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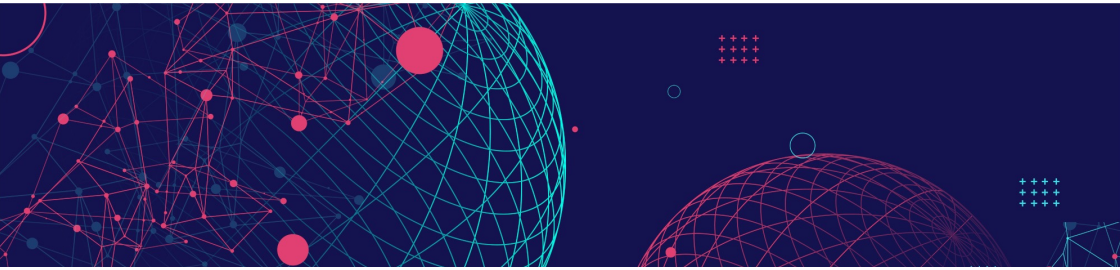

2024 IEEE INTERNATIONAL WORKSHOP ON

Metrology for AeroSpace

POLAND 2024 MetroAeroSpace

LUBLIN, POLAND - JUNE 3-5, 2024

FINAL PROGRAM

ATHENA
BUSINESS AND TECHNOLOGY CONSULTING

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Welcome Message from the General Chairs

On behalf of the Organizing Committee, we welcome you to the 2024 IEEE International Workshop on Metrology for AeroSpace (MetroAeroSpace). We are proud to highlight that this edition marks the 11th anniversary of the conference. Year by year MetroAeroSpace gain the position of the leading scientific event into field of measurement and instrumentation for aerospace. This result was achieved thanks to the efforts of the organizers of the previous editions and the colleagues that joint year by year the conference increasing the attendee number and spread information about it.

Since the first edition, MetroAeroSpace represents the international meeting place in the world of research in the field of measurement and instrumentation for aerospace involving institutions and academia in a discussion on the state-of-the-art concerning issues that require a joint approach by experts of measurement, instrumentation and industrial testing, typically professional engineers, and experts in innovation metrology, typically academics. The increasing number of scientists attending MetroAeroSpace and coming from fields, that can be very far from engineering, led to a positive hybridization of the workshop.

This 11th edition is organized at the “Lublin University of Technology” Mechanical Engineering Faculty, the oldest and largest mechanical faculty of the university. The first ever conference organization, the MetroAeroSpace conference is organized outside Italy in Lublin, Poland. Lublin, administrative centre of the voivodeship and the capital of the Lublin Region, with a population of 336 000 Lublin is the ninth-largest city in Poland. Lublin and its surrounding municipalities are associated under the Lublin Metropolitan Area with the total population of more than 700000 inhabitants. Lublin is an academic centre with internationally renowned universities and diverse educational offers. The city's main assets are five universities: Maria Curie-Sklodowska-University, Catholic University of Lublin, Lublin University of Technology, Medical University, University of Life Sciences; and a number of other higher education institutions. Lublin is the leader of international cooperation and networking hub for local partners from Central and Eastern Europe. Lublin is the winner of the Europe Prize in 2017 and in 2023, it held the title of European Youth Capital. The city is the hub of bustling social and cultural life. Renowned international festivals and sport events attract visitors from all over the Europe. The Night of Culture, Carnaval Sztukmistrzów, Re:tradition Jagiellonian Fair, Different Sounds, "Theatre Confrontations", International Dance Theatre Festival, to name, but a few are Lublin's flagship festivals.

Lublin University of Technology (LUT) is a state institution and the largest technical university in the region. It was established on 13th May 1953 on the initiative of Lublin's community of engineers and technicians. Initially, it was named the Evening Engineering School. The Faculty of Mechanical Engineering was the first in the university's structure. At present, there are six faculties in the organizational structure of Lublin University of Technology: Faculty of Mechanical Engineering, Faculty of Electrical Engineering and Computer Science, Faculty of Civil

Engineering and Architecture, Faculty of Environmental Engineering, Faculty of Fundamentals of Technology, Faculty of Management.

The Lublin region is a region permanently and for a very long time associated with all types of aviation activities. In our region, there were or are located such various types of aviation activities as the aviation industry (military aviation, including training of aviation personnel, as well as civil education combined with aviation sports activities). The Lublin region can also boast of outstanding figures in the aviation history of Poland, not only professionally connected with the region, but also coming from here, and whose careers developed outside the Lublin region, such as Eng. Zygmunt Puławski or the Żurakowski brothers: Eng. Bronisław Żurakowski and test pilot Janusz Żurakowski. Near Lublin (10 km) is located PZL-Świdnik a Leonardo Helicopters company. PZL-Świdnik a Leonardo Helicopters company has manufactured and delivered over 7,400 helicopters to customers in over 40 countries worldwide. Through PZL-Świdnik Poland is one of 5 EU member states which can boast the capability to design, manufacture, develop and support helicopters on their own. PZL-Świdnik has about 3000 employees, including 650 engineers and cooperates with 1000 Polish enterprises. PZL-Świdnik is a key partner of the Polish Ministry of Defense – 80% of helicopters supplied to the MND have been produced in Świdnik. PZL-Świdnik has been a Leonardo Helicopters company since 2010. PZL-Świdnik a Leonardo Helicopters is also a major industrial partner in the aerospace industry, supplying aerostructures to many of the world's leading manufacturers. There are partner aviation universities near Lublin. There are partner aviation universities in the immediate vicinity of Lublin - Polish Air Force University in Dęblin and The University College of Applied Sciences in Chelm, educating military and civilian pilots to serve in aviation.

As usual, this MetroAeroSpace edition will keep pursuing the state of the art and practice started over the past years. Attention is paid, but not limited to, new technology for metrology-assisted production in the aerospace industry, aircraft component measurement, sensors and associated signal conditioning for aerospace, and calibration methods for electronic test and measurement for aerospace.

MetroAeroSpace organization was a challenging task due to the large and increasing interest of our research and application areas. Efforts from many people were required to shape the technical program, arrange accommodation, manage the administrative aspects, and set up the social functions. We like to take this opportunity to thank all and each of them. We like also to thank the public and private organizations that supported the meeting in different ways. Special thanks go to ***Athena Srl*** for their day-by-day collaboration and precious support in the many complex details of the conference.

The MetroAeroSpace Technical Program consists of three keynote speeches, 20 oral sessions scheduled over three days, 1 poster session, three tutorials and 4 parallel events. Among the oral sessions, we received the proposal of up to **14 Special Sessions** and we wish to thank the organizers of these Special Sessions for their cooperation and support to the Workshop organization. With the wide range of technical sessions covering the many fields of metrology for aerospace, we are happy to welcome you to the variety of technical presentations that await you this year. Thanks to all of the Technical Program Committee members and the reviewers who have contributed to make this outstanding program possible.

We received 167 extended abstracts from all over the world. Due to the time limits of the workshop, only 105 papers have been selected after a painstaking activity of the program committee and additional reviewers. We like to thank all people who contributed to this process with opinions, comments, and suggestions to choose the best papers and even improve their quality.

Authors of all the above contributions are also welcome to submit an extended version to the Special Issues on *MDPI Sensors*.

As already mentioned, the technical program encompasses several events and activities. The keynote speeches will be held by experts in the field of metrology for aerospace.

- Felix J. Yanovsky from DELFT UNIVERSITY OF TECHNOLOGY, THE NETHERLANDS and NATIONAL AVIATION UNIVERSITY, UKRAINE, will present: *Peculiarities of W-band cloud radar calibration based on multi-instrument measurements*,
- Mirosław Wendeker, LUBLIN UNIVERSITY OF TECHNOLOGY, POLAND, will present: *RodLife - Helicopter dynamic system for digital twin purposes*,
- Philip Johannes Steinbild, DRESDEN UNIVERSITY OF TECHNOLOGY, GERMANY, will present: *Artificial Neural Networks for Signal Analysis of Electrical Time Domain Reflectometry Based Sensors*.

We are honored to have them as plenary speakers and thank them in advance for coming to our conference to share their knowledge and experiences with us.

This edition of the Workshop also includes:

- The parallel event Military Metrology for AeroSpace, which is organized by AFCEA Naples Chapter, Lublin University of Technology and University of Sannio, June 3th, 2023, with a very rich program articulated on an half day.
- Three tutorials offering the subjects:
  - *Passive Radar Observation of Space Objects using LOFAR Radio Telescopes,* Konrad Jędrzejewski, WARSAW UNIVERSITY OF TECHNOLOGY, Poland
  - *Wind power - Custom wind tunnel and gyrocopter presentation, Paweł Magryta, Konrad Pietrykowski,* Lublin University of Technology, Poland
  - *Personal flying will be available to everyone in less than two decades*, Jiří Zachardala, UDX RESEARCH S.R.O., Czech Republic
- In addition, we are glad to offer the following events:
  - Aviation exhibition "AeroPLan" devoted to aviation and aerodynamics technology at the Lublin University of Technology, co-organized with the Scientific and Technical Information Center Lublin University of Technology
  - Practical demonstration of take-off and landing of the PANS training helicopter of The University College of Applied Sciences in Chelm on the campus of the Lublin University of Technology
  - Visiting the old town of Lublin and its historical attractions

These events give more opportunities to contact Institutions and experts operating in different fields of Metrology for AeroSpace.

Several Awards offered by International Institution and Companies will be assigned, in particular to young researchers. The best contributions will be awarded, including the “Best Conference Paper Award”, the “Best Paper Presented by a Young Researcher”, the “Best Paper Presented by a Woman”, the “Best Poster Award”.

Enjoy the fellowship of colleagues and experts and spend some free time in the midst of natural and artistic beauty. We will appreciate your important feedback on the conference organization that represents for us the best way to improve the quality of the Workshop, and to achieve lasting excellence.

It is therefore with great honor and pride that we welcome you to **Lublin, Poland**, and to the **11th** International Workshop on Metrology for AeroSpace, **2024**. We hope that you enjoy both your participation in the conference and your stay in **Lublin, Poland.**

Pasquale Daponte, University of Sannio, Italy
Robert Rassa, Raytheon, US
Jerzy Józwik, Lublin University of Technology, Poland

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IEEE MetroAeroSpace 2024 Keynote Speakers

Plenary Session - Monday June 3 - H 12:00

Peculiarities of W-band cloud radar calibration based on multi-instrument measurements

Felix **Yanovsky**
Delft University of Technology, The Netherlands
National Aviation University, Ukraine

ABSTRACT

Monitoring and forecasting meteorological conditions are critical to the safe and regular operation of the global air transport system. The introduction of new millimeter-wave radars into the practice of meteorological observations not only opens up opportunities for obtaining more detailed information about cloudiness, but also necessitates the development of appropriate calibration methods to ensure reliable quantitative results.

This talk is devoted to discussing peculiarities of W-band cloud radar calibration. After brief overview on meteorological radar calibration for quantitative information obtaining, we will focus on problems and their possible solutions in respect to mm-wave radar calibration using multi-instrument measurements. Experimental part of the research is based on measurements of rain provided during several years at the experimental range located in Cabauw, the Netherlands. The stored data are used for comparison and fusion of 94 GHz radar data with non-radar measurements of drop size distribution, provided by laser disdrometers, and weather station synchronous data. Specialized MATLAB software tool developed for this sophisticated processing complex data and radar calibration will be demonstrated.

SPEAKER BIOGRAPHY

Felix J. Yanovsky (IEEE M'94–SM'96–F'08–LF'20) graduated (with Honors) from the National Aviation University (NAU), Kyiv, Ukraine. He got his PhD degree in Radar & Radio Navigation, DSc degree (habilitation) in Aviation Meteorology, and the one more DSc in Radar & Radio Navigation in 1979, 1992, and 1993 respectively. He is currently a Senior Researcher in the Delft University of Technology, Geoscience and Remote Sensing department and (remotely) the Professor of Electronics, Robotics, Monitoring and IoT Technologies (ERMIT) Department in NAU. He was visiting professor and/or scientist in different Universities in the Netherlands, USA,

Germany, Jordan, Republic of Korea, China, Poland, India, and Kenya. He promoted 16 PhD & DSc holders and hundreds of M.S. and Engineers. He was the Chair of IEEE Ukraine Section (2016-2022), founder and Chairman of the Ukraine SP/AES Joint Chapter, and IEEE Microwaves, Radar and Remote Sensing Symposium (MRRS). General Assembly member of the European Microwave Association (EuMA). Research activity in electronics, IT, radar, remote sensing, signal processing. He took part in numerous projects in Ukraine, the Netherlands, and Republic of Korea. He has numerous awards and International Grants. Author of 12 books and book chapters (CRC, Springer, Momentum Press, Elsevier, Tekhnika, NAU), more than 550 papers, and 42 invention patents.

Plenary Session - Tuesday June 4 - H 11:00

RodLife - Helicopter dynamic system for digital twin purposes

Mirosław **Wendeker**
Lublin University of Technology, Poland

ABSTRACT

The contemporary challenges in aviation engineering, aimed at increasing the safety and efficiency of helicopter operations, demand innovative technological solutions. RodLife, a dynamic helicopter system utilizing the digital twin concept, introduces a novel approach to monitoring and analyzing the lifecycle of critical components. Based on advanced mathematical and simulation models, this project provides a detailed assessment of the technical condition of structural elements, especially the blade pitch control pushrod, which is crucial for the safe operation of helicopters. Utilizing Co-simulation techniques that integrate fluid dynamics (CFD), rigid body mechanics (MBD), and finite element analysis (FEM), RodLife offers a comprehensive view of the loads affecting components under various operational conditions. This model allows for precise forecasts regarding fatigue life, taking into account real usage conditions. The article presents experimental and simulation research results that confirm the effectiveness of the proposed system in identifying potential failure points and optimizing maintenance processes. Thus, RodLife represents a step forward towards enhancing the reliability and safety of helicopters while reducing operational costs by extending the time between inspections. The innovative aspect of the RodLife project also lies in its versatility – the ability to adapt to various types of rotorcraft, opening new perspectives for the aviation industry. The presented research is the outcome of a scientific collaboration between the Lublin University of Technology with the industry, highlighting the importance of synergy between the research and application sectors in the development of new technologies.

SPEAKER BIOGRAPHY

Prof. **Mirosław Wendeker** is the Head of the Department of Thermodynamics of Fluid Mechanics and Aerospace Drives in Lublin University of Technology. His scientific discipline is mechanical engineering. Prof. Wendeker has associated his professional path with automotive and aerospace technology (combustion engines, electronic control systems for gasoline injection, aircraft drive systems, aerodynamics), photovoltaics. The professor's teaching

activities include technical thermodynamics, fluid mechanics, aerodynamics, aircraft power units and aircraft operations.

He is currently focusing his activities in the following directions:

- design and development of aircraft propulsion systems with particular emphasis on the development of internal combustion engine control systems and hybrid power units;
- design and research of vehicle and aircraft aerodynamics using both wind tunnel testing and CFD modeling.

Plenary Session - Wednesday June 5 - H 11:30

Artificial Neural Networks for Signal Analysis of Electrical Time Domain Reflectometry Based Sensors

Philip Johannes **Steinbild**
Dresden University of Technology, Germany

ABSTRACT

Spatially distributed measurements are a challenge for sensors and sensor systems. Traditional sensors, such as metallic strain gauges or piezoelectric pressure sensors, measure only one variable at a specific point. If a one- or two-dimensional measurement is required, a large number of individual sensors or a complex and costly sensor combined with complicated and large multiplexing measuring devices are used.
Electrical Time Domain Reflectometry (ETDR) is a measurement principle for spatially resolved impedance measurements of a pair of wave carrying conductors, known as a transmission line. By specifically designing the transmission line, its impedance can be made sensitive to a variety of quantities. However, the acquired ETDR signals are difficult to interpret and translate into the desired quantities, mainly due to the sophisticated interaction between the quantity and the electromagnetic wave. Electromagnetic crosstalk, signal reflections, and the sheer volume of raw measurement data add to the signal complexity.
In several projects at the Institute of Lightweight Engineering and Polymer Technology of the Dresden University of Technology, ETDR sensors have been designed and the signals have been evaluated using artificial neural networks (ANN). The keynote gives an insight into the measurement principle of these ETDR sensors and the influence of the measured quantities and artifacts on the signal. Different types of ANN are presented and critically discussed to open the debate on the use of ANN for signal processing.

SPEAKER BIOGRAPHY

Philip Johannes Steinbild studied mechanical engineering and graduated from Dresden University of Technology in 2017. Since then, he has been developing and researching function-integrated lightweight systems. His research areas are vibration behavior of lightweight structures and composites, sensor integration in lightweight structures, and electrical properties and behavior of carbon fibers. As part of his doctoral project, he is investigating the electrical properties of carbon fiber cracks in fiber-reinforced polymers, laying the groundwork for strain sensors using this principle.

Passive Radar Observation of Space Objects using LOFAR Radio Telescopes

Konrad **Jędrzejewski**

Warsaw University of Technology, Poland

ABSTRACT

Passive radar observation of space objects in Low-Earth Orbit (LEO) appears to be a clever and cost-effective alternative to active solutions. Unlike active radars, passive radars utilize existing transmitters, such as radio or television transmitters, as well as those of other radars. To detect space objects, receivers in passive radars for space object detection require very large antenna arrays or huge radio dish telescopes capable of receiving extremely weak signals reflected from space objects. Researchers from the Warsaw University of Technology and the Space Research Centre of the Polish Academy of Sciences, led by Konrad Jedrzejewski, have been employing antenna arrays (about 60 m in diameter) belonging to the LOFAR European network of astronomical radio telescopes for passive radar observation of space objects. They have developed innovative signal processing techniques and conducted experiments devoted to observing satellites using digital radio and television signals or signals from non-cooperating radars. These experiments have successfully demonstrated the feasibility of passive space target observation using LOFAR radio telescopes.

SPEAKER BIOGRAPHY

Konrad Jędrzejewski received the M.Sc. M.Sc. degree in electronics and telecommunications and later obtained a Ph.D. in electronics, both with honors, in 1995 and 2000, respectively, from the Faculty of Electronics and Information Technology at Warsaw University of Technology. Subsequently, in 2014, he achieved a D.Sc. degree in electronics. From 2000 to 2019, he served as an Assistant Professor at the Faculty of Electronics and Information Technology, Warsaw University of Technology. In 2019, he assumed the position of Associate Professor at Warsaw University of Technology.

He is the author of more than 110 scientific publications and holds three patents. His research interests include statistical and adaptive signal processing, radar signal processing, biomedical

signal processing, machine learning, and A/D converters. Notably, his recent research has concentrated on passive radar systems for observing Low-Earth Orbit (LEO) space objects using LOFAR radio telescopes and terrestrial illuminators of opportunity. The results of this research were presented at many leading international radar conferences, including 2021 IEEE Radar Conference (RadarConf21) in Atlanta, 2022 IEEE Radar Conference (RadarConf22) in New York, 2022 19th European Radar Conference (EuRAD) in Milan, International Conference on Radar Systems (RADAR 2022) in Edinburgh, 2023 IEEE Radar Conference (RadarConf23)) in San Antonio and at the IEEE International Radar Conference 2023, in Sydney, Australia. At the last conference, IEEE International Radar Conference 2023 in Sydney, he received the first prize for the best paper (Best Paper Award) entitled: “Passive Multistatic Localization of Space Objects Using LOFAR Radio Telescope.”

Professor Jędrzejewski has been the Chair of the Poland Chapter of the IEEE Signal Processing Society since March 2023. From March 2019 to February 2023, he was the Vice-Chair of the Poland Chapter of the IEEE Signal Processing Society.

Tutorial Session #2 - Tuesday June 4 - H 16:50

Personal flying will be available to everyone in less than two decades

Jiří **Zachardala**
UDX Research sro

ABSTRACT

UDX is pioneering the future of personal flight with its innovative Airwolf eVTOL hoverbike, aiming to make the skies accessible to all within the next two decades. See a cutting-edge electric propulsion system, that blends the excitement and freedom of flying with a strong commitment to sustainability. Electric power is the cornerstone of UDX's vision, ensuring a quieter, emission-free experience that aligns with global environmental goals. Electric VTOLs also boast features focused on safety and minimal maintenance, crucial for widespread adoption. In essence, UDX envisions a future where personal flight isn't a luxury or a novelty but an integral aspect of everyday life. eVTOL planes are not just reimagining transportation but reshaping it to blend seamlessly with evolving urban landscapes and contemporary lifestyles, all while upholding an eco-conscious ethos.

Airwolf is designed to bring an enjoyable, yet safe flight experience comparable to riding a motorcycle. With its tilting motors and small diameter shrouded propellers, it can take off and land anywhere, hover in place but also fly very far and fast. Small wings provide extended flight range and small motors provide an increased sense of comfort and safety for the pilot and the surroundings. Airwolf is all electric and VTOL, which makes it very practical and affordable.

UDX creates a new vehicle class altogether. With design, development, manufacturing, and testing all done in-house. We are integrating accessible open-source technologies and developing using modern manufacturing technologies such as 3D printing in combination with carbon fiber composites. This allows us to significantly reduce time to market and development costs.

SPEAKER BIOGRAPHY

Jiří Zachardala is a graduate of the Czech Technical University's Faculty of Electrical Engineering. He obtained his background through extensive work experience in IT management with a foundation in software engineering and IT infrastructure. With over 15+ years of experience, he progressed through various industries to eventually establish UDX, where he harnessed his expertise and shifted towards the development and delivery of projects in the aerospace industry. At UDX, our aim is to create innovations for the next decades, transforming the way we think about travel today.

Tutorial Session #3 - Wednesday June 5 - H 12:30

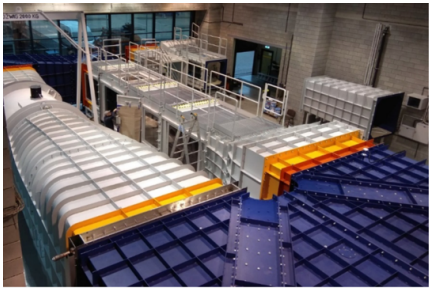
Wind power - Custom wind tunnel and gyrocopter presentation

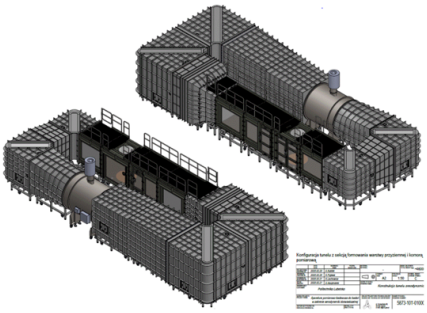
Paweł **Magryta**
Lublin University of Technology, Poland

Konrad **Pietrykowski**
Lublin University of Technology, Poland

ABSTRACT

The wind tunnel which is located in the experimental aerodynamics laboratory of the Innovation and Advanced Technology Centre of Lublin University of Technology, Poland is characterized by a closed circuit, oriented in the horizontal plane with two measuring spaces as an environmental space for measuring chamber and an additional smaller space for high-speed measuring chamber. The first one, with dimensions of 1275x1415 mm allows to obtain maximum speed of 60 m/s, the second one with dimensions of 1800x2000 mm allows to obtain maximum speed of 30 m/s. Each chamber allows for weight and pressure testing of whole aircraft models, and planned experiments will enable development of new and optimization of existing aircraft structures. These two measuring spaces are interchangeable whenever is required.





Gyrocpoter model Tercel made by Aviation Artur Trendak company is an ultralight aircraft with a takeoff weight of 560 kg. It is a two-seater machine in a side-by-side arrangement allowing flights with visibility up to 3,000 m at a distance of up to 600 km. The structure is a self-supporting composite cabin with an aluminum mast and lifting rotor blades. It is equipped with a 135 hp engine, which is a modification of the Rotax 912 engine - a turbocharging system and a fuel ejection system were developed in cooperation with the Lublin University of Technology.

SPEAKERS BIOGRAPHY

Pawel Magryta has been an employee of Lublin University of Technology in the Department of Thermodynamics, Fluid Mechanics and Aviation Propulsion Systems since 2020. He has been working with the Department since 2009, taking part in more than a dozen research and development projects. He is currently working on completing his PhD thesis. Among other things, he is responsible for wind tunnel related presentations at the Department.

Konrad Pietrykowski is an employee of the Department of Thermodynamics, Fluid Mechanics and Aviation Propulsion Systems at the Faculty of Mechanical Engineering, Lublin University of Technology. His areas of interest include CFD numerical modeling and experimental studies of wind turbine and aircraft aerodynamics, development of RES-based energy systems and internal combustion engines.

IEEE MetroAeroSpace 2024 Venue

IEEE MetroAeroSpace 2024 will be held at the **Lublin University of Technology**.

Lublin University of Technology is a major education centre and an advisory unit in the city of Lublin. The university actively participates in social and economic life, thus playing an important role in integrating and creating culture. Its scientific and educational activities significantly contribute to the development of the region.

ADDRESS
Nadbystrzycka 38D
Lublin, Poland

Use the QRCode to open the location on *Google Maps*

IEEE MetroAeroSpace 2024 Social Events

WELCOME PARTY
Monday June 3 - H 19:00

The Welcome Party will be held at "**Chata Karcma Regionalna Retaurant**" - "Chata Regional Restaurant" on **Monday June 3 - 19.00**.

Chata
karcma regionalna

ADDRESS
Nadbystrzycka 16
Lublin, Poland

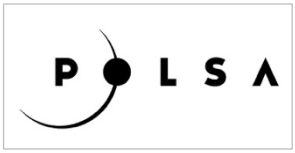
GALA DINNER
Tuesday June 4 - H 20:00

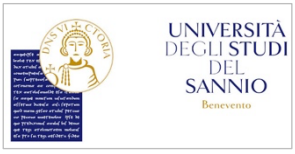
The Gala Dinner will be held at "**Za Kulisami Retaurant**" on **Tuesday June 4 - 20.00**.

za
kulisami

ADDRESS
Plac Teatralny 1
Lublin, Poland

IEEE MetroAeroSpace 2024 Patronages






VITAE DISCIMUS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Program Schedule - Monday, June 3

MONDAY - JUNE 3, 2024			
09:30 - 10:00	OPENING CEREMONY - Auditorium I		
	Auditorium I	Auditorium II	Auditorium III
10:00 - 11:40	Session 1.1 - General Session - PART I	Session 1.2 - Special Session #13 - Artificial Neural Networks in Aviation and Aerospace - PART I	Session 1.3 - Special Session #04: Manufacturing and Metrology in the Aerospace Industry - PART I
11:40 - 12:00	COFFEE BREAK - Upper Hall		
12:00 - 13:00	KEYNOTE SESSION #1 - Auditorium I Felix J. Yanovsky - Delft University of Technology, The Netherlands, National Aviation University, Ukraine Peculiarities of W-band cloud radar calibration based on multi-instrument measurements		
13:00 - 14:20	LUNCH - "Włoski Koper" Restaurant		
14:30 - 15:55	Military Metrology for AeroSpace - PART I Auditorium I - Click HERE for the schedule		
15:55 - 16:20	COFFEE BREAK - Upper Hall		
16:20 - 17:40	Session 2.1 - Military Metrology for AeroSpace - PART II	Session 2.2 - Special Session #13 - Artificial Neural Networks in Aviation and Aerospace - PART II	Session 2.3 - Special Session #14 - Structural Health Monitoring and Nondestructive Testing for Aerospace
17:30 - 18:00	IEEE Women in Engineering Panel		
19:00 - 22:00	WELCOME PARTY - "Chata Swojsko Strawa" Restaurant		

Program Schedule - Tuesday, June 4

TUESDAY - JUNE 4, 2024			
	Auditorium I	Auditorium II	Auditorium III
09:00 - 10:40	Session 3.1 - Special Session #06: Advances in Measurements for Autonomous Space Systems and for the Development and Testing of their Subsystems	Session 3.2 - Special Session #08: University Satellites and Aerospace Research and Development	Session 3.3 - Special Session #03: Metrology for Maritime Transport, Ports and Shipping
10:40 - 11:00	COFFEE BREAK - Upper Hall		
11:00 - 12:00	KEYNOTE SESSION #2 - Auditorium I Mirosław Wendeker, Lublin University of Technology, Poland RodLife - Helicopter dynamic system for digital twin purposes		
12:00 - 13:20	Session 4.1 - Special Session #07: S2S - Space to Space: Scientific and Technological Challenges for Human and Robotic Space Exploration - PART I	Session 4.2 - Special Session #01: Metrology and Instrumentation for Unmanned Aerial Vehicles	Session 4.3 - Special Session #05: Emerging Trends in Multimodal Sensor Fusion for Enhanced Aerospace Metrology
13:20 - 14:20	LUNCH - "Włoski Koper" Restaurant		
14:30 - 16:30	Session 5.1 - Special Session #07: S2S - Space to Space: Scientific and Technological Challenges for Human and Robotic Space Exploration - PART II	Session 5.2 - Special Track CASTAWAYS - Criteria and Technologies for the Development of a "New Space" Ecosystem	Session 5.3 - Special Session #04: Manufacturing and Metrology in the Aerospace Industry - PART II
16:30 - 16:50	COFFEE BREAK - Upper Hall		
16:50 - 17:40	TUTORIAL SESSION #1 - Passive Radar Observation of Space Objects using LOFAR Radio Telescopes Konrad Jędrzejewski, Warsaw University of Technology, Poland	TUTORIAL SESSION #2 - Personal flying will be available to everyone in less than two decades Jiří Zachardala, UDX Research SRO	
20:00 - 23:00	GALA DINNER - "Za Kulisami" Restaurant - Plac Teatralny 1, Lublin		

Program Schedule - Wednesday, June 5

WEDNESDAY - JUNE 5, 2024			
	Auditorium I	Auditorium II	Auditorium III
09:30 - 11:10	Session 6.1 - Special Session #07: S2S - Space to Space: Scientific and Technological Challenges for Human and Robotic Space Exploration - PART III	Session 6.2 - Special Session #11: Aerodynamic Measurement and Control of Unmanned Aerial Vehicles	Session 6.3 - General Session - PART II
11:10 - 11:30	COFFEE BREAK - Upper Hall		
11:30 - 12:30	KEYNOTE SESSION #3 - Auditorium I Philip Johannes Steinbild, Dresden University of Technology, Germany Artificial Neural Networks for Signal Analysis of Electrical Time Domain Reflectometry Based Sensors		
12:30 - 13:20	TUTORIAL SESSION #3 - Auditorium I Wind power - Custom wind tunnel and gyrocopter presentation Paweł Magryta, Konrad Pietrykowski, Lublin University of Technology, Poland		
13:20 - 14:30	LUNCH - "Włoski Koper" Restaurant		
14:30 - 15:00	POSTER SESSION		
15:00 - 16:20	Session 7.1 - Special Session #10: Optical and Innovative Sensors for Aerospace	Session 7.2 - Special Session #04: Manufacturing and Metrology in the Aerospace Industry - PART III	Session 7.3 - General Session - PART III
16:20 - 16:40	COFFEE BREAK - Upper Hall		
16:40 - 17:00	CLOSING AND AWARD CEREMONY - Auditorium I		

Technical Program - Monday, June 3

09:00 - 17:00 *Lublin University of Technology - Faculty of Mechanical Engineering*
REGISTRATIONS

09:30 - 10:00 *Auditorium I*
OPENING CEREMONY
Chair: Pasquale Daponte, *University of Sannio, Italy*

Welcome Addresses
Prof. Paweł Drozdziel, Vice Rector of Lublin University of Technology
Prof. Hubert Dębski, Dean of Faculty of Mechanical Engineering, LUT
Dr Giuseppe Bianco, Italian Space Agency

Technical Program Overview
Prof. Jerzy Józwik, Lublin University of Technology

10:00 - 11:40 *Auditorium I*
Session 1.1 - General Session - PART I
Chair: Jarosław Pytka, *Lublin University of Technology, Poland*

10:00 **Improved Kalman Filter in Variometer**
Jacek Pieniążek, Politechnika Rzeszowska, Poland

10:20 **Microwave Analysis of Lunar Lava Tubes Simulant Materials and Environment**
Andrea Delfini, Sapienza University of Rome, Italy
Roberto Pastore, Sapienza University of Rome, Italy
Davide Micheli, Telecom Italia - TILAB, Italy
Fabio Santoni, Sapienza University of Rome, Italy
Fabrizio Piergentili, Sapienza University of Rome, Italy
Paolo Marzioli, Sapienza University of Rome, Italy
Michele Lustrino, Sapienza University of Rome, Italy
Mario Marchetti, Sapienza University of Rome, Italy
Marta Albano, Agenzia Spaziale Italiana, Italy

10:40 **Analysis of Small Satellite-Based Lunar Navigation Service Availability and Accuracy on the Surface and in Low Orbit**
Rohan Kapoor, Royal Melbourne Institute of Technology, Australia
Roberto Sabatini, Khalifa University of Science and Technology, United Arab Emirates
Alessandro G. M. Gardi, Khalifa University, United Arab Emirates, RMIT University, Australia

11:00 **Real Time Non-Cooperative Surveillance of Resident Space Objects Using Estimation-Based Measurement Association**
Khaja Faisal Hussain, Khalifa University of Science and Technology, United Arab Emirates
Kathiravan Thangavel, Khalifa University of Science and Technology, United Arab Emirates

Nour El-Din Safwat, Khalifa University of Science and Technology, United Arab Emirates
Alessandro G. M. Gardi, Khalifa University, United Arab Emirates, RMIT University, Australia
Roberto Sabatini, Khalifa University of Science and Technology, United Arab Emirates

11:20 **Identification of Longitudinal Aircraft Modes and Aerodynamic Parameters With Flight Trials**
Angelo Lerro, Politecnico di Torino, Italy
Lorenzo Trainelli, Politecnico di Milano, Italy
Luca de Pasquale, Politecnico di Torino, Italy

10:00 - 11:40 *Auditorium II*
Session 1.2 - Artificial Neural Networks in Aviation and Aerospace - PART I
Chairs: Monika Kulisz, *Lublin University of Technology, Poland*
Katarzyna Biruk-Urban, *Lublin University of Technology, Poland*

10:00 **Measurement Uncertainty of Airplane Takeoff and Landing Method**
Jarosław Pytka, Lublin University of Technology, Poland
Paweł Tomiło, Lublin University of Technology, Poland
Anna Zalewska-Tytlak, Lublin University of Technology, Poland

10:20 **Aircraft Diagnostics Using Convolutional Neural Networks**
Dariusz Mika, University of Applied Sciences in Chełm, Poland
Jerzy Józwik, Lublin University of Technology, Poland
Arkadiusz Tofil, University of Applied Sciences in Chełm, Poland
Jarosław Pytka, Lublin University of Technology, Poland
Paweł Pioś, University of Applied Sciences in Chełm, Poland
Paweł Tomiło, Lublin University of Technology, Poland
Grzegorz Skorulski, Bialystok University of Technology, Poland

10:40 **Modelling of Shear Strength of Single Lap Adhesive Joints Using Neural Networks**
Monika Kulisz, Lublin University of Technology, Poland
Katarzyna Biruk-Urban, Lublin University of Technology, Poland

11:00 **AI-Based Method of Air Traffic Controller Workload Assessment**
Jan Laskowski, Lublin University of Technology, Poland
Paweł Tomiło, Lublin University of Technology, Poland
Agnieszka Laskowska, Lublin University of Technology, Poland
Jarosław Pytka, Lublin University of Technology, Poland
Edward Kozłowski, Lublin University of Technology, Poland
Łukasz Skowron, Lublin University of Technology, Poland
Radosław Piątek, Lublin University of Technology, Poland
Piotr Mamcarz, The John Paul II Catholic University of Lublin, Poland

11:20 **Acoustic Signal Analysis of the Targets of Distributed Airspace Monitoring System**
Oleksii Siechko, Lviv Polytechnic National University, Ukraine
Anton Kitsera, Lviv Polytechnic National University, Ukraine
Roman Kochan, University of Bielsko-Biala, Lviv Politechnic National University, Poland
Jerzy Józwik, Lublin University of Technology, Poland
Arkadiusz Tofil, University of Applied Sciences in Chełm, Poland
Dariusz Mika, University of Applied Sciences in Chełm, Poland

10:00 - 11:40	*Auditorium III* **Session 1.3 - Manufacturing and Metrology in the Aerospace Industry - PART I** **Chairs:** Jerzy Józwik, *Lublin University of Technology, Poland* Magdalena Zawada-Michałowska, *Lublin University of Technology, Poland*

10:00 **Surface Roughness of Magnesium Alloy AZ91D After Rough Milling Using Carbide End Mills With Different Rake Angle**
Ireneusz Zagórski, Lublin University of Technology, Poland

10:20 **Vibrations During Magnesium Alloys Milling With Different Toolholders**
Jarosław Korpysa, Lublin University of Technology, Poland

10:40 **Non-Contact Coordinate Measurements of Cutting Tool Wear**
Barbara Jamuła, Rzeszów University of Technology, Poland
Marek Magdziak, Rzeszów University of Technology, Poland
Anna Bazan, Rzeszów University of Technology, Poland

11:00 **Assessment of the Bonding Force Between the Thin NiTi Wire and 3D Printed Polymeric Matrix**
Sebastian Sławski, Silesian University of Technology, Poland
Jonasz Hartwich, Silesian University of Technology, Poland
Sławomir Duda, Silesian University of Technology, Poland
Rafał Bartusiak, Silesian University of Technology, Poland

11:20 **Comparative Analysis of the Effectiveness of Removing Surface Defects With Ceramic and Wire Brushes**
Jakub Matuszak, Lublin University of Technology, Poland
Krzysztof Ciecieląg, Lublin University of Technology, Poland
Agnieszka Skoczylas, Lublin University of Technology, Poland
Kazimierz Zaleski, Lublin University of Technology, Poland

11:40 - 12:00	*Upper Hall* **COFFEE BREAK**

12:00 - 13:00	*Auditorium I* **PLENARY SESSION - KEYNOTE SPEAKER** **Chair**: Mirosław Wendeker, *Lublin University of Technology, Poland*

Peculiarities of W-band cloud radar calibration based on multi-instrument measurements

Felix J. Yanovsky, *Delft University of Technology, The Netherlands*
National Aviation University, Ukraine

13:00 - 14:20	*"Włoski Koper" Restaurant* **LUNCH**

14:30 - 15:55	*Auditorium I* **Military Metrology for AeroSpace - PART I** **Chairs:** Pasquale Daponte, *University of Sannio, Italy* Giovanni Savoldelli Pedrocchi, *AFCEA Chapter of Naples*

14:30 **Welcome Addresses**

14:35 **Satellite constellations for smart operations**
Brig. Gen. res. Ph.D. Eng. **Adam Sowa** - Military University of Technology, Warsaw, Poland

14:55 **Manpower challenges during new aircraft implementation in the Air Force**
Col **Karol Budniak** - General Command of the Armed Forces, F-35 Implementation Team, Warsaw, Poland

15:15 **Approach for damage detection and size estimation of aerial structures based on periodic and permanent diagnostics**
Col **Krzysztof Dragan**, Prof. PhD. D.Sc. Eng - The Air Force Institute of Technology (AFIT), Division Aircraft Airworthiness, Warsaw, Poland

15:35 **Technical condition monitoring of the military aircraft**
Lt Col **Grzegorz Kozłowski**, BEng. PhD - Polish Air Force University at Dęblin, Faculty of Aviation, Dęblin, Poland
Capt. **Piotr Kozak**, MSc Eng. - Training Centre of Aviation Maintenance Personnel, Dęblin, Poland

15:55 - 16:20	*Upper Hall* **COFFEE BREAK**

16:20 - 17:10	*Auditorium I* **Military Metrology for AeroSpace - PART II** **Chairs:** Pasquale Daponte, *University of Sannio, Italy* Giovanni Savoldelli Pedrocchi, *AFCEA Chapter of Naples*

16:20 **Innovative strategies in orbital debris management: the ISOC Approach**
Capt. **Alessandro Panico**, Italian Air Force, Flight Test Department, Aerospace Engineering Group

16:40 **Optimal UAV Approach Trajectories in Wind-Affected Maritime Operations: A Case Study with a Class I unmanned helicopter and a Holland-Class OPV**
Carmine Varriale, Delft University of Technology, The Netherlands

17:00 **Final Remarks**

16:20 - 17:40 *Auditorium II*

Session 2.2 - Artificial Neural Networks in Aviation and Aerospace - PART II

Chairs: Monika Kulisz, *Lublin University of Technology, Poland*
Katarzyna Biruk-Urban, *Lublin University of Technology, Poland*

16:20 **Modelling of Selected Surface Roughness Parameters Using ANN in Waterjet Cutting**
Katarzyna Biruk-Urban, Lublin University of Technology, Poland
Monika Kulisz, Lublin University of Technology, Poland

16:40 **Development and Verification of an Original Method for Determining the Optimized Measurement Time With an Inspection Probe on a CNC Machine**
Michał Leleń, Lublin University of Technology, Poland
Jerzy Józwik, Lublin University of Technology, Poland
Daria Sałamacha, Lublin University of Technology, Poland
Monika Kulisz, Lublin University of Technology, Poland
Paweł Pieśko, Lublin University of Technology, Poland
Magdalena Zawada-Michałowska, Lublin University of Technology, Poland
Marcin Barszcz, Lublin University of Technology, Poland
Kamil Cybul, Lublin University of Technology, Poland

17:00 **ADS-B Data Anomaly Detection With Machine Learning Methods**
Raed Abu Zitar, Sorbonne University-Abu Dhabi, United Arab Emirates

17:20 **Downwash and Upwash Prediction Model for Unconventional Lifting Configuration**
Giorgio Antonio Orlando, Politecnico di Torino, Italy
Angelo Lerro, Politecnico di Torino, Italy
Gioacchino Cafiero, Politecnico di Torino, Italy

16:20 - 17:40 *Auditorium III*

Session 2.3 - Structural Health Monitoring and Nondestructive Testing for Aerospace

Chair: Alessandro Sardellitti, *University of Cassino and Southern Lazio, Italy*

16:20 **Simultaneous Estimation of Conductivity and Lift-Off Using Dimensional Analysis: A Preliminary Analysis**
Alessandro Sardellitti, University of Cassino and Southern Lazio, Italy
Vincenzo Mottola, University of Cassino and Southern Lazio, Italy
Filippo Milano, University of Cassino and Southern Lazio, Italy
Luigi Ferrigno, University of Cassino and Southern Lazio, Italy
Antonello Tamburrino, University of Cassino and Southern Lazio, Italy
Marco Laracca, Sapienza University of Rome, Italy

16:40 **The CCPS (Customized Crack Propagation Sensor) Concept as a Crack Gauge With Enhanced Functional Features for SHM**
Artur Kurnyta, Air Force Insitute of Technology, Łukasiewicz Research Network, Poland
Andrzej Leski, Łukasiewicz Research Network, Institute of Aviation, Poland

17:00 **Rapid Prototyping Algorithm for Customized Crack Propagation Sensors for SHM**
Paulina Kurnyta-Mazurek, Military University of Technology, Poland
Artur Kurnyta, Air Force Insitute of Technology, Łukasiewicz Research Network, Poland
Mariusz Janczewski, Military University of Technology, Poland

17:20 **Improving Defect Detection in Eddy Current Testing Using Multi-Frequency Rotating Eddy Current Strategy**
Federico Carere, Sapienza University of Rome, Italy
Silvia Sangiovanni, Sapienza University of Rome, Italy
Marco Laracca, Sapienza University of Rome, Italy
Alessandro Sardellitti, University of Cassino and Southern Lazio, Italy
Luigi Ferrigno, University of Cassino and Southern Lazio, Italy

17:30 - 18:00	*Auditorium I* **IEEE Women in Engineering Panel** **Chair:** Michele Fiorini, *Leonardo SpA, Italy*

19:00	*"Chata Karcma Regionalna Retaurant" - Chata Regional Restaurant* **WELCOME PARTY**

Technical Program - Tuesday, June 4

09:00 - 17:00	*Lublin University of Technology - Faculty of Mechanical Engineering* **REGISTRATIONS**

09:00 - 10:40	*Auditorium I* **Session 3.1 - Advances in Measurements for Autonomous Space Systems and for the Development and Testing of their Subsystems** **Chairs:** Marco Pertile, *University of Padova, Italy* Sebastiano Chiodini, *University of Padova, Italy*

09:00 **ROS 2 Integrated Continuous Terrain Mapping Comparison for Autonomous Navigation in Unstructured Environments**
Simone Fortuna, University of Padova, Italy
Sebastiano Chiodini, University of Padova, Italy
Andrea Valmorbida, University of Padova, Italy
Marco Pertile, University of Padova, Italy

09:20 **GNSS Test Bench Calibration for Space Service Volume Applications**
Andrea Piccolo, European Commission's Joint Research Centre
Francesco Menzione, European Commission's Joint Research Centre

09:40 **Evaluation Tool for Hybrid Launch Vehicle Navigation Systems and Measurements Fusion**
Tommaso Pantalani, Sapienza University of Rome, Italy
Emanuele Perfetti, Sapienza University of Rome, Italy
Sidhant Kumar, Sapienza University of Rome, Italy
Roberto Pastore, Sapienza University of Rome, Italy
Fabio Santoni, Sapienza University of Rome, Italy
Simone Ciabuschi, Agenzia Spaziale Italiana, Italy
Marta Albano, Agenzia Spaziale Italiana, Italy
Paolo Marzioli, Sapienza University of Rome, Italy
Fabrizio Piergentili, Sapienza University of Rome, Italy

10:00 **Improving Keypoints Tracking With Machine-Learned Features in Event-Camera-Based Visual Odometry**
Sebastiano Chiodini, University of Padova, Italy
Giovanni Trevisanuto, University of Padova, Italy
Carlo Bettanini, University of Padova, Italy
Giacomo Colombatti, University of Padova, Italy
Marco Pertile, University of Padova, Italy

10:20 **Development of a Multi-Axial Force Sensor for Small Satellite Docking**
Matteo Veronese, University of Padova, Italy
Alex Caon, University of Padova, CISAS, Italy
Riccardo Giubilato, German Aerospace Center, Germany
Francesco Branz, University of Padova, Italy
Alessandro Francesconi, University of Padova, Italy

09:00 - 10:40 *Auditorium II*
Session 3.2 - University Satellites and Aerospace Research and Development
Chair: Paweł Karpiński, *University of Life Sciences in Lublin, Poland*

09:00 **LSM-Aided Estimation Filter Based Geostationary Satellite Navigation With Available GNSS Signals**
Furkan Şevik, Istanbul Technical University, Turkey
Demet Cilden-Guler, Istanbul Technical University, Turkey

09:20 **Development of Magnetometer Sensors Calibration Platform and Orbital Satellite Scenario Emulation**
El Yazid Belaidi, Satellite Development Centre, Algeria
Aissa Boutte, Satellite Development Centre, Algerian Space Agency, Algeria
Mohamed Berroua Benzina, Satellite Development Center, Algeria

09:40 **Orbit Estimation Technology for the Initial Phases of a Nanosatellite Mission**
Alexander Spiridonov, Belarusian State University, Belarus
Vasilina Baranova, Belarusian State University, Belarus
Vladimir Cherny, Belarusian State University, Belarus
Sergey Semenovich, Belarusian State University, Belarus
Dmitriy Ushakov, Belarusian State University, Belarus
Vladimir Saetchnikov, Belarusian State University, Belarus

10:00 **Geometric Approach to Determining the Space Object Orbit Altitude Using Angels-Only Measurements**
Vasilina Baranova, Belarusian State University, Belarus
Alexander Spiridonov, Belarusian State University, Belarus
Dmitriy Ushakov, Belarusian State University, Belarus
Vladimir Kozlov, Belarusian State University, Belarus
Vladimir Cherny, Belarusian State University, Belarus
Vladimir Saetchnikov, Belarusian State University, Belarus

10:20 **The Prototype of Wide-Aperture Optical System for Communication With Student Satellite**
Siarhei Liashkevich, Belarusian State University, Belarus
Kseniya Yudytskaya, Belarusian State University, Belarus
Vladimir Saetchnikov, Belarusian State University, Belarus

09:00 - 10:40 *Auditorium III*
Session 3.3 - Metrology for Maritime Transport, Ports and Shipping
Chair: Michele Fiorini, *Leonardo SpA, Italy*

09:00 **Trends in Maritime Communications**
Peter A Pokorny, JCJ Consulting and Nova Systems Pty Ltd, Australia
Jillian Carson-Jackson, The Nautical Institute, JCJ Consulting, Australia
Peter Pokorny, Nova Systems Pty Ltd, Australia

09:20 **Introduction to CLASS (Cyber, Land, Air, Sea, Space) Surveillance Systems**
Michele Fiorini, Leonardo SpA, Italy
Marco Galloro, Leonardo SpA, Italy
Francesco De Angelis, Leonardo SpA, Italy

09:40 **Geopolitics of Arctic Shipping: Focus on the Northern Sea Route (NSR)**
Michele Fiorini, Leonardo SpA, Italy
Alexandra Middleton, University of Oulu, Finland

10:00 **Capabilities of Galileo New Services in Maritime Applications**
Francesco De Angelis, Sapienza Università di Roma, Italy
Giovanni B. Palmerini, Sapienza Università di Roma, Italy

10:20 **Mobility Data Mining: The Maritime Use Case**
Alexandros Troupiotis-Kapeliaris, University of the Aegean, Greece
Dimitrios Zissis, University of the Aegean, Greece
Sean Kohlbrenner, University of New Hampshire, USA
Christos Kastrisios, University of New Hampshire, USA

10:40 - 11:00 *Upper Hall*
COFFEE BREAK

11:00 - 12:00 *Auditorium I*
PLENARY SESSION - KEYNOTE SPEAKER
Chair: Felix J. Yanovsky, *Delft University of Technology, The Netherlands*
National Aviation University, Ukraine

RodLife - Helicopter dynamic system for digital twin purposes

Mirosław Wendeker, *Lublin University of Technology, Poland*

12:00 - 13:20 *Auditorium I*
Session 4.1 - S2S - Space to Space: Scientific and Technological Challenges for Human and Robotic Space Exploration - PART I
Chairs: Sara Coppola, *CNR-ISASI, Italy*
Ilaria Amelia Caggiano, *Università Suor Orsola Benincasa, Italy*

12:00 **[INVITED] ISAM and Lunar Exploration: Some Current Researches at Politecnico di Torino**
Stefano Mauro, Politecnico di Torino, Italy
Marcello Romano, Politecnico di Torino, Italy

12:20 **Compact Label-Free Microfluidic System for Single Cell Imaging and Diagnosis**
Zhe Wang, University of Naples Federico II, Italy
Marika Valentino, University of Naples Federico II, Italy
Jaromir Behal, University of Naples Federico II, Italy
Massimiliano Villone, University of Naples Federico II, Italy
Silvia Mari, ASI, Italy
Francesca Ferranti, ASI, Italy
Pier Luca Maffettone, University of Naples Federico II, Italy
Lisa Miccio, CNR-ISASI, Italy

12:35 **Thin Polymeric Film Functionalized by AuNPs for High Sensitive Protein Biosensing**
Concetta Di Natale, University of Naples Federico II, Italy
Sara Coppola, CNR-ISASI, Italy
Veronica Vespini, CNR-ISASI, Italy
Volodymyr Tkachenko, CNR-ISASI, Italy
Giuseppe Vitiello, University of Naples Federico II, Italy
Giuseppina Luciani, University of Naples Federico II, Italy
Francesca Ferranti, ASI, Italy
Silvia Mari, ASI, Italy
Simonetta Grilli, National Council of Research, Italy
Pier Luca Maffettone, University of Naples Federico II, Italy
Vincenzo Ferraro, University of Naples Federico II, Italy
Simone Russo, University of Naples Federico II, Italy

12:50 **Holographic Spatiotemporal Inspection Allows Comprehensive Characterization of Functionalized Membrane**
Zhe Wang, University of Naples Federico II, Italy
Anna Palma, CNR-ISASI, Italy
Vincenzo Ferraro, University of Naples Federico II, Italy
Concetta Di Natale, University of Naples Federico II, Italy
Veronica Vespini, CNR-ISASI, Italy
Fabiana Graziano, CNR-ISASI, Italy
Francesca Ferranti, ASI, Italy
Silvia Mari, ASI, Italy
Simonetta Grilli, National Council of Research, Italy
Pier Luca Maffettone, University of Naples Federico II, Italy
Sara Coppola, CNR-ISASI, Italy

13:05 **Au-NPs Functionalized Microneedles as Intelligent Components for Portable Devices**
Sara Coppola, CNR-ISASI, Italy
Anna Palma, CNR-ISASI, Italy
Veronica Vespini, CNR-ISASI, Italy
Concetta Di Natale, University of Naples Federico II, Italy

Simonetta Grilli, National Council of Research, Italy
Pietro Ferraro, CNR-ISASI, Italy

12:00 - 13:20 *Auditorium II*

Session 4.2 - Metrology and Instrumentation for Unmanned Aerial Vehicles

Chair: Konrad Wojtowicz, Military University of Technology, Poland

12:00 **Study of the Torsional Phenomena in the Wing Structure of a Quadplane UAS**
Mihai Cosmin Parparita, Jr, Technical University of Cluj Napoca, Romania
Paul Bere, Technical University of Cluj Napoca, Romania
Jerzy Józwik, Lublin University of Technology, Poland

12:20 **Novel Test-Bench for UAV Inertia Measurement Employing Direct-Drive Motors**
Luca Nanu, Politecnico di Torino, Italy
Piero Gili, Politecnico di Torino, Italy

12:40 **Extended Kalman Filter Based Data Fusion Algorithm Implemented in a Sense and Avoid System for a Mini-UAV Application**
Marco Fiorio, University of Pisa, Italy
Roberto Galatolo, University of Pisa, Italy
Gianpietro Di Rito, University of Pisa, Italy

13:00 **Model-Based Temperature Monitoring of the Internal Combustion Engine of a Lightweight Long-Endurance Fixed-Wing UAV**
Aleksander Suti, University of Pisa, Italy
Gianpietro Di Rito, University of Pisa, Italy
Giuseppe Mattei, Sky Eye Systems srl, Italy

12:00 - 13:20 *Auditorium III*

Session 4.3 - Emerging Trends in Multimodal Sensor Fusion for Enhanced Aerospace Metrology

Chair: Pasquale Longobardi, *EPFL, Switzerland*

12:00 **Thermomechanical Simulation of Laser Powder Bed Fusion for Ti-6Al-4V: A Study on Residual Stress and Impact of Laser Process Parameters Using Volumetric Heat Source**
Helia MohammadKamal, University of Salerno, Italy
Fabrizia Caiazzo, University od Salerno, Italy

12:20 **Model-Based Fusion of GNSS and Multiple-IMUs**
Aman Sharma, EPFL, Switzerland
Jan Skaloud, EPFL, Switzerland
Simon Gilgien, EPFL, Switzerland

12:40 **Above Ground Biomass Estimation in Agroforestry Environment by UAS and RGB Imagery**
Andsera A Mekonen, University of Naples Federico II, Italy
Domenico Accardo, University of Naples Federico II, Italy
Alfredo Renga, University of Naples Federico II, Italy

13:00 **4IPLAY - Improving Intelligent Infrastructure Inspection by Pushing UAS Level of AutonomY in Challenging Environments**
Adriano Mancini, Università Politecnica Delle Marche, Italy
Alessandro Galdelli, Università Politecnica Delle Marche, Italy
Elisa Capello, Politecnico di Torino, Italy
Iris David Du Mutel David Du Mutel de Pierrepont, Politecnico di Torino, Italy
Stefano Primatesta, Politecnico di Torino, Italy
Giancarmine Fasano, University of Naples Federico II, Italy
Roberto Opromolla, University of Naples Federico II, Italy
Flavia Causa, University of Naples Federico II, Italy
Federica Vitiello, University of Naples Federico II, Italy

13:20 - 14:20 *"Włoski Koper" Restaurant*
LUNCH

14:30 - 16:15 *Auditorium I*
Session 5.1 - S2S - Space to Space: Scientific and Technological Challenges for Human and Robotic Space Exploration - PART II
Chairs: Sara Coppola, *CNR-ISASI, Italy*
Ilaria Amelia Caggiano, *Università Suor Orsola Benincasa, Italy*

14:30 **[INVITED] IDRA: A Concept for an Inflatable and Retractable Robotic Arm for ISAM**
Pierpaolo Palmieri, Politecnico di Torino, Italy
Matteo Gaidano, Politecnico di Torino, Italy
Mario Troise, Politecnico di Torino, Italy
Laura Salamina, Politecnico di Torino, Italy
Matteo Melchiorre, Politecnico di Torino, Italy
Stefano Mauro, Politecnico di Torino, Italy

14:50 **EO Data Dissemination, Personal Data Processing and Privacy Compliance**
Luigi Izzo, University of Naples Suor Orsola Benincasa, Italy
Carlo Campanile, Sapienza University of Rome, Italy

15:05 **Health in Space: Integrating Legal, Ethical and Sustainability Assessments**
Ilaria Amelia Caggiano, University of Naples Suor Orsola Benincasa, Italy
Lucilla Gatt, University of Naples Suor Orsola Benincasa, Italy
Anita Mollo, University of Naples Suor Orsola Benincasa, Italy
Luigi Izzo, University of Naples Suor Orsola Benincasa, Italy
Emiliano Troisi, University of Naples Suor Orsola Benincasa, Italy

15:20 **[INVITED] Exploring Brain Activity During Space Missions: Functional Near-Infrared Spectroscopy Insights and Beyond**
Dariusz Zapała, Cortivision Sp., Italy

15:40 **PLATO: Looking for Extrasolar Planets by Measuring the Very Small Decrease in Brightness of a Star When the Planet Passes in Front of It**
Donata Valletti, Thalesaleniaspace, Italy

15:55 **[INVITED] Wireless Power Transmission: A New Frontier for Lunar Colonisation Development**
Stefano Mauro, Politecnico di Torino, Italy
Francesco Lopez, Politecnico di Torino, Italy
Anna Mauro, Politecnico di Torino, Italy
Domenico Sfasciamuro, Politecnico di Torino, Italy
Andrea Villa, Oris SRL, Italy

14:30 - 16:30 *Auditorium II*
Session 5.2 - Special Track CASTAWAYS - Criteria and Technologies for the Development of a "New Space" Ecosystem
Chairs: Claudio Sacchi, *University of Trento, Italy*
Ivan Iudice, *CIRA - Italian Aerospace Research Centre, Italy*

14:30 **A Real/Fast-Time Simulator for Impact Assessment of Spoofing & Jamming Attacks on GNSS Receivers**
Ivan Iudice, CIRA - Italian Aerospace Research Centre, Italy
Domenico Pascarella, CIRA - Italian Aerospace Research Centre, Italy
Gianluca Corraro, CIRA - Italian Aerospace Research Centre, Italy
Giovanni Cuciniello, CIRA - Italian Aerospace Research Centre, Italy

14:50 **Reconfigurable Fading Testbed for the Investigation of COTS Transceivers in OFLs**
Carla Cantore, Politecnico di Bari, Italy
Ilaria Marasco, Politecnico di Bari, Italy
Davide Monopoli, Politecnico di Bari, Italy
Giovanni Magno, Politecnico di Bari, Italy

15:10 **An Advanced MIMO Multicarrier Framework for NTN-Based 5G Broadcast/Multicast Transmissions**
Talha Faizur Rahman, Mississippi State University, USA
Vuk Marojevic, Mississippi State University, USA
Claudio Sacchi, University of Trento, Italy

15:30 **A Survey on Wireless Communication and Power Transfer Systems for Space Applications**
Vittorio U. Castrillo, CIRA - Italian Aerospace Research Centre, Italy
Francesco Fusco, CIRA - Italian Aerospace Research Centre, Italy
Hernan M. Giannetta, SpaceLab SpA, Italy
Marta Albano, Agenzia Spaziale Italiana, Italy
Enrico Cavallini, Agenzia Spaziale Italiana, Italy

15:50 **Teleneurology Applications Based on the Internet of Remote Medical Things**
Antonio Pallotti, Italian Space Agency, Italy
Charles Mwangi, Kenya Space Agency, Kenya
Munzer Jahjah, Italian Space Agency, Italy

16:10 **Graph Neural Network-Based C-RAN Monitoring for Beyond 5G Non-Terrestrial Networks**
Henok Berhanu Tsegaye, University of Trento, Italy
Claudio Sacchi, University of Trento, Italy

14:30 - 16:30 *Auditorium III*

Session 5.3 - Manufacturing and Metrology in the Aerospace Industry - PART II

Chairs: Jerzy Józwik*, Lublin University of Technology, Poland*
Magdalena Zawada-Michałowska*, Lublin University of Technology, Poland*

14:30 **Evaluation of CNC Machine Tool's Noise Level Using a Measuring System**
Daria Sałamacha, Lublin University of Technology, Poland
Jerzy Józwik, Lublin University of Technology, Poland

14:50 **Fire Test of an Equipment for Hydrogen Powered Aircraft**
Tomasz Rogalski, Rzeszow University of Technology, Poland
Jacek Pieniążek, Politechnika Rzeszowska, Poland
Piotr Cieciński, Politechnika Rzeszowska, Poland
Mirosław Szukiewicz, Rzeszow University of Technology, Poland
Marcin Drajewicz, Rzeszow University of Technology, Poland
Elżbieta Chmiel-Szukiewicz, Rzeszow University of Technology, Poland
Robert Smusz, Rzeszow University of Technology, Poland

15:10 **Experimental and Numerical Investigation of Energy Harvester Based on Magnetic Rolling Pendulum**
Marek Borowiec, Lublin University of Technology, Poland
Marcin Bochenski, Lublin University of Technology, Poland
Tomasz Haniszewski, Silesian University of Technology, Poland

15:30 **Identification of Fatigue Wear of Compressor Rotor Blade of a General Electric J85 Turbojet Engine**
Jarosław Pytka, Lublin University of Technology, Poland
Jerzy Józwik, Lublin University of Technology, Poland
Paweł Tomiło, Lublin University of Technology, Poland
Arkadiusz Tofil, University of Applied Sciences in Chełm, Poland
Paweł Pioś, University of Applied Sciences in Chełm, Poland
Dariusz Mika, University of Applied Sciences in Chełm, Poland

15:50 **The Effect of a Large Grounded Mesh Electrode and Two Types of High-Voltage (HV) Electrodes on Boundary Layer Control**
Ernest Gnapowski, Lublin University of Technology, Poland
Sebastian Gnapowski, Lublin University of Technology, Poland
Jarosław Pytka, Lublin University of Technology, Poland
Jerzy Józwik, Lublin University of Technology, Poland
Grzegorz Skorulski, Bialystok University of Technology, Poland

16:10 **Development of Vacuum Multi-Parameter Calibration Device**
Qi Guo, Beijing Satellite Environmental Engineering Research Institute, China

16:30 - 16:50 *Upper Hall*
COFFEE BREAK

16:50 - 17:40	*Auditorium I* **TUTORIAL SESSION #1** **Chair**: Kamil Anasiewicz, *Lublin University of Technology, Poland*

Passive Radar Observation of Space Objects using LOFAR Radio Telescopes

Konrad Jędrzejewski, *Warsaw University of Technology, Poland*

16:50 - 17:40	*Auditorium II* **TUTORIAL SESSION #2** **Chair**: Piotr Samczyński, Warsaw University of Technology, Poland

Personal flying will be available to everyone in less than two decades

Jiří Zachardala, *UDX Research SRO*

20:00	*"Za Kulisami" Retaurant* **GALA DINNER**

Technical Program - Wednesday, June 5

09:00 - 14:00 *Lublin University of Technology - Faculty of Mechanical Engineering*
REGISTRATIONS

09:30 - 10:30 *Auditorium I*
Session 6.1 - S2S - Space to Space: Scientific and Technological Challenges for Human and Robotic Space Exploration - PART III
Chairs: Sara Coppola, *CNR-ISASI, Italy*
Ilaria Amelia Caggiano, *Università Suor Orsola Benincasa, Italy*

09:30 **Sowing Scheduling of Two Crop Types via Predictive Control in Adaptive Vertical Farms for Space**
Patrizia Bagnerini, University of Genoa, Italy
Mauro Gaggero, National Research Council, Italy
Marco Ghio, Space V, Italy
Franco Malerba, Space V, Italy

09:45 **Thermal Simulations for the Laser Retro-Reflector Onboard Galileo 2nd Generation**
Igor Di Varano, INAF-IAPS Roma, Italy
Mattia Tibuzzi, Istituto Nazionale di Fisica Nucleare, Italy
Lorenzo Salvatori, Istituto Nazionale di Fisica Nucleare, Italy
Simone Dell'Agnello, Istituto Nazionale di Fisica Nucleare, Italy

10:00 **A Framework for Testing Differential Throttling in Linear Aerospike Nozzle**
Gaetano Maria Di Cicca, Politecnico di Torino, Italy
Roberto Marsilio, Politecnico di Torino, Italy
Emanuele Resta, Politecnico di Torino, Italy
Jehangir Hassan, Politecnico di Torino, Italy
Michele Ferlauto, Politecnico di Torino, Italy

10:15 **MISS: Multifunctional Smart Skin for Environmental Monitoring: Light and Flexible Structure Capable of Combining With a High Level of Integration Different Environmental Monitoring Parameters**
Donata Valletti, Thalesaleniaspace, Italy

09:30 - 11:10 *Auditorium II*
Session 6.2 - Aerodynamic Measurement and Control of Unmanned Aerial Vehicles
Chairs: Mirosław Wendeker, *Lublin University of Technology, Poland*
Zbigniew Czyż, *Polish Air Force University, Poland*
Paweł Karpiński, *University of Life Sciences in Lublin, Poland*

09:30 **Ground Testing of an Electric Wheeled Propulsion System for a Light Aircraft**
Jarosław Pytka, Lublin University of Technology, Poland
Łukasz Puzio, University College of Applied Sciences, Poland
Adrian Nafalski, University College of Applied Sciences, Poland

09:46 **Performance Analysis of the Unmanned Aerial Vehicle Based on the Flight Test**
Paweł Karpiński, University of Life Sciences in Lublin, Poland
Zbigniew Czyż, Polish Air Force University, Poland
Krzysztof Skiba, Lublin University of Technology, Poland
Stanisław Parafiniuk, University of Life Sciences in Lublin, Poland

10:03 **Preliminary Measurements for the Identification the Influence of the Test Object Support on the Aerodynamic Characteristics**
Zbigniew Czyż, Polish Air Force University, Poland
Paweł Karpiński, University of Life Sciences in Lublin, Poland
Pawel Ruchala, Lukasiewicz Research Network - Institute of Aviation, Poland
Tomasz Zahorski, Polish Air Force University, Poland

10:20 **Research on Toroidal Propeller Driven by Air Ion Mechanics**
Rafał Kliza, Lublin University of Technology, Poland
Mirosław Wendeker, Lublin University of Technology, Poland

10:36 **Aerodynamic Measurement of PROPWING Electric Drive System for UAVs in a Wind Tunnel**
Jan Pytka, Lublin University of Technology, Poland
Jarosław Pytka, Lublin University of Technology, Poland
Zbigniew Czyż, Polish Air Force University, Poland

10:53 **Assessment of Measurement Uncertainty of Additively Manufactured Multi-Hole Probes**
Pawel Ruchala, Lukasiewicz Research Network - Institute of Aviation, Poland
Kamil Zawadzki, Łukasiewicz Research Network - Institute of Aviation, Poland

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09:30 - 11:10 *Auditorium III*
Session 6.3 - General Session - PART II
Chair: Sylwester Samborski, *Lublin University of Technology, Poland*

09:30 **Feasibility Design of DIANA, a Dust Analyzer Developed for the Tianwen-2 Mission**
Diego Scaccabarozzi, Politecnico di Milano, Italy
Chiara Martina, Politecnico di Milano, Italy
Bortolino Saggin, Politecnico di Milano, Italy
Elimar Vieira Vaz Junior, Politecnico di Milano, Italy
Ernesto Palomba, INAF-IAPS, Italy
Andrea Longobardo, INAF-IAPS, Italy
Chiara Gisellu, INAF-IAPS, Sapienza University of Rome, Italy
Fabrizio Dirri, INAF-IAPS, Italy
Emiliano Zampetti, National Research Council, Italy
Maria Pedone, Italian Space Agency, Italy
Raffaele Pepe, Italian Space Agency, Italy
Angelo Olivieri, Italian Space Agency, Italy

09:50 **Feasibility Design of LD GRIDS, a Dust Analyzer for the Moon**
Diego Scaccabarozzi, Politecnico di Milano, Italy
Abdelrahman Mohamed Ragab M. Ahmed, Politecnico di Milano, Italy
Bortolino Saggin, Politecnico di Milano, Italy
Francesca Esposito, INAF-OAC, Italy

Carmen Porto, INAF-OAC, Italy
Giuseppe Mongelluzzo, INAF-OAC, Italy
Gabriele Franzese, INAF-OAC, Italy
Simone Silvestro, INAF-OAC, Italy
Immacolata Donnarumma, Italian Space Agency, Italy
Alessandro Turchi, Italian Space Agency, Italy
Ugo Cortesi, IFAC-CNR, Italy
Fabio D'Amico, INAF, Italy
Marco Gai, IFAC-CNR, Italy
Andrea Argan, INAF, Italy

10:10 **Feasibility Design of MiLi, a Miniaturized Lidar for Mars Observation**
Diego Scaccabarozzi, Politecnico di Milano, Italy
Kirill Potemkin, Politecnico di Milano, Italy
Bortolino Saggin, Politecnico di Milano, Italy
Elimar Vieira, Politecnico di Milano, Italy
Marco Giovanni Corti, Politecnico di Milano, Italy
Chiara Martina, Politecnico di Milano, Italy
Andrea Appiani, Politecnico di Milano, Italy
Alberto Martin-Ortega, INTA, Spain
Ignacio Arruego, INTA, Spain
Juan Jose Jimenez Martin, INTA, Spain
Luis Miguel Gonzalez Fernandez, INTA, Spain
Miguel Sanz Palomino, INTA, Spain
Daniel Garranzo Garcia-Ibarrola, INTA, Spain
Andrea Garcia Moreno, INTA, Spain
Marianela Fernandez Rodriguez, INTA, Spain
Nacho Muñoz Rebate, INTA, Spain
Andy Braukhane, DLR German Aerospace Center, Germany
Dominik Quantius, DLR German Aerospace Center, Germany

10:30 **Sustainable Space Agriculture: Biodegradable Sensors Redefining Greenhouse Monitoring Beyond Earth**
Elena Palmieri, CNR-IMM, Italy
Francesco Maita, CNR-IMM, Italy
Ivano Lucarini, CNR-IMM, Italy
Jose Ignacio Del Rio De Vicente, CNR-IMM, Italy
Antonio Minotti, CNR-IMM, Italy
Luca Maiolo, CNR-IMM, Italy

10:50 **A Precise Positioning Methodology for Autonomous Navigation of a Tethered UAV for Photogrammetry**
Alberto Jiménez Hormeño, Universidad Carlos III de Madrid, Spain
David Martin Gomez, Universidad Carlos III de Madrid, Spain
Arturo de la Escalera, Universidad Carlos III de Madrid, Spain
José María Armingol, Universidad Carlos III de Madrid, Spain

11:10 - 11:30 *Upper Hall*
COFFEE BREAK

11:30 - 12:30	*Auditorium I* **PLENARY SESSION - KEYNOTE SPEAKER** **Chair**: Jarosław Pytka, *Lublin University of Technology, Poland*

Artificial Neural Networks for Signal Analysis of Electrical Time Domain Reflectometry Based Sensors

Philip Johannes Steinbild, *Dresden University of Technology, Germany*

12:30 - 13:20	*Auditorium I* **TUTORIAL SESSION #2** **Chair**: Zbigniew Czyż, *Lublin University of Technology, Poland*

Wind power - Custom wind tunnel and gyrocopter presentation

Paweł Magryta, Konrad Pietrykowski, *Lublin University of Technology, Poland*

13:20 - 14:30	*"Włoski Koper" Restaurant* **LUNCH**

14:30 - 15:00	*Lower Hall* **POSTER SESSION** **Chair**: Magdalena Zawada - Michałowska, Lublin University of Technology

PS01 **Design of Wireless Optical System for Data Transmission Inside the Aircraft Cabin**
Fabio Leccese, Roma Tre University, Italy
Giuseppe Schirripa Spagnolo, Roma Tre University, Italy

PS02 **A New Approach to Reliability Evaluation and Fault Diagnosis of UAV as a Complex System**
Enrico Petritoli, Roma Tre University, Italy
Fabio Leccese, Roma Tre University, Italy

PS03 **Aircraft Detection Approach Based on YOLOv9 for High-Resolution Remote Sensing**
Ivan Saetchnikov, Belarusian State University, Belarus
Victor Skakun, Belarusian State University, Belarus
Elina Tcherniavskaia, Belarusian State University, Belarus

PS04 **A Method of Solving Doppler Navigation Parameters Using Only Unidirectional Dual Beams**
Tao Yu, China Academy of Managemen Science, China

PS05 **CO2 Conversion Into Methane Over Ru/CeO2 Catalysts Prepared From Different Metal Ion Precursors**
Umberto Pasqual Laverdura, ENEA, Italy
Rosa Chierchia, ENEA, Italy

Seyed Sepehr Moeini, Roma Tre University, Italy
Claudia Romano, Roma Tre University, Italy
Fabio Leccese, Roma Tre University, Italy
Simonetta Tuti, Roma Tre University, Italy

PS06 **3D LiDAR Sensor Characterization for Obstacle Detection in Autonomous UAS Applications**
Aniello Menichino, CIRA Italian Aerospace Research Center, Italy
Antonio Serpico, University of Campania L. Vanvitelli, Italy
Vittorio Di Vito, CIRA Italian Aerospace Research Center, Italy
Gennaro Ariante, University of Naples Parthenope, Italy
Salvatore Ponte, University of Campania L. Vanvitelli, Italy
Giuseppe Del Core, University of Naples Parthenope, Italy

PS07 **Analysis of Selected Physical Phenomena Accompanying the Cutting Process With a High-Pressure Abrasive Waterjet and Their Influence on Geometric Structure of the Surface**
Michał Leleń, Lublin University of Technology, Poland
Jerzy Józwik, Lublin University of Technology, Poland
Grzegorz Skorulski, Bialystok University of Technology, Poland

PS08 **Reproducibility of Properties of the Zirconia-Based Composites**
Edvin Hevorkian, University of Life Sciences in Lublin, Poland
Jerzy Józwik, Lublin University of Technology, Poland
Vasyl Kolodnitskyi, National Academy of Sciences of Ukraine, Poland
Miroslaw Rucki, Kazimierz Pulaski University of Technology and Humanities in Radom, Poland
Oksana Morozova, Ukrainian State University of Railway Transport, Poland
Krzysztof Dziedzic, Lublin University of Technology, Poland

PS09 **Assessing COTS Sensor Suitability for CubeSat Missions in Near-Space Environments**
Karen Vidaurre Torrez, Universidad Catolica Boliviana, CIDIMEC, Bolivia
Franklin Ticona Coaquira, Beihang University, China
Miguel Silva Plata, Universidad Catolica Boliviana, CIDIMEC, Bolivia
Abigail Lopez Tarqui, Universidad Catolica Boliviana, CIDIMEC, Bolivia
Guillermo Auza Banegas, Universidad Catolica Boliviana, CIDIMEC, Bolivia
Jazmin Jimenez Huanca, Universidad Catolica Boliviana, CIDIMEC, Bolivia
Nayara Lara Ramos, Universidad Catolica Boliviana, CIDIMEC, Bolivia
Fabio Diaz Palacios, Universidad Catolica Boliviana, CIDIMEC, Bolivia

PS10 **Enhancing TCVCXO Stability Using the 1 PPS Signal From the GPS**
Piotr Warda, Lublin University of Technology, Poland
Ryszard Szplet, Military University of Technology, Poland
Dominik Sondej, Military University of Technology, Poland
Pawel Kwiatkowski, Military University of Technology, Poland

PS11 **Simulation of Experimental Tests in Electronic Devices**
Roberto Paggi, ItalConsul, Italy
Gian Luca Mariotti, ItalConsul, Italy
Anna Paggi, ItalConsul, Italy
Fabio Leccese, Roma Tre University, Italy

15:00 - 16:00 *Auditorium I*

Session 7.1 - Optical and Innovative Sensors for Aerospace

Chair: Alessandro Aimasso, *Politecnico di Torino, Italy*

15:00 **Smart Composites Manufacturing and Testing by Insertion of Fiber Bragg Gratings Sensors**

Alessandro Aimasso, Politecnico di Torino, Italy
Andrea Facci, Politecnico di Torino, Italy
Matteo Bertone, Politecnico di Torino, Italy
Matteo Davide Lorenzo Dalla Vedova, Politecnico di Torino, Italy

15:20 **A Wavelet-Based Method for Defect Detection in Aircraft Components by Using Ultrasonic Technology**

Cosimo Patruno, STIIMA-CNR, Italy
Adriano Liso, STIIMA-CNR, Italy
Vito Renò, STIIMA-CNR, Italy
Veronica Vespini, CNR-ISASI, Italy
Sara Coppola, CNR-ISASI, Italy
Pietro Ferraro, CNR-ISASI, Italy
Nicola Gallo, Leonardo S.p.A., Italy
Giuseppe Del Prete, Leonardo S.p.A., Italy
Valerio Dentico, Leonardo S.p.A., Italy
Davide Chirico, Leonardo S.p.A., Italy
Ettore Stella, STIIMA-CNR, Italy

15:40 **Augmented Reality Visualization of Fiber Bragg Grating Sensor Data for Aerospace Application**

Antonio C Marceddu, Politecnico di Torino, Italy
Alessandro Aimasso, Politecnico di Torino, Italy
Matteo Bertone, Politecnico di Torino, Italy
Luca Viscanti, Politecnico di Torino, Italy
Bartolomeo Montrucchio, Politecnico di Torino, Italy
Paolo Maggiore, Politecnico di Torino, Italy
Matteo Davide Lorenzo Dalla Vedova, Politecnico di Torino, Italy

15:00 - 16:20 *Auditorium II*

Session 7.2 - Manufacturing and Metrology in the Aerospace Industry - PART III

Chairs: Jerzy Józwik*, Lublin University of Technology, Poland*
Magdalena Zawada-Michałowska*, Lublin University of Technology, Poland*

15:00 **Geometric Structure of the Surface of Impulse Shot-Peened Titanium Alloy Ti6Al4V**

Agnieszka Skoczylas, Lublin University of Technology, Poland
Jakub Matuszak, Lublin University of Technology, Poland
Krzysztof Ciecieląg, Lublin University of Technology, Poland
Kazimierz Zaleski, Lublin University of Technology, Poland

15:20 **Measurement of Cutting Forces in Conventional and Climb Milling by Recurrence Analysis**
Krzysztof Ciecieląg, Lublin University of Technology, Poland
Agnieszka Skoczylas, Lublin University of Technology, Poland
Jakub Matuszak, Lublin University of Technology, Poland

15:40 **Evaluation of the Dimensional Accuracy of a Milled Thin-Walled Part as Measured With a CNC Machine Tool Inspection Probe and a Coordinate Measuring Machine**
Magdalena Zawada-Michałowska, Lublin University of Technology, Poland
Paweł Pieśko, Lublin University of Technology, Poland

16:00 **Influence of Weather Conditions and Thermal Shocks on the Surface Properties of Epoxy Composites With TiO2**
Ewelina Kosicka, Lublin University of Technology, Poland
Robert Szczepaniak, Military University of Aviation, Poland

15:00 - 16:00 *Auditorium III*
Session 7.3 - General Session - PART III
Chair: Konrad Jędrzejewski, *Warsaw University of Technology, Poland*

15:00 **Data-Driven Identification for Model Predictive Control of a Ground Robot**
Fabio Faliero, Politecnico di Torino, Italy
Enza Incoronata Trombetta, Politecnico di Torino, Italy
Elisa Capello, Politecnico di Torino, Italy

15:20 **Preliminary Design Optimization Tool for Lighter-Than-Air Platform With Different On-Board Power Systems**
Luca de Pasquale, Politecnico di Torino, Italy
Piero Gili, Politecnico di Torino, Italy

15:40 **Optimizing Energy Consumption of the UAV Swarm Performing Coverage Task With Stochastic Sweep Coverage Control Algorithm**
Michał Duda, Military University of Technology in Warsaw, Poland
Krzysztof Falkowski, Military University of Technology, Poland

16:20 - 16:40 *Upper Hall*
COFFEE BREAK

16:40 - 17:00 *Auditorium I*
CLOSING AND AWARD CEREMONY