | Determining of the optimal parameters for a mechatronic hydraulic drive [10808-99] |
| 10808 62 | Study of the dynamic stability of the conveyor belt adaptive drive [10808-104] |
| 10808 63 | A hybrid system for an on-site automatic vehicle counting and classification [10808-150] |
| 10808 64 | Method of reducing the uniform of the daily graph of electrical load electric grids with renewable sources of energy [10808-155] |
Transmission loss allocation for a bilateral contract in deregulated electricity market [10808-156]

Phase noncontact method and procedure for measurement of axial displacement of electric machine's rotor [10808-161]

MEMS inertial sensors measurement errors [10808-162]

Improving the method of compensation of output signal temperature drift in optical methane concentration measurer [10808-163]

Experimental investigations of the amplitude-frequency meter of the velocity flowing environment [10808-164]

Two parameter active measuring probe for objects setting detection on CNC machines workspace [10808-167]

Fuel cell lab data flows optimization [10808-168]

The physical model of motor vehicle destruction under shock loading for analysis of road traffic accident [10808-169]

Vibration-based diagnostics of existing defects in hydraulic units [10808-171]

Spice simulation of nodes of the impedance type signal converters [10808-178]

The simulation of spice models of functional signal sources for impedance converters [10808-182]

Multi-layers high directivity couplers (Invited Paper) [10808-197]

Resistance-temperature detector based on the RL-diode generator of deterministic-chaotic oscillations [10808-202]

Inverted pendulum model Linear–Quadratic Regulator (LQR) [10808-212]

The functioning of distributed energy sources in the aspects of using cogeneration technology [10808-220]

Distributed cogeneration technology in the aspects of costs and power regulation [10808-222]

The economic aspect of the use of distributed generation and renewable sources in the combined process of energy production [10808-224]

The perspective of optimizing the use of combined heat and power in distributed power industry [10808-228]

UAV node design for communication cluster [10808-249]
Adaptive production control system based on optimal aggregation methods [10808-92]

Microelectronic frequency transducers of magnetic field with Hall elements [10808-177]
Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five 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.

Abenov, Arman, 2M, 64, 65
Abramowicz, Adam, 6G
Achillas, Charisios, 54
Adamczyk, Jarosław, 1E
Adamski, G., 5O
Aizhanova, Aliya, 2Q, 3B, 3P, 6O
Akhmedov, Ramin N., 68
Al-Maitah, Mohammed, 22, 2O, 55
Al-Oraiqat, Anas M., 0X
Amirgaliyeva, Saltanat, 2X
Andrikevych, Iryna, 2C
Araujo, Alvaro, 38
Arseniuk, A., 47
Askarova, Nursanat, 2H, 6E, 6F
Avramchuk, Olexander Y., 5V
Azarov, Olexiy D., 29
Azeshova, Zhanar, 0W, 20, 5U
Babiuk, Natalia P., 0D, 10
Baitussupov, Doszhon, 2E, 4Y
Bąka, Jarosław, 46
Bakun, Oksana, 0N
Balym, Yuriі, 3B
Bancer, A., 47
Babana, Serhii V., 5D
Baranowska, Agata, 32, 33, 4G
Barylak, Aleksandra, 48
Barylak, Jaromir, 46, 48
Barylo, Grygoriy, 6E, 6F
Bashkov, Evgeniy A., 0X
Bazarbayeva, Aigul, 1H
Belka, Radosław, 0C, 1J, 1O, 2T, 4H
Bereziuk, Oleh V., 3G
Bespalov, Yuriі, 3B
Bevz, Irina S., 24
Bezsmertna, Halyna V., 3H, 3K
Bezsmertnyi, Yuriі O., 3H
Bezuglyi, Andrii I., 3B
Bielawska, Iryna R., 0C, 1J, 1O, 2T
Bieniasz, Jerzy, 2Z
Bilichenko, Victor V., 0L, 1Z
Bilynsky, Yosyp Y., 5F, 5T, 5U, 69
Biskak, Oleg V., 0L, 1Z, 2O
Bissarind, Bailem, 1Z
Błaszczyk, Urszula J., 11
Blumke, Ilona, 2D
Bodnar, Oleg B., 0N
Bogachuk, Volodymyr V., 3G, 61, 66
Boncel, Slawomir, 4I
Bonderiev, Vitalii, 5M
Borecki, Michal, 0A, 02, 5S
Borovska, Taisa M., 24, 6O
Borowik, Grzegorz, 43
Borvnyk, Gennady G., 0K
Boyko, Oksana, 12, 58
Boyko, Valerry V., 3F
Brawata, Sebastian, 43
Buchowicz, Andrzej, 43
Bukowiecka, Danuta, 43
Bunya, Oleksander B., 65
Bykov, Mykola M., 21, 2V
Bykovsky, Sergey A., 6D
Byszuk, Adrian P., 3X
Cabaj, Krzysztof, 2G
Chaban, Olesia, 1Z
Chag, Xin, 06
Chatzikyrkou, Maria, 53
Cherenkov, Aleksandr D., 3P
Chernyak, Oleksandr I., 29
Chernyshova, Maryyna, 3V, 3W, 3Z, 41, 42, 4E, 4F
Chlopiw, A., 47
Chorchos, Łukasz, 19
Cichosz, Pawel, 1R
Cieszewski, Radosław, 4D
Cybulski, Robert, 0I
Czarnacka, Karolina, 5K
Czarnacki, Tomasz, 4B
Czezak, Maria, 53
Czerwosz, E., 4k, 4X
Cyżewski, Adam, 0B
Dąbrowski, Jan Ryszard, 32, 33
Danielewski, Krzysztof, 3M, 67
Danylyuk, Yevhen, 2C
Dassibekov, Khassen, 3H, 3Q
Dazkiewicz, Marek, 0B
Demchenko, Irdalda N., 4F
Demsova, Natalia, 55, 5C
Deniádecki, Stanisław R., 0C, 1J, 1O, 2T
Derecka, Anna, 2R
Dereviansk, Ihor, 1C
Derezierska, Anna, 2D
Diduschko, Roman, 0K
Didyk, Oleksiy, 13
Dobranuk, Yuriі V., 4T
Dobrorodnia, Hanna, 3B
Dobrzyński, Bartosz, 1Q
Dorosz, Jan, 32, 33
Doroz, P., 0A
Doszczeczko, Szymon, 0C
Dubolazov, Oleksander V., 0N
Dudziński, A., 47
Duk, Mariusz, 3G, 5J, 6H
Duskazaev, Gali, 3F, 6H
Dusza, Jacek J., 15
Dybowska-Sarapuk, Lucja, 3S, 4J, 4V
Dzierżak, Róża, 3B, 3F, 3H, 3Q
Dzikowski, Bartosz, 30
Emschermann, David, 3X, 49
Febriana, Putria, 07
Fechan, Andriy, 12
Fedotov, Aleksander K., 5K
Firek, Piotr, 52
Franczyk, E., 5I
Franus, Wiktor, 3A
Frasunek, Przemysław, 43
Gadomer, Łukasz, 0F
Galas, Jacek, 0B
Gambin, Tomasz, 3T
Garmash, Volodymyr V., 1Y
Gawlikowski, Piotr, 2D
Geąca, M., 0Z
Georgiyants, Marine, 3B
Gertsiy, Oleksandr A., 10
Ginter, Mariusz, 05
Głaza, Małgorzata, 43
Godula, B., 5O
 Golasiński, Marcin, 6N
Gołaszewski, Arkadiusz, 6G
Gotowicki, Paweł, 18
Góźdź, Magdalena, 0H
Grabski, Waldemar, 2D
Gracki, Krzysztof, 1W
Grądż, Zbigniew, 1F, 2O, 69
Grishin, Dmitriy I., 6O
Grzybowska, Mariusz, 0L
Grzymek, K., 47
Grocholski, Konrad, 2D
Grabicka-Kobylika, M., 47
Grodzicki, K., 47
Grómszczak, Konrad, 21, 22, 24, 30, 50, 61, 62, 6I, 6O
Grómski, Wojciech, 0M
Gruszko, Oleksander V., 3H
Grygoryszyn, Petro M., 0N
Gryko, Łukasz, 11
Grzędzicka, Jowita, 36
Gumiński, Marek, 3X
Gusarova, Iryna, 1C
Gutman, Wojciech, 35
Gwarek, K., 0U
Hackiewicz, Krzysztof, 3J, 4Z
Hamidi, Rami R., 1Z
Harasim, Damian, 10, 68
Hejduk, Mirosław, 1J
Heuser, J. M., 49
Hladyshewskiy, Mykola V., 69
Holiyaka, Roman, 12, 6E, 6F
Horodetskaja, Oksana S., 5F, 5T, 69
Hotra, O., 1K, 58
Hotra, Zenon, 12
Hrania, Valerii F., 2M, 66
Hryniewicz, K., 3U
Hutter, Dirk, 3X
Ignatovska, Ruslana V., 1N, 20
Ilchenko, Raisa, 18
Iskovych-Lototsky, Rostislav D., 50, 60
Ivanchuk, Yaroslav V., 50, 60
Ivanov, Yuriy Yu., 0L, 20, 26
Ivanyuk, Igor D., 29, 2V
Izai, Vitalii Yu., 0O, 4W
Jedynychowski, Robert, 08
Jewartowski, Błażej, 43
Jozwik, Iwona, 4I
Jurkiewicz, Rafał, 43
Kabalyants, Petr, 3B
Kacejko, Piotr, 2M, 64, 65
Kaczmarek, Cezary, 5V
Kaczorek, Tadeusz, 11
Kahankova, Gayni, 0K, 0Y
Kasianiuk, Veda S., 3I
Kasprowsicz, Grzegorz H., 3O, 3W, 3X, 32, 41, 43, 44, 45, 47, 4E, 4F
Kaziev, Samoil Sh., 6D
Kecskowska, J., 4H
Khorozko, Oleksandr V., 24, 5J
Kobylianska, Iryna M., 0Y, 2X
Kochanowicz, Marcin, 33, 4G
Knysh, Bogdan P., 1Y
Kobylianskyi, Oleksandr V., 24, 5J
Kobylianskyi, Oleksandr V., 24, 5J
Knysh, Bogdan P., 1Y
Kobylianskyi, Oleksandr V., 24, 5J
Kobylianska, Iryna M., 0Y, 2X
Kochanowicz, Marcin, 33, 4G
Miller, Piotr, 1U, 5P
Miluski, Piotr, 4G
Minarik, Daniel, 6B
Mokanyuk, Olexander, 2P
Mokin, Vitalii B., 2Q
Molnar, Zoltan R., 0O
Moskvichova, Julia, 6H
Mstovyi, Dmytro, 0Y
Mróz, Tomasz, 36
Mrozek, T., 0G
Mrozek, Tomasz, 48
Mulawka, Jan, 1L, 1M, 2L
Muslimov, Kuanysh, 28, 5T
Mussabekov, Kanat, 4T, 4W, 5E
Mussabekova, Aisha, 2V, 2Y, 5F
Mussabekova, Assel, 13, 1F, 62
Muzyka, K., 57, 59, 5N
Mykhalevskiy, Dmitro V., 69
Mykhalevych, Volodymyr M., 4S, 4T, 5E
Mykhalevych, Andriy V., 5A
Muzyka, K., 57, 59, 5N
Nadzieja, Daniel, 37, 5X
Nagorszewska, Adama, 3J, 42
Nahusko, Olexander, 4W
Nakonechna, Svitlana V., 2O
Nakonechna, Svitlana, 22
Nalbach-Moszynska, Malgorzata, 43
Nedomara, Jan, 3E
Nemci, Jakub, 6B
Nemec, Petr, 0O
Neumann, Łukasz, 2A
Nietka, Arkadiusz, 16
Nosek, Mateusz, 2G
Nikiforova, Larysa E., 0D, 55
Nykyforova, Larysa E., 0D, 55
Nytrebych, Zinovii M., 2B
Obertyukh, Roman R., 4Y
Ogorodnik, Kostiantyn V., 5F, 5T
Ogorodnik, Vitaliy A., 6C
Okal, Paweł, 4Q
Oldziej, Daniel, 37, 5X
Oleszkiewicz, Witold, 2I
Omiotek, Zbigniew, 1G
Opalska, Katarzyna, 2S
Opalski, Paweł, 39
Opolski, Lech, 2S
Opolski, Leszek J., 2S
Opolski, Leszek J., 2S
Oralbekova, Ayaulym, 50, 6D
Osadchuk, Alexander V., OR, 5D, 6P
Osadchuk, Jaroslav A., 6P
Osadchuk, Vladimir S., OR, 5D, 6P
Ostapenko, Olga, 4S
Ostapenko, Olga, 4S
Ostapenko, Olga, 4S
Ostapenko, Olga, 4S
Ostapenko, Olga, 4S
Ostapenko, Olga, 4S
Osuch, Tomasz, 18
Pachwiczewicz, Marek, 3M, 67
Pal, Yuri, 0O
Panas, Patryk, 1D, 1H
Paredes, Martha C., 2F
Parkot, Katarzyna, 17
Pastuszak, Grzegorz, 43
Pavlov, Kryslan, 4V
Pavlov, Sergii V., ON, 10, 29, 2Y
Pavlovych, Andriy V., 5A
Pawelkowicz, Magdalena, 34
Pawłowski, Marek, 1V
Pedryc, A., 0V
Perlicki, Krzysztof, 0G, 0I
Peryt, M., 47
Petruk, Roman, 2P
Petruk, Vasyl, 3K
Pięta, Paweł, 0C, 1J, 1O, 2T
Pietrzak, M., 47
Pijarski, Paweł, 1U, 5P
Pilarczyk, Rafał, 1A
Pinaev, Bogdan, 0K
Piontkievych, Oleh V., 62
Piotrowska, Ewa, 1T
Płdier, Wojciech, 34, 35, 36
Płasa, Malgorzata, 0C, 1J, 1O, 2T
Płasa, Mirosław, 0C, 1J, 1O, 2T
Podolski, Sławomir, 2L
Podgórski, Piotr, 46, 48
Polishchuk, Leonid K., 62
Politanski, Ł., 1K
Popiel, Piotr, 5E, 5G, 66
Poplavskaia, Anna A., 22
Poplavskyy, Olexander A., 1H
Posnyiak, Kacper, 36
Poźniak, Krzysztof T., 3V, 3W, 3X, 3Y, 3Z, 41, 42, 43, 47, 4D, 4E, 4F
Predecka, M., 57, 5N
Protašiuk, Rafal, 0J
Prus, P., 0A
Pryszczynska, Vasyli, 2E
Przybecki, Zbigniew, 35
Puścian, Marek, 2W
Radzewicz, Czesław, 31
Radzikowski, Kacper, 39
Ragin, Tomasz, 4G
Raimy, Abdourahmane, 21
Rakhatmalinina, Saule, 22, 24, 6A
Rakhytska, Hanna, 2P
Rodríguez Rodríguez, A., 49
Rogalski, Przemysław, 4Q, 4R
Romanyuk, Ryszard S., 02, 0K, 0L, 1Y, 1Z, 20, 3X, 47, 4D
Romanyuk, Alexander N., 0D
Romanyuk, Oksana V., 1H, 5S
Romanyuk, Olexander N., 1H, 20, 2Y, 55, 5V
Romanyuk, Sergii O., 0D
Rumian, Ksenia, 4L, 51
Rusakov, Konstantin, 31
Ryczynski, M., 47
Rychlik, Arkadiusz, 5S
Sagymbekova, Azhar, 0L, 1Y
Sakhnovskiy, Mykhaylo Yu., 0N
Saldan, Yosip R., 5F
Conference Committees

WILGA Symposia Steering Committee

Andrzej Domański, Warsaw University of Technology (Poland)
Jan 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)
Krzysztof Poźniak, Warsaw University of Technology (Poland)
Ryszard S. Romaniuk, Warsaw University of Technology (Poland)
Jerzy Weremczuk, Warsaw University of Technology (Poland)
Tomasz R. Woliński, Warsaw University of Technology (Poland)
Waldemar Wójcik, Lublin University of Technology (Poland)
Filip A. Żarnecki, University of Warsaw (Poland)

WILGA 2018 Symposium Chair

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

WILGA 2018 Symposium Committee

Tomasz Adamski, Warsaw University of Technology (Poland)
Michał Borecki, Warsaw University of Technology (Poland)
Elżbieta Czerwosz, Tele and Radio Research Institute (Poland)
Dominik Dorosz, Białystok University of Technology (Poland)
Piotr Gawkowski, Warsaw University of Technology (Poland)
Małgorzata Jakubowska, ITME Warsaw (Poland)
Kazimierz Jędrzejewski, Warsaw University of Technology (Poland)
Konrad Jędrzejewski, 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)
Lech Mankiewicz, Polish Academy of Sciences (Poland)
Robert Nietubyć, National Center for Nuclear Research (Poland)
Robert Nowak, Warsaw University of Technology (Poland)
Tomasz Osuch, Warsaw University of Technology (Poland)
Anatoli Płatownik, Warsaw University of Technology (Poland)
Krzysztof Poźniak, Warsaw University of Technology (Poland)
Ryszard S. Romaniuk, Warsaw University of Technology (Poland)
Jerzy Siuzdak, Warsaw University of Technology (Poland)
Władysław Skarbek, Warsaw University of Technology (Poland)
Andrzej Skorupski, Warsaw University of Technology (Poland)
Andrzej Smolarz, Lublin University of Technology (Poland)
Janusz Sosnowski, Warsaw University of Technology (Poland)
Piotr Turkiewicz, Warsaw University of Technology (Poland)
Wojciech Walendziuk, Lublin University of Technology (Poland)
Jerzy Weremczuk, Warsaw University of Technology (Poland)
Andrzej Wróbel, Nencki Institute of Experimental Biology (Poland)
Wojciech Zaborotny, Warsaw University of Technology (Poland)
Filip A. Żarnecki, University of Warsaw (Poland)

WILGA 2018 Organizing Committee
Maciej Linczuk, Chair, Warsaw University of Technology (Poland)

WILGA 2018 Symposium Session Chairs

Photonics Applications and Web Engineering, XLth Wilga 2018 Symposium Opening
Ryszard S. Romanik, Warsaw University of Technology (Poland)

Optical Communications
Jerzy Siuzdak, Warsaw University of Technology (Poland)

Pi of the Sky: A Network of Astronomical Telescopes
Lech Mankiewicz, Polish Academy of Sciences (Poland)

Photonic Sensors and Systems
Tomasz Osuch, Warsaw University of Technology (Poland)

High Energy Physics Experiments I
Krzysztof Poźniak, Warsaw University of Technology (Poland)

High Energy Physics Experiments II
Adam Kisiel, Warsaw University of Technology (Poland)

Sensors and Measurement Systems
Jerzy Weremczuk, Warsaw University of Technology (Poland)

Metrology and Measurement Systems
Wojciech Walendziuk, Lublin University of Technology (Poland)

Digital Image Processing and Analysis
Władysław Skarbek, Warsaw University of Technology (Poland)
Optoelectronics Technologies, Components, Devices, and Systems
Michał Borecki, Warsaw University of Technology (Poland)

Materials and Technologies I
Małgorzata Jakubowska, Warsaw University of Technology (Poland)

Materials and Technologies II
Elżbieta Czerwosz, Tele and Radio Research Institute (Poland)

Optogenetics
Andrzej Wróbel, Nencki Institute of Experimental Biology (Poland)

Biomedical and DNA Computing, Bioinformatics
Robert Nowak, Warsaw University of Technology (Poland)

Computational Intelligence
Janusz Sosnowski, Warsaw University of Technology (Poland)

Reversible Logic
Andrzej Skorupski, Warsaw University of Technology (Poland)

WILGA Poster Sessions
Waldemar Wójcik, Lublin University of Technology (Poland)

WILGA 2017 Best Student Paper Awards
Maciej Linczuk, Warsaw University of Technology (Poland)
Introduction

The SPIE-IEEE-PSP WILGA symposium [wilga.ise.pw.edu.pl], is a multi-conference event, 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] and IEEE [www.ieee.org] and their Polish Counterparts: PSP—Photonics Society of Poland [www.photonics.pl], successor of the 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 run 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 database; Photonics Letters of Poland, since 2009; Elektronika, SEP Journal, since 1998; IJET—International 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 Proceedings of SPIE. This volume is the 17th published with WILGA papers. All of the WILGA-SPIE volumes contain over 1,500 papers. All WILGA symposia have published more than 2,500 papers with over 5,000 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.
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. The Symposium is designed mainly for young researchers who just finished their Ph.D. degree, but also Ph.D., M.Sc., and B.Sc. students (from physics, photonics, electronics, electrical engineering 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 Ph.D. 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 offspring: The WILGA Symposium gave birth to a few topical meetings and conferences which then struck out on their own. These include students and young researcher regional meetings (Opole, Wrocław, Kielce, Białystok, Lublin, Toruń, Kraków and others), of SPIE student chapters, IEEE student branches, OSA student chapters, 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 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. Another meeting which originated from Wilga is Photoacoustics which started as a nondependent session.

WILGA 1998–2001: Early Wilga Symposia usually gathered around 100 young researchers each. The proceedings were published in Elektronika Journal of SEP, and on CD discs. Some of the reports from these meetings are available on Wilga webpage [wilga.ise.pw.edu.pl].

WILGA 2002: This was the tenth WILGA Symposium. This was the first time the proceedings were published SPIE (Proc. SPIE vol. 5125). Fifty-five papers were published under the following topical sessions: Optical Fibers, Links, and Networks I: Fundamentals of Optical Networking; Optical Fibers, Links, and Networks II: Technologies, Measurements, and Components; Electronic and Photonic Systems for High-Energy Physics (HEP) Experiments I: Subsystem Design; Electronic and...
Photonic Systems for High-Energy Physics Experiments (HEP) II: Numerical Calculations and Technical Solutions; Optical Fibers, Waveguides, and Communication Channel Theory; Optical Fiber Sensors and Optoelectronics: Industrial Applications; Lighting Technology; Materials Science and Optoelectronic Technologies; Photonics for Astronomy; Biomedical Applications of Electronics and Photonics; Software for Optical Networks and the Internet; Digital Holography, and 3D Object Measurements, and Recognition. WILGA 2002 was reported in the IEEE Region 8 News, August 2002 edition.

**WILGA 2003**: The number of participants exceeded 200 persons for the first time. Proc. SPIE vol. 5484 was published containing 95 papers. The topical sessions were: Optical Communications, Optical Computing, and Control Theory; Tesla: Superconducting Linac and Free Electron X-Ray Laser; Advanced Electronic and Photonic Systems for the BAC/ZEUS Detector at the Hera Accelerator; Advanced Electronic and Photonic Systems for the CMS Detector at the LHC Accelerator; Advanced Electronic and Photonic Systems for Astronomy; Materials Science and Materials for Optoelectronics; Optical Fibers; Optical Fiber Lasers; Advanced Optoelectronic and Optical Fiber Sensors; Diffraction, Holography, Interferometry, and Image Processing; Optoelectronic Components: Photodiodes and LEDs; Optical Fiber Lighting Technology; Optical Broadband Internet Technologies and Techniques; and DSP and Radar Imaging. Wilga 2003 was reported in IEEE Region 8 News, November 2003 issue.

**WILGA 2004**: The number of participants was close to 300. An official agreement of cooperation was signed during Wilga 2004 between the Polish Chapters of SPIE and IEEE. Ninety-two papers were published in SPIE vol. 5775. The sessions were: RF Control System for Tesla and European Superconducting X-ray Free Electron Lasers; Radiation Hardening of Photonics and Electronics for Accelerator/Detector Technologies; Electronic and Photonic Systems for Accelerator/Detector Technology and Astronomy; Optical Communications; Fiber Bragg Gratings and Photonic Crystal Structures; Optoelectronic Materials and Technologies; Digital Holography, Interferometry, and Image Processing; Flame Photometry and Combustion Process Control; FPGA and VHDL; Calculation and Measurement Techniques in Optoelectronics and Electronics; Telemetric Networks for Municipal Systems; Optical and Broadband Internet Technologies and Techniques.

**WILGA 2005 and SPIE Poland 2005 Congress on Optics and Optoelectronics**: 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. The WILGA 2005 Symposium was split to two parts: one was held in Wilga, and the second jointly with the COO’05 at Warsaw University of Technology. Two separate proceedings volumes were published, SPIE Proc. 5948 and 6159. SPIE COO Warsaw 2005 hosted nearly 800 participants. The two Wilga volumes gathered together over 250 papers.
WILGA 2006: The number of participants stabilized at around 300 persons. Proc. SPIE vol. 6347 was published containing 111 peer reviewed papers. Several sessions were organized devoted to trial defenses of Ph.D. and M.Sc. theses, mainly in photonics and electronics. The sessions included: Free electron laser instrumentation; HEP instrumentation and measurements; International linear Collider, Software and hardware aspects of photonics; Hardware and software co-design; Experiments in space research, astronomy, and astroparticle physics; Bragg gratings and nonlinear optical fibers; Capillary and ring core optical fibers; Materials for optical fiber technology; Photoacoustics; Optoelectronic equipment; Optical fiber sensors and lighting technology; Optical interconnections, packaging, soldering, and RFID technology; Biometrics; Biomedical applications of photonics and electronics; HF circuits; Simulation and control theory; Virtual laboratories and optical Internet technology; and Intelligent computing in optoelectronics.

WILGA 2007: This was the 20th WILGA Symposium. Proc. SPIE 6937 was published containing 152 papers. Nearly 250 presentations filled over 20 topical sessions. The aggregated participation was again around 300 persons. Wilga 2007 was again reported in the IEEE Region 8 News, December 2007 issue. The sessions were on topics such as: Apparatus for optical and gamma-ray astrophysical observations; Flash laser and European x-ray laser development; Superconductive accelerator technology for free electron laser and high energy photon physics; Photoacoustics and ultrashort pulse technology; Optical fiber technology and measurements; Optical fiber applications; Nanomaterials and material research for photonics and electronics; Optical and quantum cryptography; Medical x-ray accelerators and biomedical applications; Warmer program sensory networks for water management/preservation and environment protection; Image processing; Passive and active radar imaging; Signal processing; Radar technology, Optical and radiofrequency technology; Optical measurements; and Algorithms for data processing.

WILGA 2008: WILGA 2008 gathered over 200 participants and the proceedings volume (SPIE vol. 7124) contained 35 papers. The introduction to this volume contains a report on the establishment of the Polish Photonics Society, which evolved from the local SPIE Chapter in Poland. PSP immediately opened its publishing body which is Photonics Letters of Poland. The sessions included: Photonic materials research; Liquid crystal and Bragg optical fibers; Photonic micro-components; Apparatus for optical and gamma ray astrophysical observations; Photonic equipment for high energy physics experiments and accelerator technology; Optimal learning systems for photonics and medicine; Warmer project: sensory networks for water management/preservation and environment protection; Broadband pulse technology; and Photonic broadband networks.

WILGA 2009: Proc. SPIE vol. 7502 was published containing 100 papers. There were around 200 presentations, and over 300 participants in two parts, optical and...
radar. The sessions included: Image processing, Optical biometry; Optical astronomy and space technology; Radar technology; Navigation and target tracking; Signal filters and DSP; Signal modulation, transmission and detection; Laser materials, optical fibers and optoelectronics; Sensors, remote sensing, and measuring networks; Genetics databases and biomedical applications.

**WILGA 2010:** Proc. SPIE vol. 7745 contained 73 papers. The symposium gathered around 300 participants in two parts, optical and radar. Over 200 presentations filled 25 topical sessions. The sessions included: Development of photonics and electronics in Europe and Poland; Photonics applications in astronomy and space technology; Optoelectronics and optical fiber technology; Photonics and IT applications in biology and medicine; Acoustic signal processing; Optoelectronics and electronic, image processing, material nanotechnology; Multiprocessor co-integration platforms. The volume features a series of program articles on development of electronics and telecommunications in Poland.

**WILGA 2011:** Proc. SPIE vol. 8008 contained 71 papers. There were over 250 participants and over 200 presentations. Wilga 2011 featured SPIE-PSP award for the best student paper presentation. The sessions included: Development of photonics and electronics in Europe and Poland: knowledge representation; Advanced photonics and electronics systems: hardware aspects; Advanced photonics and electronics systems: software aspects; Applications of photonics in astronomy; Communications technologies; Multimedia technologies; Advanced biomedical systems; Radar technologies; Materials for photonics and optoelectronics, optical fibers.

**WILGA XXXth Jubilee Symposium:** WILGA 2012, January Edition was held on 26-29 January 2012 at WUT’s FE&IT. The WILGA 2012 May edition was held on 28 May–2 June 2012 in a resort owned by Warsaw University of Technology. Over 300 presentations were given during both editions of Wilga, covering a broad area of photonics applications and web engineering. Nearly 350 persons participated. Proc. SPIE 8454 contained 85 papers. The sessions were: Photonics overview for XXX Wilga Symposium, Pi-of-the-sky: a network of astronomical telescopes; Satellite and space technology; High energy physics experiments; Communications and multimedia technology; Optoelectronic technologies, components, devices and systems; Materials and technologies; Components and systems modelling; Biomedical and DNA computing; Airborne applications of computational intelligence; Artificial intelligence, cryptography, software and ontological ICT systems.

**WILGA 2013:** Proc. SPIE 8903 was published and contained 100 papers. The working research sessions of 32nd WILGA 2013 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, JET and ITER photomasks, 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, EuCARD—European Coordination of Accelerator Research and Development, and TIARA, etc. A special session was devoted to a project EuCARD² (2013–2017), which is a continuation of EuCARD.

WILGA 2014: Proc. SPIE 9290 was published containing 125 papers. The Wilga 2014 Symposium was held during the last week of May 2014. The working research sessions of the 34th WILGA 2014 symposium were held 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 codesign, 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 2015: Proc. SPIE 9662 was published containing 169 papers. The Symposium was held during the last whole week of May 2015, plus during two adjacent weekends. The working research Sessions of 36th WILGA 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 2016: The 38th Edition of Wilga Symposium was held on 29 May–6 June. It gathered more than 350 participants from Poland and Europe. Over 250 papers were presented orally and around 50 posters. Proc. SPIE volume 10031 contains 194 papers. The 2013–2016 Wilga Symposia were under friendly research patronage of the EuCARD2 EC Program on accelerator technology. The following topical sessions were organized: material engineering, photonics, sensors and measurements, biomedical applications, research experiments, and high-performance computing.
XL SPIE – PSP WILGA 2017: Proc. SPIE 10445 contained 238 papers. WILGA 2017, the 40th Symposium Jubilee Edition, was held 28 May–5 June 2016, and gathered a record number of nearly 400 participants. Wilga 2017 and hopefully the next Wilga meetings will cooperate with the ARIES EC H2020 Project on Accelerator Research and Innovation for European Science and Society. Wilga 2017 saw in Warsaw two important SPIE Conferences on Remote Sensing, also on Security and Defense. The Symposium featured the following sessions: Photonics and Optoelectronics, Computational intelligence, Biomedical applications, Research Experiments, Material research, and Advanced applications.

WILGA 2018: Wilga 2018 took place 3–10 June and gathered over 300 participants. Wilga 2018 was attended by participants from Czech Republic, Germany, France, Ukraine, Belarus, and Kazakhstan. Traditionally the following topical sessions were organized: Photonics Applications, Photonics Technologies and Components, Instrumentation for High Energy Physics Experiments, Free Electron Lasers, Instrumentation for Tokamaks and Hot Plasma Fusion Experiments, Astronomy and Wide Sky observations, Biophotonics and Optogenetics, Photonics – Electronics – Mechatronics Co-integration, Hardware – Software Co-design, High Performance Computing and Artificial Intelligence, etc.

The Wilga Symposium tries also to address critical research and technical issues currently under discussion in Poland. Air pollution associated with coal-based energy generation and common usage of old types of inefficient furnaces is widely debated. A session was organized on distributed measurements of air pollution using mobile devices equipped in multi-parameter sensors. Different flame measurement techniques were compared. Poland, called a coal country, faces a difficult decision on the governmental level concerning the development of big scale nuclear power facilities. This decision must be addressed to avoid serious energy balance issues. A review paper was presented and a separate session on this subject was organized with participation of young researchers and nuclear energy infrastructure proponents and supporters.

WILGA 2019: The WILGA 2019 summer meeting on Photonics Applications will be held on 2–9 June 2019. The organizers warmly invite interested young researchers and students in photonics and related fields to participate in this exceptional and very friendly research event oriented toward young researchers from Poland and all over Europe, and the world.

References

Ryszard S. Romaniuk