Overview of the II International Conference on Metrological Support of Innovative Technologies – ICMSIT-II-2021

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Abstract. The overview describes the main directions and results of the II International Conference “ICMSIT-II-2021” held in St. Petersburg in March 3-6, 2021. It gives the details about the participants and the proceedings. The anchor partner of Krasnoyarsk Science and Technology City Hall was St. Petersburg State University of Aerospace Instrumentation. A description of the main trends in modern innovative technologies, engineering and industrial physics as well as in the development of the third International Forum “Metrological Support of Innovative Technologies” by the St. Petersburg State University of Aerospace Instrumentation is given in the overview.

The Volume contains Proceedings of the International Conference on Metrological Support of Innovative Technologies (ICMSIT-II-2021) which was held in March 3-6, 2021 in St. Petersburg, Russian Federation.

The purpose of the Conference was to share the results and prospects of the achievements in the application of modern methods of engineering physics and information-measuring technologies in high-tech production, in the fields of aerospace, energy, chemical and oil and gas engineering, economics and organization of engineering production, as well as in modern areas of complex research of technical and information systems for testing, diagnostics and quality control of materials.

The Conference “ICMSIT-II-2021” was jointly organised by the St. Petersburg State University of Aerospace Instrumentation and Krasnoyarsk Science and Technology City Hall with the support of the International and Russian Union of Scientific and Engineering Public Associations, UNESCO Departments of St. Petersburg and the Metrological Academy of the Russian Federation.

The Program Committee and Editorial Board included prominent professors and scientists from the Russian Academy of Sciences, Universities and Institutes of Uzbekistan, India, Poland, Egypt, Kazakhstan, Belarus, Latvia, South Korea, China, Germany, Finland and Russia as well as specialists from Russian and foreign leading industrial enterprises.

A wide range of fundamental and applied problems of metrological support in various innovative technologies and systems has undergone consideration during the meeting.
Figure 1. Plenary talks and sections.
The Conference was organised in 12 main directions:

- Engineering and Industrial Physics;
- Instrumentation Metrology and Standards;
- Control and Measurement Devices in Medicine;
- Measurements in Mechanical Engineering and Automation Systems;
- Innovative Technologies in Instrumentation and Electronics;
- Cybernetics, Economics and Organization of Metrological Support;
- Metrological Engineering and Support of Special Equipment;
- Advanced Tendencies of Training Specialists in Applied Physics, Engineering, and Metrology;
- Mechanical Engineering and Industry 4.0;
- Automation Engineering and Cyber-Physical Systems;
- Information-measuring systems for environmental monitoring;
- Material Sciences: tests, diagnostics and quality control of materials.

The program of the Conference ICMSIT-II-2021 included keynote and plenary talks as well as numerous presentations of the participants (figure 1).

The scientific session of the Conference was held at St. Petersburg State University of Aerospace Instrumentation (SUAI) in the framework of the third International Forum “Metrological Support of Innovative Technologies”. The organization of the International Forum belongs to the leadership of the St. Petersburg State University of Aerospace Instrumentation. For the first time on March 4, 2019, the I International Forum “Metrological Support of Innovative Technologies” was held, which was dedicated to the 75th anniversary of Academician of the Russian Academy of Sciences, Doctor of Economics, Professor, Head of the Department of Metrological Support of Innovative Technologies and Industrial Safety V.V. Okrepilov. The Metrological Academy of the Russian Federation, which has been under his leadership for several decades, has initiated this unique forum, which annually brings together hundreds of experts in the field of measuring equipment management, creating innovative product quality control systems, and innovative training methods for specialists at the SUAI. The first forum was held on the basis of the Da Vinci Science and Exhibition Hall at St. Petersburg State University of Aerospace Instrumentation and gathered more than 50 speakers. It should be emphasized that scientists from Egypt, Slovenia, Thailand, Iraq, Belarus took part in the 1st forum. Thanks to Professor Okrepilov, scientists from one of the most authoritative scientific centers of Russia, the All-Russian Scientific Research Institute of Metrology named after D. I. Mendeleev, as well as many industrial enterprises, such as JSC NPO Radar-MMS, OJSC TsNPO Leninets, LLC Regional Engineering and Technology Center of the city of Kaluga were invited to participate in the forum (figure 2).

Figure 2. Academician of RAS, Doctor of Economics V.V. Okrepilov makes a presentation at the I International Forum "Metrological support of innovative technologies" (March 4, 2019).
On March 4, 2020, SUAI hosted the II International Forum “Metrological Support of Innovative Technologies”, which was held under the auspices of the Unesco departments of St. Petersburg and the Russian Metrological Academy. The opening ceremony was attended by the President of the Metrological Academy of the Russian Federation, academician of the Russian Academy of Sciences, doctor of economic sciences, professor V.V. Okrepilov, head of D.I. Mendeleev VNIIM, Academician of the Metrological Academy of the Russian Federation A.N. Pronin, deputy Director of D.I. Mendeleev VNIIM in quality and educational activities, Doctor of Technical Sciences, academician of the Metrological Academy of the Russian Federation M.V. Okrepilov, Director of the Institute of Physics and Technology of SUAI Doctor of Technical Sciences, Professor E.G. Semenova, as well as a representative of the Indian scientific community, a research fellow at Amity University, PhD, Saurav Dixit (India, Delhi).

The II International Forum noted the urgent need to unite Russian metrologists in solving the problems they face. It is necessary to further expand international relations, deepen scientific approaches to metrological activity. With the development of the economy and industry, with the emergence of new high-tech tools and technologies at domestic enterprises, it is important not to forget that quality management methods must also develop at the same time, and access to foreign markets is impossible without compliance with international standards. Innovation requires the development of advanced measuring instruments that contribute to the introduction of new and improvement of existing technological processes.

With the increasing importance of the Forum among the world community, papers of the participants of the I International Conference ICMSIT-I-2020 began to be published not only in the Russian-language collection of conference proceedings [1-3], indexed in the RSCI, but also in the Journal of Physics: Conference Series [4], indexed foreign prominent databases. The publications in this journal is an important factor in increasing the quality of reports and expanding the geography of speakers, joining the program committee of the Forum and Conference of world-class scientists.

In 2021, new foreign representatives entered the Program Committee of the Conference:

- Pak Kyn U, Director of Medical & Journey RUSSKO Co. Ltd, South Korea;
- Zhang Fengan, Associate Director of International Exchange Office of Liaoning Normal University, China;
- Gundula Herwig, Dr., Head of Staff Unit for International and European Affairs, Ministry of Science, Research and Culture, Potsdam, Germany;
- Chgan Vantin, Ph. D, Director of Research Center “One Way – One Belt” EAEC at North-Western University, China;
- Saurav Dixit, Dr. Associate Professor, Amity University, India;
- Anatolijs Borodinecs, Dr. Sc., Professor, Riga Technical University, Riga, Latvia;
- Alexandrs Korjakins, Dr. Sc., Professor, Riga Technical University, Riga, Latvia.
Discussion of the development of high-tech industry and improving the quality of industrial production within the framework of the III International Forum “Metrological support of innovative technologies” made it possible to draw up an accurate picture of scientific activity in this area. With the active development of technologies and Industry 4.0, the requirements for ensuring the quality of products are also increasing, and compliance with high standards allows us to enter international markets and become a leader in the field of advanced technologies. The pandemic has set new tasks and new challenges for production, and the solution of issues of product quality assurance has become even more in demand in the face of high competition and new demands of society.

This year, the geography of participants is expanding significantly. The III Forum was joined by experts from India, Egypt, Poland, Belarus, Kazakhstan, the United Kingdom of Great Britain and Northern Ireland, Latvia, Iran etc. The event has offered a platform for bringing together students, postdocs, innovative academics and industrial experts to exchange their ideas and contribute new engineering approaches to metrological support of mechanical and automation processes in various technological-, information-, measuring systems for environmental monitoring. Great interest was aroused by the section devoted to cybernetics, economics and organization of metrological support, advanced tendencies of training specialists in applied physics, engineering, and metrology, instrumentation metrology and standards.

It is significant that the III Forum is one of the first events in the program of preparation for the 300th anniversary of the Russian Academy of Sciences, which will be celebrated in 2024. Russian science has always been distinguished by the highest level, and in the development of metrology it still occupies leading positions in the world.

The Conference ICMSIT-II-2021 provided the premier interdisciplinary and multidisciplinary forum for researchers, practitioners and educators to present and discuss the most recent innovations, trends, concerns, practical challenges encountered and the solutions adopted in the fields of innovative technologies in instrumentation and electronics, mechanical and automation engineering, chemical technologies, cyber-physical systems, digitization of Industry 4.0, etc. Although the schedule of the Conference was very tight, there were very vivid discussions among the participants.

All speakers made presentations demonstrating a high level of professional training. The sections devoted to metrology in the field of medicine, innovative technologies in measurements, pedagogical problems of personnel training, military subjects and ecology allowed to unite the maximum number of participants. The participants who could not come to the Conference due to different reasons including the problem of high transportation costs presented on-site presentations which are available on the website of the Conference.

The reports of participants representing leading research institutes, manufacturing companies, universities and educational centers of Russia, Europe and Asia aroused great interest. There was a significant increase in the number of enterprises, universities and research institutes that submitted materials for publication. This year we would like to highlight the following organizations among the active participants of the Conference: Dmitrov Institute of Continuing Education, branch of Dubna University; All-Russian Research Institute of Metrology named after D.I. Mendeleev; JSC "NPP Radar MMS"; Belarusian National Technical University; State Atomic Energy Corporation "Rosatom"; All-Russian Research Institute of Metrological Service; All-Russian Scientific Research Institute of Physical, Technical and Radio Engineering Measurements; Eurasian National University named after L.N. Gumilyov (Nur-Sultan, Kazakhstan); FBU "Test-Saint Petersburg"; Military representation of the Russian Ministry of Defense; JSC "TsNPO" Leninets "; St. Petersburg National Research Academic University named after Zh. I. Alferov Russian Academy of Sciences; Institute of Nuclear Physics named after G.I. Budker of the Siberian Branch of the Russian Academy of Sciences; Institute of Mechanics and Seismic Resistance of Structures of the Academy of Sciences of the Republic of Uzbekistan; Kursk plant "MAYAK" - Branch of JSC "NNPO M.V. Frunze"; Joint Institute for Nuclear Research; Dagestan State Medical University; Ulyanovsk Institute of Civil Aviation named after Chief Marshal of Aviation B.P. Bugaev; Central Research Institute of Economics, Control Systems and Information "Electronics";
Main Scientific Metrological Center of the Ministry of Defense of the Russian Federation; Belarusian State Institute for Advanced Training and Retraining of Personnel in Standardization, Metrology and Quality Management; International Kazakh-Turkish University named after A. Yassavi; Technopolis "ERA".

The international scope of the Conference was confirmed by the participation of representatives from 11 countries besides Russia (China, Latvia, Azerbaijan, Uzbekistan, Republic of Kazakhstan, Kyrgyzstan, Czech Republic, Belarus, Israel, Ukraine, Vietnam):

- Azerbaijan State Oil and Industry University, Baku, Azerbaijan
- Atyrau State University named after Kh. Dosmukhamedov, Kazakhstan
- Le Quy Don Technical University, Hanoi, Vietnam
- Belarusian State University of Informatics and Radioelectronics, Minsk, Belarus
- Bukhara Engineering Technological Institute, Uzbekistan
- Department of Enterprise Economics, State educational institution of higher professional education "Donetsk National Technical University", Pokrovsk, Donetsk region, Ukraine
- Eurasian National University, Nur-Sultan, Republic of Kazakhstan
- Department of Mathematical Methods and Computer-Aided Design, Private educational institution "Donetsk Academy of Transport", Ukraine
- Fergana branch of Tashkent University of Information Technologies named after Mukhammad al-Khwarizmi, Fergana, Uzbekistan
- Fergana State University, Fergana, Uzbekistan
- Institute of Endocrinology and Metabolism, Assuta Medical Center, Tel Aviv, Israel
- Institute of Endocrinology, Ramat Gan, Israel
- Institute of Mechanics and Seismic Stability of Structures named after M.T. Urazbaev of the Academy of Sciences of the Republic of Uzbekistan, Tashkent city, Uzbekistan
- Institute of Polymers, Department of Materials, ETH Zurich, Switzerland
- Karaganda State Technical University, Karaganda, Kazakhstan
- Karshi branch of Tashkent University of information technologies named after Mukhammad al-Khwarizmi, Karshi, Uzbekistan
- National Transport University, Kyiv, Ukraine
- National University of Life and Environmental Sciences of Ukraine, Kyiv, Ukraine
- Osh State University, Osh, Kyrgyz Republic
- Private educational institution "Donetsk Academy of Transport", Donetsk, Ukraine
- Publishing House “Education and Science” s.r.o., Prague, Czech Republic
- Research and innovation centre of information and communication technologies at Tashkent University of Information Technologies, Tashkent, Uzbekistan
- Riga Technical University, Institute of Civil engineering, Latvia
- Riga Technical University, Institute of Materials and structures, Latvia
- Riga Technical University, Laboratory of Building Materials, Latvia
- Samarkand branch of Tashkent University of information technologies named after Mukhammad al-Khwarizmi, Samarkand, Uzbekistan
- China Aviation Industry General Aircraft Zhejiang Institute Co., Ltd, China
- State educational institution of higher professional education "Donetsk National Technical University", Pokrovsk, Donetsk region, Ukraine
- Sumy State University, Sumy, Ukraine
- Tashkent Institute of Architecture and Civil Engineering, Tashkent city, Uzbekistan
- Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, Uzbekistan
- Tashkent Institute of Textile and Light Industry, Uzbekistan
- Tashkent State Technical University, Tashkent, Uzbekistan
- Tashkent University of Information Technologies named after Muhammad al-Khwarizmi, Amir Temur, Tashkent, Uzbekistan
- Technological Institute, Bukhara, Uzbekistan
- Urgench branch of Tashkent Medical Academy, Uzbekistan
Modern technologies and experience in organizing distance learning made it possible to invite foreign scientists to the Forum and Conference in the online format and thereby preserve the wide geography of the event. This year, thanks to the mixed format, it was possible to speak in the form of a face-to-face session and in a videoconference mode with a parallel broadcast on YouTube (Figure 4).

Figure 4. Academician of the Russian Academy of Sciences, V.V. Okrepilov at the III International Forum “Metrological support of innovative technologies” in the videoconference mode and director of the Institute for Fundamental Training and Technological Innovation, Professor, Doctor of Sciences E.G. Semenova open the Plenary session of the Conference ICMSIT-II-2021

The participants from Russia (more than 50 regions) represented more than 200 universities, scientific institutes and organisations, industrial enterprises:

- "Federal scientific Agroengineering centre VIM», Moscow
- A.N. Bach Institute of Biochemistry, Research Center of Biotechnology of the Russian Academy of Sciences, Moscow
- Academy of the State Fire Service of the Ministry of Emergency Situations of Russia, Moscow
- Admiral Makarov State University of Maritime and Inland Shipping
- All-Russian Research Institute for Hydraulic Engineering and Land Reclamation (VNIIGIM), Moscow
- All-Russian research Institute of aviation materials, Moscow
- All-Russian Research Institute of Experimental Physics FSUE RFNC – VNIIEF, Sarov, Nizhny Novgorod region
- Altai State University, Barnaul
- AO “NPP “Signal”, Saint-Petersburg
- Architecture and Civil Engineering Academy, Samara State Technical University
- Baltic state technical university «VOENMEH», Saint Petersburg
- Bauman Moscow State Technical University
- Belgorod State Technological University named after V.G. Shoukhov
- Birsk branch of Bashkir State University

- Western Caspian University, Baku, Azerbaijan
- Central-Asian Institute for Applied Geosciences, Bishkek, Kyrgyzstan

• Urgench branch of Tashkent University of Information Technologies named after Muhammad al-Khwarizmi, Urgench, Uzbekistan
• Urgench State University, Department of Physics, Uzbekistan
• Biysk Technological Institute (branch) of Altai State Technical University named after I.I. Polzunov
• Boreskov Institute of Catalysis of the Siberian Branch of the RAS
• Branch of LUKOIL-Engineering VolgogradNIPImorneft, Volgograd
• Bryansk State Technical University
• Budker Institute of Nuclear Physics of Siberian Branch Russian Academy of Sciences (BINP SB RAS), Novosibirsk
• Center of Information Technologies in Engineering RAS, Odintsovo
• Central scientific research institute of Stomatolog and Oral Surgery, Moscow
• Chechen State University
• Chuvash State Agrarian University
• Chuvash State University named after I. N. Ulyanov, Cheboksary
• Civil Defense Academy of EMERCOM of Russia
• Company group "Technoserv", Moscow
• Computer and Information Sciences Department, Povolzhskiy State University of Telecommunications and Informatics, Samara
• Control Systems LLC, Krasnoyarsk
• Cryptosoft, Penza
• Department of Aircraft Design and Certification Moscow Aviation Institute (National Research University)
• Department of Algebra and Mathematical Methods in Economy of Orel State University named after I.S. Turgenev, Orel
• Department of Applied Mathematics and Computer Science, Vyatka State University
• Department of Applied Mathematics and Informatics, Nosov Magnitogorsk State Technical University
• Department of Computer Systems and Networks, Saint Petersburg State University of Aerospace Instrumentation
• Department of Criminal Law, Criminal Procedure Law and National Security of Vyatka State University
• Department of Criminal Law, Procedure and National Security of Vyatka State University, Kirov
• Department of Customs Registration, Siberian State University of Science and Technology, Krasnoyarsk
• Department of Digital Control Technologies Institute of Business Process Management and Economics, Siberian Federal University
• Department of Digital Technologies in Education of Vyatka State University
• Department of Economics and Business Process Management Institute of Business Process Management and Economics, Siberian Federal University
• Department of Economics and management in the construction sector Institute of Business Process Management and Economics, Siberian Federal University
• Department of Economics and Management, Orel State Institute of Culture
• Department of Economics, Siberian State University of Science and Technology
• Department of Foreign Languages, Vyatka State University, Kirov
• Department of General Education Academy of Public Administration, Moscow
• Department of Informatics and Records Management, Orel State Institute of Culture
• Department of Informatics, Institute of Mathematics and Information Technologies (named after Prof. Nikolay Chervyakov) North Caucasus Federal University, Stavropol
• Department of Information-measuring Equipment, South Ural State University (National Research University), Chelyabinsk
• Department of Logistics, Siberian State University of Science and Technology, Krasnoyarsk
• Department of Pedagogy, Institute of Pedagogy and Psychology of Education FSEI HE Moscow City Pedagogical University, Moscow
• Department of Power Supply of Enterprises, Kabardino-Balkarian State Agrarian University, Nalchik
• Don state agrarian university, Novocherkassk
• Don State Technical University, Rostov on Don
• East Siberian State University of Technology and Management, Ulan-Ude
• Faculty of Biology and Chemistry of Chechen State University
• Faculty of Management, Russian Presidential Academy of National Economy and Public Administration, Moscow
- Far Eastern Federal University, Vladivostok
- Federal Science Center Scientific-research Institute for System Studies of the Russian Academy of Sciences
- Federal State Autonomous Educational Institution for Higher Education Russian Transport University
- Federal State Autonomous Educational Institution of Higher Education "Moscow Polytechnic University" (Moscow Polytech)
- Federal State Autonomous Educational Institution of Higher Education First Moscow State Medical University named after I.M. Sechenov (Sechenov University), Moscow
- Federal State Budgetary Educational Institution of Higher Education "Kuban State Agrarian University named after I.T. Trubilin", Krasnodar
- Federal State Budgetary Educational Institution of Higher Education "T.F. Gorbachev Kuzbass State Technical University"
- Federal State Budgetary Educational Institution of Higher Education «Kurgan State University», Kurgan
- Federal State Budgetary Educational Institution of Higher Education Astrakhan State Medical University, Astrakhan
- Federal State Budgetary Educational Institution of Higher Education "St. Petersburg state forestry university named after S.M. Kirov"
- Federal State Budgetary Scientific Institution Federal Scientific Center "All-Russian Scientific Research and Technological Institute of Poultry Farming” of the Russian Academy of Sciences, Sergiev Posad
- Federal State Unitary Enterprise « Russian metrological institute of technical physics and radio engineering», Moscow Region, Mendeleevsk
- Federal State-Funded Educational Institution of Higher Education Plekhanov Russian University of Economics, Moscow
- FGBSI «The Federal Center of Analysis»
- Financial University under the Government of the Russian Federation, Moscow
- Forest Institute, Siberian Branch of the Russian Academy of Sciences, Krasnoyarsk
- FSBEE HE Siberian Fire and Rescue Academy EMERCOM of Russia, Zheleznogorsk
- Gubkin Russian State University of Oil and Gas, Moscow
- Industrial University of Tyumen, Affiliate in Nizhnevartovsk
- Institute for Engineering and Environmental Problems in Agricultural Production – Branch of Federal State Budgetary Scientific Institution "Federal Scientific Agroengineering Center VIM", Saint-Petersburg
- Institute for Problems of Ecology and Mineral Wealth Use of Tatarstan Academy of Sciences, Kazan
- Institute FTTI - Institute of Fundamental Training and Technological Innovations
- Institute of Astronomy of the Russian Academy of Sciences
- Institute of Computational Modelling SB RAS, Krasnoyarsk
- Institute of Ecology and Geography, Siberian Federal University
- Institute of Integrated Safety and Special Instrument Engineering, MIREA - Russian Technological University, Moscow
- Institute of land surveying, cadastre and nature management of Krasnoyarsk state agrarian university, Krasnoyarsk
- Institute of Mechanics and Power Engineering named after V. P. Goryachkin
- Institute of Oil and Gas Problems of the Siberian Branch of the RAS - Division of Federal Research Centre “The Yakut Scientific Centre of the Siberian Branch of the Russian Academy of Sciences”, Yakutsk
- Institute of service and entrepreneurship (branch) of DSTU in Shakhty, Shahty, Rostov region
- Institute of Space and Information Technologies, Siberian Federal University, Krasnoyarsk
- Irkutsk National Research Technical University
- Irkutsk State Railway Engineering University
- ITMO University, Saint Petersburg
• Joint Stock Company "Central Research Institute of Economy, Management and Information Systems "Electronics"
• Joint Stock Company «Russian Space Systems», Moscow
• JSC Federal Scientific and Production Centre «Titan - Barricady», Volgograd
• JSC Kvant, Moscow
• JSC Radar MMS, Saint-Petersburg
• Kabardino-Balkarian state agricultural university named after V.M. Kokov, Nalchik
• Kalashnikov Izhevsk State Technical University
• Kaliningrad State Technical University
• Katanov State University of Khakassia, Abakan
• Kazan (Volga region) Federal University (KFU), Kazan
• Kazan Cooperative Institute of the Russian University of Cooperation (KCI RUC)
• Kazan Federal University
• Kazan National Research Technological University, Kazan
• Kerch State Maritime Technical University
• Krasnoyarsk Institute of Railway Transport – branch of the Irkutsk State Transport University
• Krasnoyarsk State Agrarian University
• Krasnoyarsk State Medical University named after Professor V.F. Voino-Yasenetsky
• Kuban State Technological University
• Limited Liability Company "PKF Alliance", Saint Petersburg
• Lobachevsky University NNSU, Nizhny Novgorod
• M. K. Ammosov North-Eastern Federal University, Yakutsk, Republic of Sakha (Yakutia)
• Marine Hydro-physical Institute, Russian Academy of Sciences, Sevastopol
• Mechanical Engineering Research Institute of the Russian Academy of Sciences, Moscow
• Medical Engineering Department, Kazan National Research Technological University
• Medical Institution of the Federal State Budgetary Educational Institution of Higher Education Ogarev Mordovia State University, Saransk
• Medicine Cybernetics and Computer Science Department, General Medicine Faculty, Penza State University
• Michurinsky State Agrarian University
• Minin Nizhny Novgorod State Pedagogical University
• MIREA - Russian Technological University
• Moscow Aviation Institute (National Research University)
• Moscow Pedagogical State University, Moscow
• Moscow State University of Civil Engineering (National Research University)
• Murmansk Arctic State University
• Murmansk Marine Biological Institute
• National Research Tomsk State University
• National Research University "MPEI", Moscow
• National Research University Higher School of Economics, Moscow
• National Research University Moscow Power Engineering Institute
• National university of science and technology “MISiS”, Moscow
• Natural Sciences Department, Private institution of higher education "Medical University" Reaviz, Samara
• Track and railway facilities department, Samara State Transport University
• Department of tractors, automobiles and technical mechanics, Federal State Budgetary Educational Institution of Higher Education "Kuban State Agrarian University named after I.T. Trubilin", Krasnodar
• Nizhny Novgorod branch JSC "Gazprom proektirovanie"
• North-Eastern Federal University, Yakutsk
• Novokuzenetsk Branch-Institute of Kemerovo State University
• Novosibirsk State Technical University
• Omsk State Agrarian University named after P.A. Stolypin
• OOO «Laboratomo-issledovatel'skij cent», Rostov on Don
• Orel branch of Emperor Alexander I St. Petersburg State Transport University
• Orel State University named after I.S. Turgenev
• Orenburg State University
• Pavlov Institute of Physiology RAS
• Penza State Technological University
• Penza State University
• Peoples' Friendship University of Russia, Moscow
• Perm Institute of the FPS of Russia
• Perm Military Institute of National Guard Troops of the Russian Federation
• Perm National Research Polytechnic University
• Perm State Agro-Technological University named after academician D. N. Prianishnikov
• Plekhanov Russian University of Economics, Moscow
• Polotsk State University, Novopolotsk
• Polzunov Altai State Technical University, Barnaul
• Povolzhskiy State University of Telecommunications and Informatics, Samara
• Primorskaya State Academy of Agriculture, Ussuriisk
• Private institution of higher education "Medical University" Reaviz, Samara
• PRO FERRUM Limited Liability Company, St. Petersburg
• Research Institute of the Federal Penitentiary Service of Russia
• Reshetnev Siberian State University of Science and Technology
• RN-BashNIPIneft LLC, Ufa
• Russian Federation South-West State University, Kursk
• Russian Metrological Institute of Technical Physics and Radio Engineering
• Russian Presidential Academy of National Economy and Public Administration under the President of the Russian Federation
• Russian State Agrarian University – Moscow State Agrarian University named after K A Timiryazev
• Russian Technological University
• Ryazan Institute (Branch) of Moscow Polytechnic university
• Saint-Petersburg Electrotechnical University "LETT"
• Saint Petersburg Federation PRO FERRUM Limited Liability Company
• Saint Petersburg Limited Liability Company "PKF Alliance"
• Saint Petersburg State Agrarian University
• Saint Petersburg State Forestry University named after S.M. Kirov
• Saint Petersburg State University of Architecture and Civil Engineering
• Saint Petersburg University of State Fire Service of EMERCOM of Russia
• Saint-Petersburg State Marine Technical University
• Samara National Research University
• Samara State Technical University
• Saratov State Technical University named after Yu. A. Gagarin
• Saratov State Vavilov Agrarian University
• Scientific and research center, Stock Company «Experimental Design Bureau «Electroavtomatika» named after P A Yefimov
• Scientific Research Institute of the Federal Penitentiary System, Moscow
• Sechenov First Moscow State Medical University
• Secondary school with in-depth study of individual subjects of Stulovo, Kirov
• Sevastopol State University
• Sholom-Aleichem Primursky State University, Birobidzhan
• Shukshin Altai State University for Humanities and Pedagogy
• Siberian Federal University
• JSC “Academician M F Reshetnev Information satellite systems”
• Krasnoyarsk Science and Technology City Hall of the Russian Union of Scientific and Engineering Associations
• Siberian State Automobile and Highway University (SibADI), Omsk
• Siberian State Medical University, Tomsk
• Siberian State University of Geosystems and Technologies
• Solution Factory, Krasnoyarsk
• South State Ural University, Chelyabinsk
• South Ural state agrarian University
• SPC «Lasers and equipment of TM» Ltd, Moscow
• St. Petersburg Mining University
• St. Petersburg South-West State University
• Peter the Great St. Petersburg Polytechnical University
• St. Petersburg State University of Aerospace Instrumentation
• State Public Institution of Higher Education Russian Customs Academy, Lyubertsy
• Surgut State Pedagogical University
• Surgut state university
• Technological University Penza
• Territorial Directorate of Roszdravnadzor (Federal Health Care Supervisory Agency) in the Vladimir Region, Vladimir
The Conference ICMSIT-II-2021 was traditionally held within the framework of the II International Forum at the St. Petersburg State University of Aerospace Instrumentation (SUAI), which is celebrating its 80th anniversary this year. Throughout its rich history, SUAI, as a unique educational institution, has asserted advanced positions in training specialists who can effectively work with the most advanced equipment, create and introduce the most advanced technologies into production. Today, SUAI is rightfully among the leaders in the development of innovations in the educational process, including providing high quality training in metrology specialties, without which it is impossible to imagine reliable and fault-tolerant activities in the production and operation of aviation and space technology [5-8].

The Conference was held with the assistance of the UNESCO Chairs of St. Petersburg, which were partners of the Forum:

- UNESCO Chair "Education in a multicultural society" of the Russian State Pedagogical University named after A. I. Herzen;
- UNESCO Chair "Quality Management of Education for Sustainable Development" of the St. Petersburg State Polytechnic University named after Peter the Great;
- UNESCO Chair "Distance Engineering Education" of St. Petersburg State University of Aerospace Instrumentation.

The main goal of these departments is to disseminate advanced international and Russian experience in training highly qualified specialists.

Also, since 2021, the St. Petersburg Mining University, the «Mitytoyo» company, the «Master-Service Metrology Group» company, the Institute of Regional Economics of the Russian Academy of Sciences, the «Amity» University (India) have become the partners of the Conference.
The Program Committee is constantly supported by the Metrological Academy of the Russian Federation. It should be noted that there is a direct interest in replenishing the ranks of the Academy with talented scientists and practitioners who have proven their highest qualifications in practice.

Representatives of the largest technical universities in Russia, modern enterprises and scientific and technical complexes, as well as leading Russian and foreign experts in the field of metrology, take part in the events of the Forum and Conference.

That is why there is no doubt that this event will become the “boiling point” of metrological thought, a place of meaningful dialogue about the state and prospects of scientific research and practical activity in this sphere, which is most important for the development of modern industry.

All participants were invited to present their papers in this Volume and all submitted manuscripts went through the independent peer review process. We are very grateful to all reviewers from Russia, China, USA, Slovenia, Germany and Republic of Kazakhstan for their time and highly professional comments. We deeply believe that their reviews gave opportunity to improve the scientific quality of the presented papers which may be useful for academic, scientific and industrial partners.

More than 500 reports were submitted to the Organizing Committee of the Conference. 315 reports were selected for inclusion into this Volume after the review process. All the papers were subjected to rigorous peer-review by conference committee members and international reviewers. The papers were selected based on their quality and relevance to the Conference directions and on the results of their presentation at the Conference session. The proceedings present to the readers the recent advances in the field of applied physics and cyber-physical systems (section 1), cybernetics, economics and information measuring systems (section 2), engineering and innovative technologies (section 3), instrumentation technologies and environmental engineering (section 4). These papers reflect modern engineering approaches in all Conference directions, broaden the researches of the previous Conferences [9-20].

We chose the Journal of Physics: Conference Series (JPCS) to provide all contributors with the opportunity to publish their papers in an international, peer-reviewed journal. This is understood and appreciated by all the participants of our Conference, and therefore this Volume provides an excellent overview of the main topics of our Conference.

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