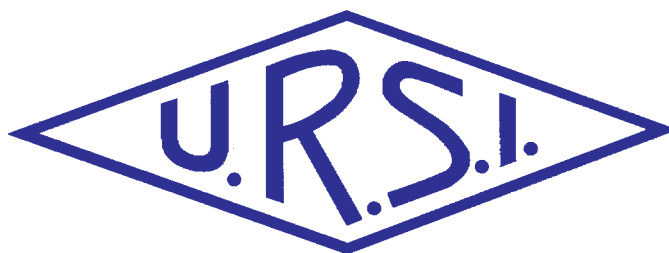


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REPORT ON MSMW 2013, TERATECH 2013 AND CCWS 2013

THE EIGHTH INTERNATIONAL KHARKOV SYMPOSIUM ON PHYSICS AND ENGINEERING OF MICROWAVES, MILLIMETER, AND SUB-MILLIMETER WAVES (MSMW 2013)

WORKSHOP ON TERAHERTZ TECHNOLOGIES AND RADIO-SPECTROSCOPY OF COMPLEX MEDIA (TERATECH 2013)

WORKSHOP ON COMPLEX CONDUCTIVITY AND WAVE SYMMETRY OF FE-BASED SUPERCONDUCTORS (CCWS 2013)

Kharkov Ukraine, 24 - 28 June 2013

The MSMW 2013 symposium took place at the V. N. Karazin Kharkov National University, Ukraine on June 24-28, 2013. It was organized by the Scientific Council of the National Academy of Sciences of Ukraine (NASU) on Radio-Physics and Microwave Electronics, in cooperation with the following organizations:

- A. Usikov Institute of Radio-Physics and Electronics of NAS of Ukraine (IRE NASU)
- Institute of Radio Astronomy of NAS of Ukraine (IRA NASU)
- V. Karazin Kharkov National University (KhNU)
- Kharkov National University of Radio-Electronics (KhNURE)
- Institute of Magnetism of NAS and Ministry of Education and Science of Ukraine (IM NASU and MESU)
- Young Scientists Council of IRE NASU
- IEEE AP/MTT/ED/AES/GRS/NPS/EMB Societies East Ukraine Joint Chapter

- IEEE IRE-Kharkiv Student Branch and associated AP-S, ED-S and MTT-S Student Chapters
- National URSI Committee of Ukraine

It was technically cosponsored by the IEEE Microwave Theory and Techniques Society and URSI, and sponsored by the IEEE AES/AP/ED/GRS/MTT/NPS Societies East Ukraine Joint Chapter, the IEEE AP and MTT Societies, and the European Microwave Association (EuMA).

The working days of the symposium were June 25-27. Every day the program started with a plenary session of five or six 30-minute invited lectures in a large auditorium. After that, three or four parallel day-long sessions of 15-minute contributed papers were presented. The working language of the symposium was English. June 27 and 28 were filled in with social events. The number of registered participants was 164, including 124 from Kharkov; 27 from the rest of Ukraine; 32 from Russia; two each from Germany, France, and Japan; nine from Mexico; one each from China, Sweden, USA, Italy, Czech Republic, Turkey, Taiwan, and Australia; four from the United Kingdom; and three from Belarus. The total number of papers presented during the symposium was about 213, included 28 invited papers.



Figure 1. The MSMW 2013 Organizing Committee.



Figure 2. The MSMW 2013 opening ceremony. The Chair, Prof. Vladimir M. Yakovenko, addressed the participants with opening words.

ACD-ROM version of the MSMW 2013 proceedings was prepared before the symposium. The MSMW 2013 symposium program contained papers submitted by worldwide-known experts in microwaves and shorter-wavelength science and technology, so participation in the symposium became a unique experience for Ukrainian participants. The holding of the symposium became possible thanks to the support of its sponsors: the IEEE AES/AP/ED/GRS/MTT/NPS Societies East Ukraine Joint Chapter, the IEEE IRE-Kharkiv Student Branch and associated AP-S, ED-S, and MTT-S Student Chapters, the IEEE AP and MTT Societies, the European Microwave Association (EuMA), as well as efforts of the traditional founders and organizers of MSMW (Figure 1). The European Microwave Association donated a special grant for the funding of the EuMA-MSMW Microwave Prizes, awarded to the young scientists who presented outstanding papers during the symposium.

As was done three years ago for MSMW 2010, this year, the Workshop on Terahertz Technologies and Spectroscopy of Complex Media (TERATECH 2013) was organized in the framework of the MSMW'2013 symposium, in the format of a special session. We strongly hope that it had a remarkable impact on the ongoing and future R&D in this novel area. This is fully in line with

the traditionally strong emphasis placed by the MSMW program on millimeter and sub-millimeter-wave physics and technology. This extremely captivating and challenging area of nanophysics and nanoelectronics, considered the key technology of the current century, was also included in the agenda of the workshop.

Taking into account the urgency of the problem and many requests from participants and research organizations, the MSMW 2013 Organizing Committee also decided to organize the Workshop on Complex Conductivity and Wave Symmetry of Fe-Based Superconductors (CCWS'13) as a special session in the framework of the MSMW 2013.

June 24

June 24 was the day of symposium registration, for meeting and settling of participants. A tour of the city was also organized for symposium participants.

June 25

MSMW 2013 started at 9:00 am on June 25, 2013, with the opening ceremony in the Sinelnikov Room auditorium



Figure 3a, Photo 3b. The plenary session



Figure 4. Discussion in the session “Wave propagation, radar, remote sensing and signal processing”

of the Kharkov National University. The first to address the participants was MSMW 2013 Chair and Director of IRE NASU, Vice Chair of the Ukrainian National URSI Committee, Prof. Vladimir M. Yakovenko (Figure 2). He was followed by the welcoming words of Prof. Nikolai A. Azarenkov, Vice-Rector of Kharkiv National University. The next to make a welcoming speech was Dr. Kostyantyn Ilyenko (IRE NASU), who spoke in the name of the IEEE AP/MTT/ED/AES/GRS/NPS Societies East Ukraine Joint Chapter, as previous Chair.

The first morning plenary session (Figures 3a, 3b) consisted of five invited talks:

- “Tamm States and Variety of their Analogs in Electrodynamics,” S. Tarapov and D. Belozorov, Kharkov, Ukraine
- “Development of High-Frequency Gyrotrons in FIR FU Covering Sub-THz to THz Range for Applications to High-Power THz Spectroscopy,” Toshitaka Idehara and Svilen P. Sabchevski, Fukui-shi, Japan
- “A New Effective Modal Method by B-Splines Expansion for Crossed Surface-Relief Gratings,” G’erard Granet, Clermont-Ferrand, France
- “Control of Electromagnetic Waves in Metamaterials: From Microwaves to Optics,” Yuri Kivshar, Canberra, Australia
- “Powerful Free-Electron Masers with Novel Bragg Resonators,” N. Peskov, N. Ginzburg, A. Sergeev, A. Arzhannikov, S. Sinitsky, A. Kaminsky, and S. Sedykh, N. Novgorod, Russia

Furthermore, after a lunch, the symposium continued working with four simultaneous sessions:

Session WT: “Workshop on Terahertz Technologies and Spectroscopy of Complex Media”

Session A: “Electromagnetic Theory and Numerical Simulation”



Figure 5. Prof. V. O. Nichiporenko, University of Nizhny Novgorod (Russia), and Prof. Toshitaka Idehara, University of Fukui (Japan)

Session C: “Wave Propagation, Radar, Remote Sensing and Signal Processing” (Figure 4)

Session G: “Scientific, Industrial and Biomedical Applications”

In session WT, the following invited paper was presented:

- “Modern Resonator Spectroscopy at Sub-mm Wavelengths,” V. Parshin, M. Tretyakov, M. Koshelev, and E. Serov, N. Novgorod, Russia.

In session G, the following invited papers were presented:

- “Millimeter Waves for Determination of Composition of Biodiesel Fuel,” V. Meriakri, E. Chigryai, M. Parkhomenko, R. Denisyuk, and S. V. von Gratowski, Fryazino, Russia
- “Towards Microwave and Millimeter-Wave Biosensors,” N. Klein, T. H. Basey-Fisher, W. J. Otter, N. Guerra, C. Triulzi, A. Gregory, S. M. Hanham, and S. Lucyscyn, London, United Kingdom
- “Microdosimetry and Physiological Effects of Millimeter-Wave Irradiation in Isolated Neural Ganglion Preparation,” S. Romanenko, V. Pikov, P. H. Siegel, Pasadena, USA

Later that evening, at 7:00 pm, a welcome party was organized at the university restaurant. At the welcome party, Ukrainian sparkling wine was served. This event created a perfect atmosphere to relax and shake off the troubles of the long and sometimes tiring journeys that participants had to undertake to reach MSMW 2013 (Figure 5).

June 26

At the plenary session, the following invited papers were presented (Figure 6):



Figure 6. Prof. Dmitro M. Vavriv of IRANAS (Ukraine) told about problems of the interactions of high-frequency and low-frequency oscillations

- “Spin-Torque Microwave Detectors: Fundamentals and Applications,” O. Prokopenko, G. Melkov, V. Tiberkevich, and A. Slavin, Kyev, Ukraine
- “Tunable Metamaterial Structures for Controlling THz Radiation,” Mikhail Odit, Irina Vendik, Dmitry Kozlov, Irina Munina, and Viacheslav Turgaliev, Saint-Petersburg, Russia
- “Engineering Low-Cost THz Technologies for Ubiquitous Applications,” S. Lucyszyn, London, United Kingdom
- “Developments of Microwave HTS-Based Devices and Subsystems for Applications in Civilian Satellites,” Y. Wu, L. Sun, C. Li, X. Zhang, Q. Zhang, J. Wang, Y. Bian, T. Yu, B. Cui, G. Li, H. Li, and Y. He, Beijing, China
- “Interaction of High-Frequency and Low-Frequency Oscillations: Threats and Benefits,” V. Buts and D. Vavriv, Kharkov, Ukraine
- “High-Harmonic THz Gyrotrons and Gyro-Multipliers,” I. Bandurkin, V. Bratman, A. Fedotov, Yu. Kalynov, A. Savilov, N. Novgorod, Russia

That day, regular sessions of contributed papers consisted of:

Session J: “Microwave Superconductivity”

Session B: “Microwave Solid State Physics and Applications”

Session D: “Vacuum Electronics”

Session H: “R-Functions, Atomic Functions, Wavelets, Fractals”

Session WS: “Workshop on Complex Conductivity and Wave Symmetry of Fe-Based Superconductors”

In session D, the following invited papers were presented:

- “Development and Experimental Investigation of High Power THz Gyrotrons,” M. Glyavin, A. Luchinin, and M. Morozkin, N. Novgorod, Russia
- “Techniques of Non-Collinear Electro-Optic Sampling for Efficient Detection of Pulsed Terahertz Radiation,” M. Tani, T. Kinoshita, T. Nagase, S. Ozawa, S. Tsuzuki, D. Takeshima, E. Estacio, K. Kurihara, K. Yamamoto, and M. Bakunov, Fukui, Japan
- “Medium Power Compact Sources of Electromagnetic Radiation in Millimeter and Sub-Millimeter Ranges,” A. Kuleshov and B. Yefimov, Kharkov, Ukraine

In session H the following invited papers were presented:

- “Correlation Functions Interpolation by Generalized Kravchenko-Kotelnikov Sampling Series,” V. Kravchenko and D. Churikov, Moscow, Russia
- “Novel Methods in Denoising, Resolution Enhancement, and Object Reconstruction of Multidimensional Signals and Objects,” V. Ponomaryov, Mexico, Mexico

In session WS the following invited papers were presented:

- “Complex Electronic Structure of Iron-Based Superconductors as a Key to High-Temperature Superconductivity,” A. Kordyuk, Kyiv, Ukraine
- “Tunneling into Two-Band Superconductors: The Case of Magnesium Diboride and Fe-Based Superconductors,” M. Belogolovskii, P. Sidel, Donetsk, Ukraine
- “Pseudogap in SmFeAsO (0.85) in Comparison with S-Wave Symmetry Theories,” A. Solovjov, V. Svetlov, V. Stepanov, S. Sidorov, V. Tarenkov and A. D’yachenko, Kharkov, Ukraine
- “Microwave Response, Complex Conductivity and Effect of Order Parameter Symmetry in Fe-Based Superconductors,” N. Cherpak, A. Barannik, Y.-S. He, R. Prozorov, and M. Tanatar, Kharkov, Ukraine.

After the sessions, all the participants were invited to enjoy the concert provided by Ukrainian folk instruments Ensemble “CimBanDo & Co” of the Department of Folk Instruments of the Kharkov State Academy of Culture. They were winners of awards at Ukrainian and international competitions (Figure 7).



Figure 7. Concert for the MSMW'13 participants present the teachers ensemble "CimBanDo & Co" of the Department of folk instruments of the Kharkov State Academy of Culture

That evening, the symposium banquet was held at the university restaurant. This was a lovely event, accompanied with live music, dancing, and informal speeches. However, the dominant tone was the joy of meeting old friends and colleagues, and making new friends.

June 27

Two parallel sessions of regular papers that day went along the following topics:

Session E: "Microwave and mm-Wave Engineering"

Session F: "Radio Astronomy and Study of the Earth Environment"

In session E, the following invited paper was presented:

- "A Low-Phase-Noise GaAs FET/BJT Voltage-Controlled Oscillator for Microwave Applications," V. Ulansky and S. Ben Suleiman, Kyev, Ukraine

On the third day, the plenary session was as follows:

- "Resonant Cherenkov Type Radiation in Dispersive Metamaterials," P. Melezhik, A. Poyedinchuk, N. Yashina, and G. Granet, Kharkov, Ukraine
- "Atomic Functions and Generalized Thue Morse Sequence in Digital Signal and Image Processing," W. Hilberg, V. Kravchenko, O. Kravchenko, and Y. Konovalov, Moscow, Russia

The closing ceremony of MSMW2013 took place in the Sinelnikov Room of KhNU at 15:30. At first, the winners of the Young Scientist Paper Contest were awarded with the EuMA-MSMW prizes and certificates (Figure 8). This year, the European Microwave Association established a 1000 Euro fund to be awarded to the winners of the Young Scientist Paper Contest. This was divided into six prizes: one first prize, two second prizes, and three third prizes. The international awards jury consisted of five members: N. T. Cherpak, Kharkov, Ukraine; T. Idehara,



Figure 8. Dr. Mikhail V. Balaban, member of Organizing Committee, is awarding the EuMA Young Scientist Third Prize to Sergey Ponomarenko

Fukui, Japan; J. Niemeyer, Braunschweig, Germany; S. Lucyszyn, London, UK; Y. He, Beijing, China; and M. Balaban, Kharkov, Ukraine.

The First Prize was awarded to Aleksey A. Girich, "Transmission and Reflection of Electromagnetic Waves from Ferrite-Semiconductor Periodic Multilayered Structures," IRE NASU, Kharkov, Ukraine. Two Second Prizes were awarded to Mikhail A. Odit, "Tunable Metamaterial Structures for Controlling THz Radiation," St. Petersburg Electrotechnical University, St. Petersburg, Russia; and

Ivan A. Smirnov, "Spectroscopy of the Ground, First and Second Excited Torsional States of Acetaldehyde from 0.05 to 1.6 THz," IRA NASU, Kharkov, Ukraine. Three Third Prizes were awarded to Sergey Romanenko, "Microdosimetry and Physiological Effects of Millimeter Wave Irradiation in Isolated Neural Ganglion Preparation," California Institute of Technology, Huntington Medical Research Institutes Pasadena, USA; Irina. A. Protsenko, "Accurate Permittivity Characterization of Liquids by Means of WGM Resonator with Microfluidic," IRE NASU, Kharkov, Ukraine; and Viktor A. Sydoruk, "Advanced Microwave Near-Field Technique for Investigation of Material Properties," Forschungszentrum Jülich, Jülich, Germany. The certificates of the EuMA-MSMW prizes, signed by Prof. Dr.-Ing Wolfgang Heinrich, President of the European Microwave Association, and Prof. Vladimir M. Yakovenko, MSMW 2013 Chair, were handed to the winners.

The final closing address was given by Prof. Vladimir M. Yakovenko. He announced that the next symposium, MSMW 2016, will again be held in Kharkov in June, 2016. He thanked the participants and organizers for creating an unprecedented forum for scientific discussions, and expressed hope that the MSMW symposia series will be continued. He also expressed gratitude to the international institutions, such as the IEEE, URSI, and EuMA, which rendered valuable and timely support.

The Young Scientist Prize from the Ukrainian Physical Society for the best paper presentation was awarded to Mikhail V. Balaban, "Electromagnetic Wave Scattering by a Graphene-Sandwiched Thin Dielectric Disk Analyzed Using the Generalized Boundary Conditions," IRE NASU, Kharkov, Ukraine.

June 28

In order to relax after four days of intensive work, and to strengthen the links originated at the symposium, an outdoor activity was organized for participants. Nice weather and the hospitality of the hosts helped finish the symposium agenda.

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