2022 IEEE INTERNATIONAL WORKSHOP ON

Metrology for AeroSpace

PISA, ITALY / JUNE 27-29, 2022

WORKSHOP PROGRAM

For further information, visit the website
www.metroaerospace.org

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Welcome Message from the General Chairs

On behalf of the Organizing Committee, we welcome you to the 2022 IEEE International Workshop on Metrology for AeroSpace (MetroAeroSpace).

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.

Due to the COVID-19 outbreak, the 2020 MetroAeroSpace 7th edition was not held in Pisa and there was an effort by the Organizing Committee to prepare a virtual conference. This year, this 9th edition moves back to Pisa in presence, and it is organized at "Centro Congressi Le Benedettine" with the patronage of the University of Pisa. Thus, we are really glad to welcome you to the historic and beautiful Pisa.

Pisa's roots go back deeply to the past. Etruscans as well as ancient Romans were there and they left their archaeological remains. Pisa was a famous Sea Republic in the medieval age. It was the city of the mathematician Leonardo Fibonacci and, later, of Galileo Galilei who founded the experimental method. A citation attributed to Galileo reports: "*Measure what is measurable, and make measurable what is not so*". We believe you can join the spirit of this citation and move towards the new challenges and development of the Metrology for AeroSpace. We think all this makes Pisa the ideal venue for the 2022 edition of MetroAeroSpace and we hope that our attendees will enjoy the conference, the city and its surroundings!

This 9th 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 goes 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, 24 oral sessions scheduled over three days, 2 poster sessions, five tutorials and two parallel events. Among the oral

sessions, we received the proposal of up to 22 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 149 extended abstracts from all over the world. Due to the time limits of the workshop, only 120 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 Remote Sensing* MDPI, and *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.

- Franco Malerba, the first Italian astronaut, Italy, will present: *Return to the Moon: Old and New Challenges*.
- Alessandro Giazotto, Silk Sports Car, Econscience-H2, Ex-Airbus, Italy, will present: *Measuring everything we do, and… focussing on what matters most*
- Larry Fineberg, Embry-Riddle Aeronautical University, Florida, USA, will present: *Small spacecraft requirement verification methods and the metrology needed to support them*

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 and University of Sannio, June 27th, 2022, with a very rich program articulated on the full day.
- The panel *Sharing ideas with experienced and early-stage researchers*, organized by the Women in Engineering (WIE) IEEE Italy Section Affinity Group, June 28th, 2022.
- Five tutorials offering the subjects:
  - *Technologies for "New Space" Systems*, Claudio Sacchi, University of Trento, Italy;
  - *Experimental implementation and study of the lightning swept-stroke along an aircraft*, Vincent Andraud, The French Aerospace Lab Onera, France;
  - *Investigation of Muzzle Flow Using Background Oriented Schlieren and Particle Image Velocimetry Techniques*, Abdelhafidh Moumen, Royal Military Academy, Belgium;
  - *Computerized tomography for industrial application*, Riccardo Girelli, Labormetdue, Italy;
  - *From Needs to Solutions: Hydrogen in the Aerospace Sector*, but not only, Michele Ferrazzini and Sanjiv Sharma, Econscience-H2.

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", and the "Best Paper of the Special Session on Metrology for Radar Systems".

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 Pisa, Italy, and to the 9th International Workshop on Metrology for AeroSpace, 2022. We hope that you enjoy both your participation in the conference and your stay in beautiful Pisa.

Pasquale Daponte, University of Sannio, Italy
Bernardo Tellini, University of Pisa, Italy
Robert Rassa, Raytheon, US

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IEEE MetroAeroSpace 2022 Plenary Speakers

Plenary - Monday, June 27, 2022 - H 10:15

Return to the Moon:
Old and New Challenges

Franco Malerba

ABSTRACT

The most exciting space event planned this year is in my opinion the launch of the combination SLS-Orion for the return of Humans to the Moon. This launch will give concreteness to the expectations of a Lunar Economy and credibility to the dream of a human journey to Mars in a distant, but not imaginary, horizon.

Moving beyond the Space Station and building habitable settlements on the Moon will confront us to the most difficult challenges of living in space, we will have to take on new risks and develop new technologies. In this talk I would gladly touch upon some of the human challenges in deep space, some hypotheses and scenarios that intersect with my past and present experiences: the challenge of food autonomy in space, the challenge of weightlessness protection. The latter one is linked somehow to my Shuttle mission in the space July 1992, whose 30th anniversary occurs this year, the first ASI astronaut mission, which I recall with pride and emotions.

SPEAKER BIO

Franco Malerba is the first Italian astronaut.

He was the scientific astronaut on the first mission of the Tethered satellite aboard the space shuttle Atlantis (1992). Graduated in Electronic Engineering and Physics at the University of Genoa (Italy), he has a long international experience gained working with international research Institutions (CNR, ESA, NASA, ASI) and with important hi-tech industries (Digital Equipment, Alenia Spazio). He was an elected Member of the European Parliament (94-99) engaged in policies for science and technological innovation and later was the Scientific Attaché at the Italian Diplomatic Representation in Paris (05-13) working with the OECD, ESA, and IEA-NEA.

In 2001 received the honors of Commendatore della Repubblica Italiana.

Presently:

Member of the Order of the Italian journalists since 2001, free-lance columnist of scientific topics for the GEDI newspapers (La Stampa, Il Secolo XIX);

Lecturer at the University of Genoa and at the University of Leicester (UK);

Recital voice of the theatrical spectacle musical Journey in Space;

Organizer and architect of the Busalla Space Festival since 2017;

Founding partner of two spin-off of the University of Genoa – DBSpace and SpaceV - both enterprises are innovative startups in the space sector.

Plenary - Tuesday, June 28, 2022 - H 09:00

Measuring everything we do, and… focussing on what matters most

Alessandro Giazotto
SILK SPORTS CAR, ECONSCIENCE-H2, EX-AIRBUS

ABSTRACT

Safety and Quality are non-negotiable objectives in our industry.
This talk will explore how Airbus is benefitting from the EN9145 standard - Advanced Product Quality Planning - to ensure the above objectives are met, as well as Customer Satisfaction, while minimising the Cost of Non-Quality.

SPEAKER BIO

Alessandro Giazotto is an executive with 20+ years multi-domain experience in Hi-Tech sectors (Automotive, Energy, Hydrogen, Aviation, Aerospace & Defence, Physics) covering the overall product lifecycle. He has recently joined the leadership-team of Silk Sports Car Company Srl, and is the co-founder of EconScience-H2, an International Think Tank, with the aim to build the Strategic Landscape / Ecosystem for the enablement of a Hydrogen based Net Zero World.
With a background in Aerospace Engineering gained at Pisa University, and in Leadership, Strategy & Management gained at Lancaster University Management School (UK) he started his career working in the Virgo Project performing design optimisation.
He then joined Airbus covering leadership roles in multiple domains (Research & Technology, Engineering, Operations, Plant, Programme, Customer Services, Quality and Procurement), within the Commercial business and the Aerospace and Defence division. In his last appointment he was responsible for Quality for the Wing Aerostructures' Supply Chain for all Civil and Large Military aircrafts.

Small spacecraft requirement verification methods and the metrology needed to support them

Larry Fineberg
EMBRY-RIDDLE AERONAUTICAL UNIVERSITY

ABSTRACT

Spacecraft programs are an evolutionary process that typically begin with a mission purpose; a broad statement of a goal that is intended to be accomplished. Once funding is secured, a set of "Level 0" or baseline program requirements are developed, which then drive a set of breadth and depth requirements. Requirements are verified through are range of methods, typically arranged into these categories: Measurement, Test, Analysis, and/or Demonstration. A design cycle is initiated to transition from concept to implementation. Requirement verification during the design cycle consists of a series of analyses which evolve into models. Exit criteria at the Critical Design Review (CDR) is typically 90% of the build drawings are complete and the program can proceed to manufacturing. Testing is performed during and after manufacturing to "buy-down" risk and ensure the design has been implemented satisfactorily.

At every step in the process, requirement verifications ensure that successful implementation (and intent) of the design. Teams of discipline engineers, often led by systems engineers, develop requirements to implement the system-level and subsystem level designs. Requirements are established across every discipline, which include mechanical, electrical, guidance & control, dynamic & static environments, thermal, radiation, and so on.

As the design evolves from concept to manufacturing, the requirement verification effort shifts focus from analyses to physical testing. In a step-wise fashion, analyses and software models are anchored through measurement and test.

At this phase, the tools used to for requirement verification must be accurate in the range of conditions under which the tests and measurements performed. Robust and mature metrology programs ensure that test results are an accurate representation of the measurements and data that is being generated. Tools, instruments, and test stands all have to be calibrated to an applicable standard for the condition that the hardware is operated under.

Small spacecraft, such as nanosatellites or CubeSats, present a variety of challenges with respect to requirement implementation/verifications and associated metrology. These spacecraft are often built at the university (or even high school) level and as such students do not have access to the same resources as a large corporation or a government entity. Challenges include lack of "corporate knowledge", student learning curves, low budget, and limited manufacturing resources. Likewise, equipment metrology is not consistent within and across the university system. All of these items pose some level of risk to the success of a small spacecraft mission and will be discussed during this lecture.

SPEAKER BIO

Larry Fineberg has worked in the aerospace industry for over 35 years, primarily at the Kennedy Space Center (KSC). During his 20-year tenure at Boeing, he served on a team of engineering center representatives for the design, development, qualification, manufacturing, processing, and post-flight data analysis of the space shuttle

orbiter main propulsion system. In 2004, Mr. Fineberg transitioned to a NASA civil servant position in the Launch Services Program (LSP) and served in an oversight role for the Atlas V and Delta II launch complex mechanical systems. A few years later, and until retirement, he served as an LSP Senior Integration Engineer for expendable launch vehicle missions, such as: InSight Mars Lander, Magnetospheric Multiscale (MMS) Mission, NuSTAR, and the CubeSat Launch Initiative (CSLI). Mr. Fineberg is also part-time Adjunct Professor teaching aerospace design capstone classes (University of Florida-2019 and Embry Riddle University -Current). In addition, he currently serves as an independent consultant in a variety of technical areas, including CubeSat design, construction, and operation.

IEEE MetroAeroSpace 2022 Tutorials

Monday, June 27, 2022 - H 16:00

Computerized tomography for industrial application

Riccardo Girelli
LABORMETDUE

ABSTRACT
Industrial computed x-ray tomography has a key role in scientific research and technological development. This technique is employed for different characterization and measurement techniques in various fields, such as metallography, optical and electronic microscopy, image analysis, physical and mechanical tests, environmental simulation, and chemical analysis. Therefore, it has relevance for research, production, and quality control purposes. Labormet Due Srl performs metrological x-ray based tests using instruments operating at 300 kV and 450 kV, and case studies concerning heat exchanger design and manufacturing, joint brazing analysis, fiber-reinforced polymer modeling, and complex metal-based structures analysis are presented throughout the tutorial.

SPEAKER BIO
Riccardo Girelli worked for Labormet in Torino as a commercial technician since 1992. The company was a distributor of Leica, Presi (a metallographic preparation French company), and Polaroid. With the dedication of colleagues and the executive, they took on many mandates for the sale of quality control instrumentation, increasing the portfolio of proposals, and extending our business opportunities abroad. Therefore, companies based in the Piedmont region began to involve us in the development of complete laboratories in new plants under construction worldwide. After Labormet's ownership withdrew in 2012, Girelli founded Labormet due and, together with a partner, they further expanded their representatives and collaborators. In 2013, they took over the mandate of G.E. concerning industrial tomography, and they realized that the opportunity is not in the sale of these instruments, but in the possibility to provide the service. Today, 3 metrologists work in their Metrologic laboratory with 2 instruments operating at 300 and 450 kV. These are certified ISO 9001 and EN 9100, and they are suppliers of most of the big Automotive and Aerospace industrial groups in Italy and abroad.

Monday, June 27, 2022 - H 16:00

Technologies for "New Space" Systems

Claudio Sacchi
UNIVERSITY OF TRENTO, ITALY
IEEE AESS "GLUE TECHNOLOGIES FOR SPACE SYSTEMS PANEL" CHAIR

ABSTRACT

In the recent years, the emerging concept of "New Space" is changing the vision of Space as an ecosystem where connectivity is an enabling "glue" technology servicing a lot of new applications. What shall we see in the "New Space"? We shall see, for sure, more software rather than hardware, more "network intelligence" rather than pure repetition of signals, tighter integration among terrestrial and Space segments (navigation, broadcasting, communications, IoT, etc.). Space communications will exploit advanced concepts of "quantum engineering". Moreover, the "New Space" should be also sustainable. How can we guarantee the "Space Sustainability"? This tutorial will try to answer to these questions, presenting an overview of the most innovative enabling technologies for "New Space" systems that will characterize the evolution of Space in the next decades.

SPEAKER BIO

Claudio Sacchi received the "Laurea" degree in Electronic Engineering and the Ph.D. in Space Science and Engineering from the University of Genoa, Italy, in 1992 and 2003, respectively. From 1996 to 2002, he was a Research Cooperator with the Department of Biophysical and Electronic Engineering (DIBE), University of Genoa, and with the National Italian Consortium in Telecommunications (CNIT), managing project activities in the field of multimedia surveillance systems and satellite communications. Since August 2002, he has joined the Department of Information Engineering and Computer Science (DISI), University of Trento, Italy, covering the role of an Assistant Professor. He is also with the Research Unit at the University of Trento, CNIT. He upgraded to the position of an Associate Professor in December 2020. He has authored and coauthored more than 110 papers published in international journals and conferences. His research interests are mainly focused on wideband mobile and satellite transmission systems based on space, time and frequency diversity, MIMO systems, array processing; multi-rate and multi-access wireless communications; EHF broadband aerospace communications; software radio and cognitive radio; and radio communications for emergency recovery applications. In 2011, he was a Guest Editor of the special issue of PROCEEDINGS OF THE IEEE: Aerospace Communications: History, Trends and Future and the featured-topic special issue of IEEE Communications Magazine: Toward the Space 2.0 Era in 2015. Since 2019, he has been coordinating and chairing the IEEE AESS technical panel: "Glue Technologies for Space Systems" that was awarded by AESS as "Outstanding Panel of the Year" in 2020 and 2021. He is a member of the IEEE ComSoc, IEEE BTS, IEEE VT, and IEEE AESS Society.

Investigation of Muzzle Flow Using Background Oriented Schlieren and Particle Image Velocimetry Techniques

Abdelhafidh Moumen
ROYAL MILITARY ACADEMY, BELGIUM

ABSTRACT

About 70% of the chemical energy developed by a conventional weapon system (propellant-gun) is not converted into kinetic energy of the projectile but is contained in a combustion gas-particle mixture which is rapidly discharged from the muzzle of the gun in a few milliseconds after the projectile ejection. These muzzle flow fields exhibit the structure of a supersonic highly underexpanded jet encapsulated by an outer blast wave. Due to the harsh environment, the extremely short duration, and the explosive evolution of the intermediate ballistics phase, this flow characterization has been heretofore limited to local and intrusive measurement techniques. Consequently, the quantitative experimental data are limited, so are the number of numerical codes validated in this field. In this context, the present study investigates the application of the Background Oriented Schlieren (BOS) and the Particle Image Velocimetry (PIV) techniques as quantitative investigation tools in the intermediate ballistics field.

In BOS, the salient features of the muzzle flow such as vortex rings, shock bottles, Mach disk, and blast wave are accurately captured and described both qualitatively and in terms of density. Three improved approaches that are essential to the analysis are proposed and they are related to (i) density field reconstruction based on Abel inversion, (ii) phase separation procedure, and (iii) a-posteriori uncertainty quantification. In PIV, we demonstrate the suitability of this technique to provide accurate velocity measurements in the challenging environment of the propellant flow. This was achieved using: (i) the naturally existing particles in the combustion gas as tracers, (ii) two different solid tracers; namely, TiO_2 and ZrO_2 particles with a nominal size of 100 nm, seeded in the gas using two different methods.

SPEAKER BIO

Mr. **Abdelhafidh Moumen** is a military officer, he is a specialist in energetic materials, ammunition, IEDs, and weapon systems. He holds a master's degree in engineering sciences in weapon systems and ballistics from the Polytechnic Faculty of the Royal Military Academy of Belgium (RMA) since 2011. With his professional experience of more than eight years in the fields of weapon system inspection, restoration, modernization, and explosive ordnance disposal as an active-duty officer, along with his engineering background, he has joined the Department of Weapon Systems and Ballistics at RMA as a researcher since 2018. Mr. Moumen's research interests are primarily focused on the analysis and quantitative visualization of the muzzle flow field. He is the author and co-author of multiple papers published in international journals and conferences. He is a member of the International Ballistics Society and a recipient of the "Rosalind and Pei Chi Chou Award" (2019).

From Needs to Solutions: Hydrogen in the Aerospace Sector, but not only

Michele Ferrazzini
ECONSCIENCE-H2

Sanjiv Sharma
ECONSCIENCE-H2

ABSTRACT

In recent years, the need to solve the climate crisis has emerged as an utmost priority. If we don't want to handover a significantly degraded biosphere to our children, we have to change fast and stop our reliance of fossil fuels, the primary sources of Green House Gases (GHG). Countries have to secure global Net Zero GHG emissions by mid-century, and keep global warming to maximum 1.5°C degrees to pre-industrial era.

Renewable energy and renewable fuels are the key elements to enable this change, but it is not easy to make them available to everybody and with the required capacity: renewable energy can be produced only when the sources (like Wind, Solar radiation, Tidal, and Wave) are available, and so it needs to be stored.

We wonder if Hydrogen could be the answer, or at least part of the answer, and we think it can.

This tutorial will try to answer some of the many questions related to making hydrogen the solution for our needs and for our biosphere, in order to reach the Net Zero era. How to produce, transport, store and use hydrogen? What should we measure, or learn to measure, to enable hydrogen-based solutions? Further, we explore how systems thinking through data analyses, modelling and simulation, forms a significant aspect in helping us to find feasible solutions to these questions.

SPEAKERS BIO

Michele Ferrazzini CEO of ESE Engineering Services for Energy, Co-Founder of EconScienceH2, received the MSc in Electric Engineering ("ingegneria elettrotecnica") from the Politecnico of Milan, in 1992. From 1992 until today, he worked in the power generation industry in some of the largest companies in this field, from Ansaldo Energia to ABB, from Alstom (now GE) to Sadelmi. He worked on energy projects in four continents, ranging from fossil to renewable energies, from hydro to coal, from gas to biomass, from photovoltaic to wastes, from geothermal to pumping storage. In the latest 13 years, he joined ESE, a consultancy and engineering company devoted to the power generation and storage, starting as Technical Manager and becoming Partner in 2013 and

Managing Director in 2015. As ESE's director he helped the company to enter in the next era of innovative storage and renewable generation: i.e.: floating photovoltaic, new kind of biomass gasification, molten salts storage, hybrid plants combining fossil and renewable fuels, solutions for hydrogen production, storage and utilization.

At the beginning of 2021, together with Mr. Alessandro Giazotto (a Keynote Speaker in this IEEE workshop), he founded EconScience-H2, an international Think Tank, with the aim to build the Strategic Landscape/Ecosystem for the enablement of a Hydrogen based Net Zero World.

Dr **Sanjiv Sharma** is an Honorary Industrial Fellowship at the University of Bristol. Sanjiv retired from Airbus in 2019. At Airbus his role was as Technical Expert for Modelling & Simulation and has been leading research and application of Engineering Mathematics and Uncertainty Quantification & Management (UQ&M) in aircraft design. He also worked on the analyses of Landing Gear Systems through modelling and simulation, Product Integrity and Research & Technology Projects.

He has led systems engineering work packages on collaborative research projects in both European (FP7) and UK (ATI) projects. More recently, he led the application of UQ&M in the analyses of structures, control systems and mechatronics systems.

Dr Sharma obtained BSc (Eng) in Mechanical Engineering in 1982 at Imperial College, MSc in Control & Signal Processing in 1990 at the University of Portsmouth and PhD in Applied Mathematics from the University of the West of England. He is an Associate Member of the Institute of Mechanical Engineers and a Fellow of the Institute of Mathematics and its Application.

Experimental implementation and study of the lightning swept-stroke along an aircraft

Vincent Andraud
THE FRENCH AEROSPACE LAB ONERA, FRANCE

ABSTRACT

In the domain of the aeronautical industry, the risk of a lightning strike is taken into account from the conception of the aircraft as the phenomenon statistically occurs every 1000 to 10000 flight hours. As this phenomenon involves a lightning channel that is static in the terrestrial reference frame and an aircraft that can reach a speed of 100 m/s in the take-off or the landing phase, there is a displacement of the impact area – the arc root - on the aircraft outer skin. This phenomenon is referred to as the swept-stroke phenomenon. Thus, all the parts of the aircraft are exposed to the risk of direct electric and thermomechanical damages induced by lightning strikes. Therefore, it is necessary to understand the physical mechanisms that drive the displacement of the arc root to optimize lightning strike protections. There is a significant bibliography about the modeling of this displacement combining electromagnetism and fluid mechanics equations. Though, the existing simulation codes still have not been validated by the implementation of an experimental aircraft simulation that would be struck down by lightning to create a reference database for the physical parameters of the phenomenon. This work aims to reproduce such an experiment and establish a reference database. To reproduce a representative experiment of swept-stroke, a high-power electric generator with a Buck configuration capable to reproduce an electric arc respecting the aeronautical standard lightning waveform is designed, implemented, and tested. Electric arcs of a few kV representatives of the continuous lightning waveform standard are created and elongated until 1.50 m. The propulsion of test samples to speeds of several tens m/s is realized with the design, development, and implementation of a Railgun electromagnetic launcher: a supercapacitor bank enables the injection of a current of 25 kA during 50 ms into a Laplace's rails system and so to propel samples of a few hundred grams to the desired speeds within 2 m of acceleration. The coupling of the electric generator and the Railgun enables the reproduction and the study of the swept-stroke: electrical measures and optical diagnostics through high-speed camera and spectroscopy are implemented to characterize the electric, hydrodynamic and thermal behavior of the moving electric arc. The impact point displacement is also characterized and analyzed. These measures and analyses are also conducted with a Wind tunnel that provokes the displacement of the electric arc on the test sample, replacing the Railgun. From this study, the comparison between the two modes of relative motion between the electric arc and the test sample is established.

SPEAKER BIO

Vincent Andraud received his engineering degree from the French school CentraleSupelec in 2018. After research projects about the formation and the dynamics of electric arcs in the aeronautical context in the French Lab GeePs and the characterization of a vacuum arc plasma thruster in the German Universitat des Bundeswehr, he conducted and received a Ph.D. in 2022 in Electrical Engineering in the French labs Onera, GeePs and the Université Paris-Sud. His topic was the experimental implementation and the study of the lightning swept-stroke along with an aircraft. To this end, he designed and built an electric generator capable to reproduce electric arcs representative of a lightning channel and a low-voltage railgun capable to propel an aeronautical test sample at the speed of an aircraft within 2 m.

Military Metrology for AeroSpace

June 27, 2022 - 11:20

Military Metrology for AeroSpace is a parallel event of 2022 IEEE International Workshop on Metrology for AeroSpace (IEEE MetroAeroSpace 2022).
The event is organized by **AFCEA - Naples Chapter** and **University of Sannio**.
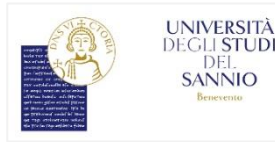
PROGRAM

11:20   **Welcome Adresses**
Organizing Committee - B.Gen. Giovanni Savoldelli Pedrocchi, President, AFCEA Chapter Naples

11:25   **Opening Remarks - The development of Italian Airlift and AAR capability to overcome modern challenge**
B.Gen. Alessandro De Lorenzo, 46° B.A. Commander (ITAF)

11:50   **LI – Lighting Imager: a State of the Art Instrument for Meteorological Observation**
Carlo Simoncelli, Leonardo Company, IPT Leader Imagers and PM Lighting Imager
Guia Pastorini, Leonardo Company, Engineering Space and PEM Lighting Imager

12:20   **Flight Test Instrumentation for motion sickness research in the suborbital environment**
LT Giorgio Vastarella, Flight Test Wing (ITAF)
LT Marco Rigamonti, Flight Test Wing (ITAF)

14:00   **Metrology in Balistics laboratory Applications and research Activities**
Col. Johan Gallant, Department of Weapon Systems and Balistics - Royal Military Academy Brussels Belgium

14:25   **Hyperspectral remote sensing and super-resolution**
LT Gianluca Cellamare, Centro Interforze Studi Applicazioni Militari (CISAM)

14:50   **Space and Aerospace operational domains - ITAF main programs**
Col. Marco Galgani, Deputy Chief - General Office for Space (ITAF)

15:15   **Italian Naval Aviation Test & Evaluation Centre: Project Mind IN the Extreme (MINE)**
Cdr Nicola D'Amico, Experimental Test Pilot, Commanding Officer of the Navy Test Evaluation Center (IT Naval Aviation)
LT Alessandro ALCIBIADE, MD, Naval Flight Surgeon and Subject Matter Expert in Biomedicine for the Navy Bureau for Space and Technology Innovation (IT Navy)

16:00   **The calibration of digital PTH sensors of the ground observations network of the Italian Air Force Meteorological Service**
LT. Col. Alessandro Galliani, Director Technical Center for Meteorology (ITAF)

16:25   **Next Generation Ows**
LT COL. Fabio Grandi, Chief Logistic AVES Brigade (ITArmy)

16:50   **Skymetry, a platform which integrate drones and airplanes acquisition with satellite imagines" (ESA - Incubed Plus Project)**
Eng. Luca Olivotto, Digisky Company

17:10   **Use of Multi Frequency Doppler Radar for Space Surveillance & Tracking activity**
LTen. Eng. Pasquale Tenace, Head of Data Processing Center, Poligono Sperimentale e Addestramento Interforze Di Salto Di Quirra (ITAF-PISQ)

17:35   **An introduction to Space Surveillance and Tracking activities**
GMV Aerospace&Defense: Eng. Lorenzo Porcelli, Flight Dynamics and Operations – Space Situational Awareness

17:55   **Closing Remarks**
B.Gen. Giovanni Savoldelli Pedrocchi / B.Gen. Alessandro De Lorenzo, 46° B.A. Commander (ITAF)

IEEE WIE Italy Section AG - Panel

June 28, 2022 - 14:30

Sharing ideas with experienced and early-stage researchers

In line with the objectives of the WIE Commitment Chart "Steering girls to STEM" (https://site.ieee.org/italy-wie/steer2stem/), the purpose of the panel is to promote female models who are role models and who carry out mentoring activities towards young minds.

To this end, the panel wants to highlight how from the comparison between experienced and early stage researchers on their respective experiences it is possible to identify guidelines and prospects for growth and good practices that increase the presence of young women in the aerospace sector.

The structure of the Panel will be composed as follows: # 2 Topics: Aeronautic and Measurements; Space and Measurements - # 2 Speakers experienced researchers (women) with # 2 young researchers / Ph.D. student (1 boy and 1 girl) for each experienced researcher.

Each speaker, role model in the reference sector, will address one of the two topics, with a technical intervention on their sector; then the two early stage researchers will take the floor and will be able to briefly talk about their experience. A discussion phase will conclude the panel.

Speakers

Sandra **Costanzo**
UNIVERSITY OF CALABRIA

Sara **Bagassi**
UNIVERSITY OF BOLOGNA

WIE Panelists

Patrizia **Lamberti**
UNIVERSITY OF SALERNO

Fiorella **Lamberti**
LEONARDO COMPANY

Claudia Conte
UNIVERSITY OF NAPLES

IEEE MetroAeroSpace 2022 Venue

The IEEE MetroAeroSpace 2022 will be held at **"Le Benedettine" Conference Center** of the **University of Pisa**. Le Benedettine Conference Center is an ancient Monastery held by nuns. It was built in 1393 on the south bank of the Arno river, in an area called "tegularia" in the late Middle Ages. During the centuries, the Monastery went through massive renovations.

Nowadays, closed to the cult, it is completely restored and used as a venue for meetings and conferences by the University of Pisa. The Conference Venue is situated in the city centre and is walking distance from the main railway station.

Address: Piazza S. Paolo a Ripa D'Arno, 16

Google Maps
https://goo.gl/maps/oBFZ5yqgKjUaQneU6

IEEE MetroAeroSpace 2022 Social Events

WELCOME RECEPTION

Monday, June 27, 2022
H 19:00

The IEEE MetroAeroSpace 2022 Welcome Reception will be held at the **Chiostro di Santa Caterina**.
Address: Piazza Santa Caterina - Pisa

Use the qrcode to reach the Welcome Party Venue.

GALA DINNER
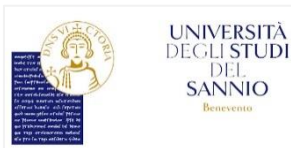
Tuesday, June 28, 2022
H 20:00

The IEEE MetroAeroSpace 2022 Gala Dinner will be held at the **Chiostro Santa Maria del Carmine.**
Address: Corso Italia, 85 - Pisa

Use the qrcode to reach the Gala Dinner Venue.

IEEE MetroAeroSpace 2022 Patronages

IEEE MetroAeroSpace 2022 Sponsors

Program Schedule - Monday June 27

MONDAY - JUNE 27, 2022				
09:45 - 10:15	OPENING CEREMONY - WELCOME ADDRESSES			
10:15 - 11:00	PLENARY SPEAKER Return to the Moon: Old and New Challenges Franco Malerba			
11:00 - 11:20	COFFEE BREAK			
	ROOM A	ROOM B	ROOM C	ROOM E
11:20 - 12:40	SESSION 1.1 Military Metrology for AeroSpace	SESSION 1.2 General Session - Part 1	SESSION 1.3 General Session - Part 2	
12:40 - 14:00	LUNCH			
14:00 - 15:40	SESSION 2.1 Military Metrology for AeroSpace	SESSION 2.2 Measurement for improving quality, reliability and safety in aerospace applications	SESSION 2.3 Manufacturing and Metrology in the Aerospace Industry - Part 1	SESSION 2.4 General Session - Part 3
15:40 - 16:00	COFFEE BREAK			
16:00 - 16:40	SESSION 3.1 Military Metrology for AeroSpace	TUTORIAL SESSION 1 Computerized tomography for industrial application Riccardo Girelli, LABORMETDUE	TUTORIAL SESSION 2 Technologies for "New Space" Systems Claudio Sacchi, University of Trento, Italy	
16:40 - 18:00		SESSION 3.2 Metrology and Instrumentation for Unmanned Aerial Vehicles	SESSION 3.3 Interplanetary Exploration: Mars and Moon	SESSION 3.4 Metrology for maritime transport, ports and shipping
19:00	WELCOME RECEPTION			

Program Schedule - Tuesday June 28

TUESDAY - JUNE 28, 2022				
09:00 - 09:50	PLENARY SPEAKER Measuring everything we do, and... focussing on what matters most Alessandro Giazotto, SILK SPORTS CAR, ECONSCIENCE-H2, EX-AIRBUS			
	ROOM A	ROOM B	ROOM C	ROOM E
09:50 - 11:10	SESSION 4.1 Metrology for Radar Systems - Part 1	SESSION 4.2 Diagnostic methodology and sensors technologies	SESSION 4.3 Mars and Moon Environments and their Effects on Space Systems: New Challenges for Space Exploration	
11:10 - 11:30	COFFEE BREAK			
11:30 - 13:10	SESSION 5.1 Metrology for Radar Systems - Part 2	SESSION 5.2 Advances on Multimodal Imaging based Intelligent Systems in Aerospace Metrology	SESSION 5.3 Measurements and Instrumentation for Autonomous Spacecraft and Planetary Exploration	SESSION 5.4 Manufacturing and Metrology in the Aerospace Industry - Part 2
13:10 - 14:30	LUNCH			
14:30 - 16:10	IEEE Women in Engineering Italy Section AG Panel Sharing ideas with experienced and early-stage researchers	SESSION 6.2 Structural Health Monitoring and Nondestructive Testing for Aerospace	SESSION 6.3 Complex systems operational availability: Measurements, Methodologies and Requirements	
16:10 - 16:30	COFFEE BREAK			
16:30 - 17:10	TUTORIAL SESSION 3 Investigation of Muzzle Flow Using Background Oriented Schlieren and Particle Image Velocimetry Techniques Abdelhafidh Moumen, Royal Military Academy, Belgium	TUTORIAL SESSION 4 From Needs to Solutions: Hydrogen in the Aerospace Sector, but not only Michele Ferrazzini, Sanjiv Sharma, ECONSCIENCE-H2		
20:00	GALA DINNER			

Program Schedule - Wednesday June 29

WEDNESDAY - JUNE 29, 2022				
09:00 - 09:50	PLENARY SPEAKER Small spacecraft requirement verification methods and the metrology needed to support them Larry Fineberg, EMBRY-RIDDLE AERONAUTICAL UNIVERSITY			
	ROOM A	ROOM B	ROOM C	ROOM E
09:50 - 11:30	SESSION 7.1 Space to Space: Scientific and Technological Challenges for Human and Robotic Space Exploration - P1	SESSION 7.2 General Session - Part 4	SESSION 7.3 Terrestrial and In-Flight Verification of the Guidance, Navigation and Control Systems for Aerospace Vehicles	SESSION 7.4 University satellites and aerospace research and development
11:30 - 11:50	COFFEE BREAK			
11:50 - 13:05	SESSION 8.1 Space to Space: Scientific and Technological Challenges for Human and Robotic Space Exploration - P2	POSTER SESSION 1 POSTER SESSION 2		
13:00 - 14:20	LUNCH			
14:20 - 15:40	SESSION 9.1 Space to Space: Scientific and Technological Challenges for Human and Robotic Space Exploration - P3	TUTORIAL SESSION 5 Experimental implementation and study of the lightning swept-stroke along an aircraft Vincent Andraud, THE FRENCH AEROSPACE LAB ONERA, FRANCE	SESSION 9.3 Sensors and Solutions for Autonomous Aerospace Systems	SESSION 9.4 Measurements in the Research of Aerodynamics and Control of Unmanned Aerial Vehicles
15:40 - 16:00	COFFEE BREAK			
16:00 - 16:30	CLOSING AND AWARD CEREMONY			

Technical Sessions - Monday, June 27

09:00 - 16:00
REGISTRATION
Room: Le Benedettine Congress Center

09:45 - 10:15
OPENING SESSION - WELCOME ADDRESSES
Room: Room A - Le Benedettine Congress Center

10:15 - 11:00
PLENARY SESSION
Room: Room A - Le Benedettine Congress Center
Chair: Pietro Ferraro, *National Research Council, Italy*

Return to the Moon: Old and New Challenges

Franco Malerba

11:00 - 11:20
COFFEE BREAK
Room: Le Benedettine Congress Center

11:20 - 12:40
SESSION 1.1
Military Metrology for AeroSpace
Room: Room A - Le Benedettine Congress Center
Chair: B.Gen. Giovanni Savoldelli Pedrocchi, *AFCEA Chapter Naples*

11:20 **Welcome Adresses**
Organizing Committee
B.Gen. Giovanni Savoldelli Pedrocchi, President, AFCEA Chapter Naples

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LT Giorgio Vastarella, Flight Test Wing (ITAF)
LT Marco Rigamonti, Flight Test Wing (ITAF)

11:20 - 12:20
SESSION 1.2
General Session - Part 1
Room: Room B - Le Benedettine Congress Center
Chair: Mirko Marracci, *University of Pisa, Italy*

11:20 **UAV-Based Monitoring and AFM Analysis of Airborne Pollutants**
Veaceslav Sprincean, Moldova State University, Republic of Moldova
Adrian Paladi, Moldova State University, Republic of Moldova
Vasili Andruh, Moldova State University, Republic of Moldova
Arcadi Chirita, Moldova State University, Republic of Moldova
Florentin Paladi, Moldova State University, Republic of Moldova

11:40 **A cloud-assisted ADS-B network for UAVs based on SDR**
Giacinto Gelli, Università Federico II di Napoli, Italy
Ivan Iudice, Italian Aerospace Research Centre, Italy
Domenico Pascarella, Italian Aerospace Research Centre, Italy

12:00 **Self-awareness approach for complete coverage metrology using autonomous systems**
Miguel Espinosa Miñano, Universidad Carlos III de Madrid, Spain
Pablo Flores Peña, Drone Hopper S.L., Spain
Zhuoyao He, Shanghai Jiao Tong University, China
David Martín Gómez, Universidad Carlos III de Madrid, Spain

11:20 - 12:20
SESSION 1.3
General Session - Part 2
Room: Room C - Le Benedettine Congress Center
Chair: Alice Buffi, *University of Pisa, Italy*

11:20 **Smart Solar Panels project, the design outline**
Cesare Molfese, INAF - Italian National Institute of Astrophisics, Italy
Diego Scaccabarozzi, Politecnico of Milan, Italy
Bortolino Saggin, Politecnico of Milan, Italy
Ciprian Popa, INAF - Italian National Institute of Astrophisics, Italy
M.Grigera Naón, Politecnico of Milan, Italy

11:40 **Design of VISTA, a quartz crystal thermogravimetric analyzer for Hera mission**
Diego Scaccabarozzi, Politecnico di Milano, Italy
Bortolino Saggin, Politecnico di Milano, Italy
Marco Giovanni Corti, Politecnico di Milano, Italy
Stefano Arrigoni, Politecnico di Milano, Italy
Pietro Valnegri, Politecnico di Milano, Italy
Fabrizio Dirri, Istituto di Astrofisica e Planetologia Spaziale INAF-IAPS, Italy
Chiara Gisellu, Istituto di Astrofisica e Planetologia Spaziale INAF-IAPS, Italy
Ernesto Palomba, Istituto di Astrofisica e Planetologia Spaziale INAF-IAPS, Italy
Andrea Longobardo, Istituto di Astrofisica e Planetologia Spaziale INAF-IAPS, Italy
Emiliano Zampetti, Consiglio Nazionale delle Ricerche CNR, IIA-CNR, Italy

12:00 **Property of high-frequency pressure measurement**
Jacek Pieniążek, Rzeszów University of Technology, Poland
Piotr Cieciński, Rzeszów University of Technology, Poland
Daniel Ficek, Rzeszów University of Technology, Poland
Marek Szumski, Rzeszów University of Technology, Poland

12:40 - 14:00
LUNCH
Room: Le Benedettine Congress Center

14:00 - 15:40
SESSION 2.1
Military Metrology for AeroSpace
Room: Room A - Le Benedettine Congress Center
Chair: B.Gen. Giovanni Savoldelli Pedrocchi, *AFCEA Chapter Naples*

14:00   **Metrology in Balistics laboratory Applications and research Activities**
Col. Johan Gallant, Department of Weapon Systems and Balistics - Royal Military Academy Brussels Belgium

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Cdr Nicola D'Amico, Experimental Test Pilot, Commanding Officer of the Navy Test Evaluation Center (IT Naval Aviation)
LT Alessandro ALCIBIADE, MD, Naval Flight Surgeon and Subject Matter Expert in Biomedicine for the Navy Bureau for Space and Technology Innovation (IT Navy)

14:00 - 15:40
SESSION 2.2
Measurement for improving quality, reliability and safety in aerospace applications
Room: Room B - Le Benedettine Congress Center
Chairs: Lorenzo Ciani, *University of Florence, Italy*
           Gabriele Patrizi, *University of Florence, Italy*

14:00   **Vibration test campaign on ALM flanges of bladder fuel tanks for Tiltrotor application**
Martina Orefice, Italian Aerospace Research Centre, Italy
Giovanni Bruno, Italian Aerospace Research Centre, Italy
Carmine Carandente Tartaglia, Italian Aerospace Research Centre, Italy
Francesco Di Caprio, Italian Aerospace Research Centre, Italy
Aniello Menichino, Italian Aerospace Research Centre, Italy
Vincenzo Quaranta, Italian Aerospace Research Centre, Italy
Marika Belardo, Italian Aerospace Research Centre, Italy

14:20   **Hybrid-electric propulsive systems sizing and performance evaluation tool for aircraft and UAV**
Luciano Maraschi, Sapienza University of Rome, Italy
Luca Bernabei, Sapienza University of Rome, Italy
Paolo Marzioli, Sapienza University of Rome, Italy
Riccardo Malpica Galassi, Sapienza University of Rome, Italy
Pietro Paolo Ciottoli, Sapienza University of Rome, Italy
Mauro Valorani, Sapienza University of Rome, Italy
Fabrizio Piergentili, Sapienza University of Rome, Italy

14:40 **Experimental characterisation of Li-Po battery packs and BLDC machines for hybrid propulsion systems of lightweight UAVs**
Gianpietro Di Rito, University of Pisa, Italy
Aleksander Suti, University of Pisa, Italy
Andrea Ricci, University of Pisa, Italy
Roberto Galatolo, University of Pisa, Italy
Giuseppe Mattei, Sky Eye Systems s.r.l., Italy

15:00 **Investigation of the effects of temperature variations on Inertial Measurement Units for UAV**
Gabriele Patrizi, University of Florence, Italy
Marcantonio Catelani, University of Florence, Italy
Lorenzo Ciani, University of Florence, Italy
Marco Carratù, University of Salerno, Italy
Antonio Pietrosanto, University of Salerno, Italy
Paolo Sommella, University of Salerno, Italy
Giovanni Betta, University of Cassino and Southern Lazio, Italy
Domenico Capriglione, University of Cassino and Southern Lazio, Italy

15:20 **Experimental Analysis of Temperature Gradient Effect on Lithium batteries**
Mirko Marracci, University of Pisa, Italy
Gianluca Caposciutti, University of Pisa, Italy
Gabriele Bandini, University of Pisa, Italy
Alice Buffi, University of Pisa, Italy
Bernardo Tellini, University of Pisa, Italy

14:00 - 15:40
SESSION 2.3
Manufacturing and Metrology in the Aerospace Industry - Part 1
Room: Room C - Le Benedettine Congress Center
Chairs: Jerzy Józwik, *Lublin University of Technology, Poland*
Magdalena Zawada Michałowska, *Lublin University of Technology, Poland*

14:00 **Cutting force components in rough milling of magnesium alloys with a TiAlN-coated carbide tool**
Ireneusz Zagórski, Lublin University of Technology, Poland

14:20 **Modeling and Testing of 2D Surface Roughness Parameters After Milling AZ91D Magnesium Alloy With the HSS Tool**
Monika Kulisz, Lublin University of Technology, Poland
Ireneusz Zagórski, Lublin University of Technology, Poland
Jerzy Józwik, Lublin University of Technology, Poland

14:40 **Effect of Brushing Process on Edge State of Fiber-Reinforced Plastics**
Jakub Matuszak, Lublin University of Technology, Poland

15:00 **Influence of Technological Parameters on Cutting Force Components During Drilling of GFRP Composite**
Katarzyna Biruk-Urban, Lublin University of Technology, Poland
Jerzy Józwik, Lublin University of Technology, Poland
Paul Bere, Technical University of Cluj-Napoca, Romania

15:20 **Use of Brushing for Improving the Surface Quality of Fiber-Reinforced Plastics After Milling**
Krzysztof Ciecieląg, Lublin University of Technology, Poland

14:00 - 15:20
SESSION 2.4
General Session - Part 3
Room: Room E - Le Benedettine Congress Center
Chair: Mirko Marracci, *University of Pisa, Italy*

14:00 **Cold Gas Measurement System for Linear Aerospike Nozzles**
Valentin Bonnet, École Nationale Supérieure de Mécanique et d'Aérotechnique, France
Francesca Ortone, Politecnico di Torino, Italy
Gaetano Maria Di Cicca, Politecnico di Torino, Italy
Roberto Marsilio, Politecnico di Torino, Italy
Michele Ferlauto, Politecnico di Torino, Italy

14:20 **Flexible Time Triggered Ethernet: A Cost Efficient COTS-Based Technology for the Development of Launcher Networks**
Vincenzo Eramo, Sapienza University of Roma, Italy
Francesco Valente, Sapienza University of Roma, Italy
Francesco G. Lavacca, Sapienza University of Roma, Italy
Tiziana Fiori, Sapienza University of Roma, Italy
Valentino Papandrea, Sapienza University of Roma, Italy
Marta Albano, Agenzia Spaziale Italiana, Italy
Simone Ciabuschi, Agenzia Spaziale Italiana, Italy

14:40 **Thermal conductance measurement of the MAJIS insulating mountings down to cryogenic temperature**
Bortolino Saggin, Politecnico di Milano, Italy
Martìn Grigera Naòn, Politecnico di Milano, Italy
Diego Scaccabarozzi, Politecnico di Milano, Italy
Giovanni Moschioni, Politecnico di Milano, Italy
Leonardo Tommasi, Leonardo SpA, Italy
Maurizio Rossi, Leonardo SpA, Italy
Giuseppe Piccioni, IAPS - INAF, Italy

15:00   **RIIFS spectrometer optical bench design**
Bortolino Saggin, Politecnico di Milano, Italy
Diego Scaccabarozzi, Politecnico di Milano, Italy
Andrea Appiani, Politecnico di Milano, Italy
Francesco Rusconi, Politecnico di Milano, Italy
Martin Grigera Naón, Politecnico di Milano, Italy
Giancarlo Bellucci, INAF - Institute for Space Astrophysics and Planetology, Italy

15:40 - 16:00
COFFEE BREAK
Room: Le Benedettine Congress Center

16:00 - 18:00
SESSION 3.1
Military Metrology for AeroSpace
Room: Room A - Le Benedettine Congress Center
Chair: B.Gen. Giovanni Savoldelli Pedrocchi, *AFCEA Chapter Naples*

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GMV Aerospace&Defense: Eng. Lorenzo Porcelli, Flight Dynamics and Operations – Space Situational Awareness

17:55   **Closing Remarks**
B.Gen. Giovanni Savoldelli Pedrocchi / B.Gen. Alessandro De Lorenzo, 46° B.A. Commander (ITAF)

16:00 - 16:40
TUTORIAL SESSION 1
Room: Room B - Le Benedettine Congress Center
Chair: Gianluca Caposciutti, *University of Pisa, Italy*

Computerized tomography for industrial application

Riccardo Girelli, LABORMETDUE

16:00 - 16:40
TUTORIAL SESSION 2
Room: Room C - Le Benedettine Congress Center
Chair: Alice Buffi, *University of Pisa, Italy*

Technologies for "New Space" Systems

Claudio Sacchi, *University of Trento, Italy*

16:40 - 18:00
SESSION 3.2
Metrology and Instrumentation for Unmanned Aerial Vehicles
Room: Room B - Le Benedettine Congress Center
Chair: Konrad Wojtowicz, *Military University of Technology, Poland*

16:40 **Bluetooth Low Energy based Technology for Small UAS Indoor Positioning**
Gennaro Ariante, University of Naples "Parthenope", Italy
Salvatore Ponte, University of Campania "L. Vanvitelli", Italy
Giuseppe Del Core, University of Naples "Parthenope", Italy

17:00 **Experimental evaluation of Wall Effect for small UAVs in Climate-Controlled Environments**
Iris David Du Mutel de Pierrepont Franzetti, Politecnico di Torino, Italy
Elisa Capello, Politecnico di Torino, Italy
Andrea Vilardi, terraXcube, Eurac Research, Italy
Riccardo Parin, terraXcube, Eurac Research, Italy

17:20 **Path planning for aerial mobility in urban scenarios: the SMARTGO project**
Giancarmine Fasano, University of Naples Federico II, Italy
Flavia Causa, University of Naples Federico II, Italy
Armando Franzone, University of Naples Federico II, Italy
Carmela Piccolo, University of Naples Federico II, Italy
Livio Cricelli, University of Naples Federico II, Italy
Alberto Mennella, Topview S.R.L., Italy
Valerio Pisacane, Euro.Soft S.R.L., Italy

17:40 **Simulator sickness and cybersickness as significant indicators in a primary selection of candidates for FPV drone piloting**
Przemysław Wojciechowski, Military University of Technology, Poland
Konrad Wojtowicz, Military University of Technology, Poland

16:40 - 18:00
SESSION 3.3
Interplanetary Exploration: Mars and Moon
Room: Room C - Le Benedettine Congress Center
Chairs: Claudio Sacchi, *University of Trento, Italy*

16:40 **Analysis of GNSS data at the Moon for the LuGRE project**
Alex Minetto, Politecnico di Torino, Italy
Fabio Dovis, Politecnico di Torino, Italy
Andrea Nardin, Politecnico di Torino, Italy
Oliviero Vouch, Politecnico di Torino, Italy
Gabriele Impresario, Agenzia Spaziale Italiana (ASI), Italy
Mario Musmeci, Agenzia Spaziale Italiana (ASI), Italy

17:00 **CFD Analysis of the unpredicted bimodal size distribution histograms for the ExoMars MicroMED sensor**
Giuseppe Mongelluzzo, INAF - University of Naples "Federico II", Italy
Gabriele Franzese, INAF – Osservatorio Astronomico di Capodimonte, Italy
Fabio Cozzolino, INAF – Osservatorio Astronomico di Capodimonte, Italy
Francesca Esposito, INAF – Osservatorio Astronomico di Capodimonte, Italy
Alan Cosimo Ruggeri, INAF – Osservatorio Astronomico di Capodimonte, Italy
Carmen Porto, INAF – Osservatorio Astronomico di Capodimonte, Italy
Alberto Martin-Ortega, Instituto Nacional de Técnica Aeroespacial, Spain
Simone Silvestro, INAF – Osservatorio Astronomico di Capodimonte, Italy
Ciprian Ionut Popa, INAF – Osservatorio Astronomico di Capodimonte, Italy
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José Ramon De Mingo, Instituto Nacional de Técnica Aeroespacial, Spain
Fausto Cortecchia, INAF – Astrophysics and Space Science Observatory, Italy
Nuria Andrés Santiuste, Instituto Nacional de Técnica Aeroespacial, Spain
Daniele Brienza, INAF – Institute for Space Astrophysics and Planetology Italy
Joaquín Rivas Abalo, Instituto Nacional de Técnica Aeroespacial, Spain

17:20 **Performance evaluation of a lunar navigation system exploiting four satellites in ELFO orbits**
Gheorghe Sirbu, University of Rome Tor Vergata, Italy
Mauro Leonardi, University of Rome Tor Vergata, Italy
Mattia Carosi, Thales Alenia Space Italia, Italy
Carmine Di Lauro, Thales Alenia Space Italia, Italy
Cosimo Stallo, Thales Alenia Space Italia, Italy

17:40   **Study on Relay Networks based on Lagrangian Points for Optical-based Mars-to-Earth Communications**
Stefano Bonafini, University of Trento, Italy
Nicola Satriano, University of Trento, Italy
Claudio Sacchi, University of Trento, Italy

16:40 - 17:40
SESSION 3.4
Metrology for maritime transport, ports and shipping
Room: Room E - Le Benedettine Congress Center
Chairs: Michele Fiorini, *Leonardo s.p.a., Italy*
Jillian Carson-Jackson*, The Nautical Institute, UK*

16:40   **Small Cell-based Full-Duplex System for Secure Communications in Ports and Shipping**
Dongsheng Zheng, Peking University, Beijing, China
Wenyao Li, Peking University, Beijing, China
Zijian Zhou, Peking University, Beijing, China
Chenbo Wang, Peking University, Beijing, China
Bingli Jiao, Peking University, Beijing, China

17:00   **Feasibility of Container Shipping on the Northern Sea Route (NSR)**
Michele Fiorini, Leonardo S.p.A., Italy
Alexandra Middleton, University of Oulu, Finland

17:20   **Initial descriptions of e-navigation Common Shorebased System Architecture (CSSA)**
Michele Fiorini, Leonardo S.p.A., Italy
Marco Galloro, Leonardo S.p.A., Italy

19:00
WELCOME RECEPTION
Chiostro di Santa Caterina - *Piazza Santa Caterina, Pisa*

Technical Sessions - Tuesday, June 28

09:00 - 16:00
REGISTRATION
Room: Le Benedettine Congress Center

09:00 - 09:50
PLENARY SESSION
Room: Room A - Le Benedettine Congress Center
Chair: Bernardo Tellini, *University of Pisa, Italy*

Measuring everything we do, and… focussing on what matters most

Alessandro Giazotto, SILK SPORTS CAR, ECONSCIENCE-H2, EX-AIRBUS

09:50 - 11:10
SESSION 4.1
Metrology for Radar Systems - Part 1
Room: Room A - Le Benedettine Congress Center
Chairs: Silvia Liberata Ullo, *University of Sannio, Italy*
Maria Sabrina Greco, *University of Pisa, Italy*
Alfonso Farina, *Selex ES*

09:50 **Measuring the Anti-Intercept features of Noise Radar waveforms: the way ahead**
Gaspare Galati, Tor Vergata University, Italy
Gabriele Pavan, Tor Vergata University, Italy

10:10 **RCS Measurements of UAVs and Their Statistical Analysis**
Massimo Rosamilia, University of Naples "Federico II", Italy
Augusto Aubry, University of Naples "Federico II", Italy
Alessio Balleri, Cranfield University, UK
Vincenzo Carotenuto, University of Naples "Federico II", Italy
Antonio De Maio, University of Naples "Federico II", Italy

10:30 **A Harmonic Radar Simulator for Modulated Waveforms**
Yucel Takak, TOBB University of Economics and Technology, Turkey
Harun Taha Hayvaci, American University of the Middle East, Kuwait

10:50   **Comparison of TMA tracking algorithms for a centralised fusion architecture**
        Giovanni Golino, Leonardo S.p.A, Italy
        Antonio Graziano, Leonardo S.p.A, Italy
        Luca Timmoneri, Leonardo S.p.A, Italy
        Alfonso Farina, Consultant, Leonardo S.p.A, Italy

09:50 - 11:10
SESSION 4.2
Diagnostic methodology and sensors technologies
Room: Room B - Le Benedettine Congress Center
Chairs: Mario De Cesare, *Italian Aerospace Research Centre, University of Campania "Luigi Vanvitelli", Italy*
         Umberto Galietti, *Polytechnic University of Bari, Italy*

09:50   **Experimental application of a novel set up apparatus for spectral emissivity characterization at high temperature for Thermal Protection System**
        Francesca Di Carolo, Polytechnic University of Bari, Italy
        Mario De Cesare, Italian Aerospace Research Centre, University of Campania "Luigi Vanvitelli", INFN, Italy
        Antonio Del Vecchio, Italian Aerospace Research Centre, University of Campania "Luigi Vanvitelli", INFN, Italy
        Luigi Savino, Italian Aerospace Research Centre, Italy
        Umberto Galietti, Polytechnic University of Bari, Italy
        Davide Palumbo, Polytechnic University of Bari, Italy
        Luigi Lucchese, Italian Aerospace Research Centre, Polytechnic University of Bari, Italy
        Carlo Purpura, Italian Aerospace Research Centre, Italy
        Mario De Stefano Fumo, Italian Aerospace Research Centre, Italy

10:10   **A fully automated halogen lock-in thermography test procedure to verify the alignment of CFRP wing spars**
        Francesco Ancona, Diagnostic Engineering Solutions S.r.l., Italy
        Francesca Di Carolo, Politecnico di Bari, Italy
        Giovanni Santonicola, Diagnostic Engineering Solutions S.r.l., Italy
        Davide Palumbo, Politecnico di Bari, Italy
        Umberto Galietti, Politecnico di Bari, Italy

10:30   **Balloon-Borne Software Defined Receiver for GNSS Radio Occultation Measurements: ROMULUS Experiment**
        Alessandro Rossi, Sapienza University of Rome, Italy
        Ariele Zurria, Sapienza University of Rome, Italy
        Damiano Porpora, Sapienza University of Rome, Italy
        Lorenzo Rossi, Sapienza University of Rome, Italy
        Clara Di Nunzio, Sapienza University of Rome, Italy
        Elisa Depaolis, Sapienza University of Rome, Italy
        Linda Misercola, Sapienza University of Rome, Italy

Flavio Pasquale, Sapienza University of Rome, Italy
Gabriele Agresti, Sapienza University of Rome, Italy
Giuseppe Morichetti, Sapienza University of Rome, Italy
Gabriele Boccacci, Sapienza University of Rome, Italy
Elena Valant, Sapienza University of Rome, Italy
Paolo Marzioli, Sapienza University of Rome, Italy
Fabio Santoni, Sapienza University of Rome, Italy
Fabrizio Piergentili, Sapienza University of Rome, Italy

10:50   **Global Positioning System measurements: comparison of IoT wearable devices**
Grazia Iadarola, Polytechnic University of Marche, Italy
Deivis Disha, Polytechnic University of Marche, Italy
Adelmo De Santis, Polytechnic University of Marche, Italy
Susanna Spinsante, Polytechnic University of Marche, Italy
Ennio Gambi, Polytechnic University of Marche, Italy

09:50 - 11:10
SESSION 4.3
Mars and Moon Environments and their Effects on Space Systems: New Challenges for Space Exploration
Room: Room C - Le Benedettine Congress Center
Chairs: Mario Marchetti, *AIDAA - Associazione Italiana di Aeronautica e Astronautica*
               Andrea Delfini, *Sapienza University of Rome, Italy*

09:50   **Measurement of Martian Soil Electromagnetic Absorption Cross Section from 800 MHz to 6 GHz for future Mars Cellular Telecommunication systems**
Davide Micheli, TIM SPA, Italy
Andrea Delfini, Sapienza University of Rome, Italy
Fabrizio Piergentili, Sapienza University of Rome, Italy
Roberto Pastore, Sapienza University of Rome, Italy
Fabio Santoni, Sapienza University of Rome, Italy
Mario Marchetti, Sapienza University of Rome, Italy

10:10   **Analysis and management algorithms of the noise level for the ExoMars MicroMED instrument**
Gabriele Franzese, INAF – Osservatorio Astronomico di Capodimonte, Italy
Nuria Andrés Santiuste, Instituto Nacional de Técnica Aeroespacial, Spain
Carmen Porto, INAF – Osservatorio Astronomico di Capodimonte, Italy
Giuseppe Mongelluzzo, INAF – Osservatorio Astronomico di Capodimonte, Italy
Fabio Cozzolino, INAF – Osservatorio Astronomico di Capodimonte, Italy
Francesca Esposito, INAF – Osservatorio Astronomico di Capodimonte, Italy
Ignacio Arruego, Instituto Nacional de Técnica Aeroespacial, Spain
Joaquín Rivas, Instituto Nacional de Técnica Aeroespacial, Spain
José Ramon De Mingo, Instituto Nacional de Técnica Aeroespacial, Spain
Alan Cosimo Ruggeri, INAF – Osservatorio Astronomico di Capodimonte, Italy
Alberto Martín-Ortega, Instituto Nacional de Técnica Aeroespacial, Spain

Fausto Cortecchia, INAF – Astrophysics and Space Science Observatory (OAS), Italy
Ciprian Ionut Popa, INAF – Osservatorio Astronomico di Capodimonte, Italy
Simone Silvestro, INAF – Osservatorio Astronomico di Capodimonte, Italy
Daniele Brienza, INAF – Institute for Space Astrophysics and Planetology (IAPS), Italy
Ilia Kuznetsov, IKI – Space Research Institute, Russia
Alexander Zakharov, IKI – Space Research Institute, Russia
Gennady Dolnikov, IKI – Space Research Institute, Russia
Andrew Lyash, IKI – Space Research Institute, Russia
Igor Dokuchaev, IKI – Space Research Institute, Russia

10:30 **A Deep Learning-based Crater Detector for Autonomous Vision-Based Spacecraft Navigation**
Roberto Del Prete, University of Naples Federico II, Italy
Alfonso Saveriano, University of Naples Federico II, Italy
Alfredo Renga, University of Naples Federico II, Italy

10:50 **Insights on Early Life Analogs at Mars: Central Andes Holocene Microbialitic Records as a Proxy to the Jezero Crater Exploration**
Patricio Guillermo Villafañe, Instituto Superior de Correlación Geológica, Argentina
Carlos Cónsole Gonella, Instituto Superior de Correlación Geológica, Argentina

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11:10 - 11:30
COFFEE BREAK
Room: Le Benedettine Congress Center

11:30 - 13:10
SESSION 5.1
Metrology for Radar Systems - Part 2
Room: Room A - Le Benedettine Congress Center
Chairs: Silvia Liberata Ullo, *University of Sannio, Italy*
Maria Sabrina Greco, *University of Pisa, Italy*
Alfonso Farina, *Selex ES*

11:30 **Super-Resolution of Synthetic Aperture Radar Complex Data by Deep-Learning**
Pia Addabbo, Università degli studi del Sannio, Italy
Mario Luca Bernardi, Università degli studi del Sannio, Italy
Filippo Biondi, Università degli studi dell'Aquila, Italy
Marta Cimitile, Univeristà Unitelma Sapienza, Italy
Carmine Clemente, University of Strathclyde, UK
Nicomino Fiscante, Università degli studi Roma TRE, Italy
Gaetano Giunta, Università degli studi Roma TRE, Italy
Danilo Orlando, Università degli Studi "Niccolò Cusano", Italy

11:50   **A Fast Polarization Estimation Method with Convolutional Neural Networks**
Yusuf Önür, TOBB University of Economics and Technology, Turkey
Harun Taha Hayvaci, American University of the Middle East, Kuwait

12:10   **Design & Development of Wireless Low-Cost Sonar Surveillance System Using HC-SR04**
Md Masiat Roushan Masrafee, Military Institute of Science and Technology, Bangladesh
Karthikeyan Karthikeyan, Military Institute of Science and Technology, Bangladesh
Fatema Humayara, Military Institute of Science and Technology, Bangladesh

12:30   **PolSAR Covariance Structure Detection and Classification based on the EM Algorithm**
Sudan Han, National Innovation Institute of Defense Technology, China
Pia Addabbo, Università degli studi del Sannio, Italy
Filippo Biondi, Italian Ministry of Defence
Carmine Clemente, University of Strathclyde, UK
Danilo Orlando, Università degli Studi "Niccolò Cusano", Italy
Giuseppe Ricci, Università del Salento, Consorzio Nazionale Interuniversitario per le
Telecomunicazioni, Italy

12:50   **Drone classification using mmWave micro-Doppler radar measurements**
Gianluca Ciattaglia, Polytechnic University of Marche, Italy
Linda Senigagliesi, Polytechnic University of Marche, Italy
Daniele Alidori, Polytechnic University of Marche, Italy
Laura Cipriani, Polytechnic University of Marche, Italy
Grazia Iadarola, Polytechnic University of Marche, Italy
Susanna Spinsante, Polytechnic University of Marche, Italy
Ennio Gambi, Polytechnic University of Marche, Italy

11:30 - 13:10
SESSION 5.2
Advances on Multimodal Imaging based Intelligent Systems in Aerospace Metrology
Room: Room B - Le Benedettine Congress Center
Chair: Pietro Ferraro, *National Research Council, Italy*

11:30   **Historical Perspective and Latest Technological Advances in Non-Destructive Testing and Quality Assurance With Optical Methods**
Pietro Ferraro, ISASI CNR, Italy
Massimo Rippa, ICIB-CNR, Italy

11:50   **An accurate hardware calibration and 3D point cloud stitching towards automatic quality control in aerospace manufacturing**
Pierluigi Dibari, CNR STIIMA, Italy
Massimiliano Nitti, CNR STIIMA, Italy
Cosimo Patruno, CNR STIIMA, Italy
Gaetano Pernisco, CNR STIIMA, Italy
Maria di Summa, CNR STIIMA, Italy

Nicola Mosca, CNR STIIMA, Italy
Vito Renò, CNR STIIMA, Italy

12:10 **A combined Neural Network/3D image analysis approach to defect detection in EBM ALM imaging**
Francesco Martone, CIRA Italian Aerospace Research Centre, Italy
Paolo Leoncini, CIRA Italian Aerospace Research Centre, Italy
Giorgio Fusco, Aerosoft S.p.A., Italy
Cinzia Toscano, CIRA Italian Aerospace Research Centre, Italy

12:30 **Additive Manufacturing in aeronautics: an overview and a case-study**
Vittorio Alfieri, University of Salerno, Italy
Fabrizia Caiazzo, University of Salerno, Italy

12:50 **Robust S-Y-biLSTM object tracking method for onroad objects shoot from an unmanned aerial vehicle**
Ivan Saetchnikov, Belarusian State University, Belarus
Victor Skakun, Belarusian State University, Belarus
Elina Tcherniavskaia, Belarusian State University, Belarus

11:30 - 13:10
SESSION 5.3
Measurements and Instrumentation for Autonomous Spacecraft and Planetary Exploration
Room: Room C - Le Benedettine Congress Center
Chair: Marco Pertile, *University of Padova, Italy*

11:30 **Visual Odometry analysis of the NASA Mars 2020 Perseverance rover's images**
Simone Andolfo, Sapienza University of Rome, Italy
Flavio Petricca, Sapienza University of Rome, Italy
Antonio Genova, Sapienza University of Rome, Italy

11:50 **Measurement of mechanical characteristics of tape tethers for space applications**
Andrea Valmorbida, University of Padova, Italy
Alice Brunello, CISAS G. Colombo, University of Padova, Italy
Lorenzo Olivieri, CISAS G. Colombo, University of Padova, Italy
Simone Fortuna, University of Padova, Italy
Giulia Sarego, CISAS G. Colombo, University of Padova, Italy
Marco Pertile, University of Padova, Italy
Enrico C. Lorenzini, University of Padova, Italy

12:10 **Consensus sensor fusion to estimate the relative attitude during space capture operations**
Alex Caon, CISAS G. Colombo, University of Padova, Italy
Mattia Peruffo, University of Padova, Italy
Francesco Branz, University of Padova, Italy
Alessandro Francesconi, University of Padova, Italy

12:30   **A Relative Navigation Module Based on Visual and Ranging Measurements for CubeSat Applications**
Claudio Vela, University of Naples "Federico II", Italy
Giuseppe Napolano, University of Naples "Federico II", Italy
Alessia Nocerino, University of Naples "Federico II", Italy
Roberto Opromolla, University of Naples "Federico II", Italy
Michele Grassi, University of Naples "Federico II", Italy
Matteo Manzo, University of Naples "Federico II", Italy
Salvatore Amoruso, University of Naples "Federico II", Italy
Guido Di Donfrancesco, ALA Advanced Lidar Applications S. r. l., Italy

12:50   **Calibration for the stereo hyperspectral pushbroom camera HYPSOS**
Cristina Re, INAF, Osservatorio Astronomico di Padova, Italy
Chiara Doria, Center of Studies and Activities for Space (CISAS), Italy
Nicolò Borin, Center of Studies and Activities for Space (CISAS), Italy
Emanuele Simioni, INAF, Osservatorio Astronomico di Padova, Italy
Livio Agostini, Center of Studies and Activities for Space (CISAS), Italy
Gabriele Cremonese, INAF, Osservatorio Astronomico di Padova, Italy
Giampiero Naletto, University of Padova, Italy
Massimiliano Tordi, Eie Group, Italy

11:30 - 13:10
SESSION 5.4
Manufacturing and Metrology in the Aerospace Industry - Part 2
Room: Room E - Le Benedettine Congress Center
Chairs: Magdalena Zawada Michałowska, *Lublin University of Technology, Italy*
Ireneusz Zagórski, *Lublin University of Technology, Italy*

11:30   **Selected properties of the surface layer of objects made of various construction materials after vibratory shot peening**
Agnieszka Skoczylas, Lublin University of Technology, Poland

11:50   **Measurement Uncertainty of a Coordinate Measuring Machine Applied to a Thin-Walled Aircraft Structure in Relation to the Assessment of Dimensional and Shape Accuracy**
Magdalena Zawada-Michałowska, Lublin University of Technology, Poland
Paweł Pieśko, Lublin University of Technology, Poland
Józef Kuczmaszewski, Lublin University of Technology, Poland
Jerzy Józwik, Lublin University of Technology, Poland

12:10   **Geometric accuracy of deep holes drilled with various strategies and technological parameters**
Damian Moń, Lublin University of Technology, Poland
Paweł Pieśko, Lublin University of Technology, Poland
Magdalena Zawada-Michałowska, Lublin University of Technology, Poland
Jerzy Józwik, Lublin University of Technology, Poland

12:30   **Experiment on Repetition Rate Locking of a Fiber Optical Frequency Comb**

Zhitao Zhang, *Beijing Aerospace Institute for Metrology and Measurement Technology, China*
Yajun Liang, *Beijing Aerospace Institute for Metrology and Measurement Technology, China*
Tieli Zhang, *Beijing Aerospace Institute for Metrology and Measurement Technology, China*
Xiaoqiang Gao, *Beijing Aerospace Institute for Metrology and Measurement Technology, China*
Lin Liu, *Beijing Aerospace Institute for Metrology and Measurement Technology, China*

12:50   **Research On Absolute Distance Measurement using Inter-mode Beat of Optical Frequency Comb**

Xiaoxu Liu, *Beijing Aerospace Institute for Metrology and Measurement Technology, China*
Lin Liu, *Beijing Aerospace Institute for Metrology and Measurement Technology, China*
Yongchao Zhang, *Beijing Aerospace Institute for Metrology and Measurement Technology, China*
Zhitao Zhang, *Beijing Aerospace Institute for Metrology and Measurement Technology, China*
Xiaoqiang Gao, *Beijing Aerospace Institute for Metrology and Measurement Technology, China*
Yang Xie, *Beijing Aerospace Institute for Metrology and Measurement Technology, China*

13:10 - 14:30
LUNCH
Room: Le Benedettine Congress Center

14:30 - 16:10
IEEE Women in Engineering Italy Section AG Panel
Sharing ideas with experienced and early-stage researchers
Room: Room A - Le Benedettine Congress Center
Chairs: Patrizia Lamberti, *University of Salerno, Italy*
            Fiorella Lamberti, *Leonardo Company*
            Claudia Conte, *University of Naples Federico II, University of Bergamo, Italy*

14:30 - 16:30
SESSION 6.2
Structural Health Monitoring and Nondestructive Testing for Aerospace
Room: Room B - Le Benedettine Congress Center
Chairs: Leandro Maio, *University of Naples Federico II, Italy*
            Vittorio Memmolo, *University of Naples Federico II, Italy*
            Marco Laracca, *Sapienza University of Rome, Italy*

14:30   **An integrated structural health monitoring system based on Lamb waves**

Raffaele Vallifuoco, University of Campania Luigi Vanvitelli, Italy
Luigi Zeni, University of Campania Luigi Vanvitelli, Italy
Aldo Minardo, University of Campania Luigi Vanvitelli, Italy
Donato Perfetto, University of Campania Luigi Vanvitelli, Italy
Francesco Caputo, University of Campania Luigi Vanvitelli, Italy
Alessandro De Luca, University of Campania Luigi Vanvitelli, Italy

14:50   **Lamb waves detection through phi-OTDR for structural health monitoring**
Raffaele Vallifuoco, University of Campania Luigi Vanvitelli, Italy
Enis Cerri, University of Campania Luigi Vanvitelli, Italy
Aldo Minardo, University of Campania Luigi Vanvitelli, Italy
Luigi Zeni, University of Campania Luigi Vanvitelli, Italy
Rizwan Zahoor, University of Campania Luigi Vanvitelli, Italy
Donato Perfetto, University of Campania Luigi Vanvitelli, Italy
Francesco Caputo, University of Campania Luigi Vanvitelli, Italy
Alessandro De Luca, University of Campania Luigi Vanvitelli, Italy

15:10   **Design and realisation of a Wind Tunnel model for ice protection system demonstration**
Salvatore Ameduri, Centro Italiano Ricerche Aerospaziali, Italy
Angela Brindisi, Centro Italiano Ricerche Aerospaziali, Italy
Antonio Concilio, Centro Italiano Ricerche Aerospaziali, Italy
Giovangiuseppe Giusto, Centro Italiano Ricerche Aerospaziali, Italy
Leandro Maio, University of Naples Federico II, Italy
Vittorio Memmolo, University of Naples Federico II, Italy
Lorenzo Notarnicola, Centro Italiano Ricerche Aerospaziali, Italy
Lorenzo Pellone, Centro Italiano Ricerche Aerospaziali, Italy
Filomena Piscitelli, Centro Italiano Ricerche Aerospaziali, Italy
Fabrizio Ricci, University of Naples Federico II, Italy

15:30   **Use of piezoelectric patches in Health Usage and Monitoring Systems: a preliminary assessment**
Mario R. Chiarelli, University of Pisa, Italy
Gianpietro Di Rito, University of Pisa, Italy
Benedetto Luciano, AESIS srl, Italy
Ivan J. Miralles Irles, University of Pisa, Italy
Enrico Liberatori, University of Pisa, Italy
Luca Bancallari, MBDA Italia S.p.A., Italy

15:50   **Shape Sensing of a Doubly Curved Aft Fuselage Panel using Inverse Finite Element Method**
Mohammad A. Abdollahzadeh, Sabanci University, Turkey
Adnan Kefal, Sabanci University, Turkey
Mehmet Yildiz, Sabanci University, Turkey

16:10   **Optimization of an ECT-based method for the thickness measurement of metallic plates**
Giulia Di Capua, University of Cassino and Southern Lazio, Italy
Luigi Ferrigno, University of Cassino and Southern Lazio, Italy
Marco Laracca, Sapienza University of Rome, Italy
Alessandro Sardellitti, University of Cassino and Southern Lazio, Italy
Antonello Tamburrino, University of Cassino and Southern Lazio, Italy
Salvatore Ventre, University of Cassino and Southern Lazio, Italy

14:30 - 16:10
SESSION 6.3
Complex systems operational availability: Measurements, Methodologies and Requirements
Room: Room C - Le Benedettine Congress Center
Chairs: Fabio Leccese, *Roma Tre University of Rome, Italy*
            Manuel Greco*, Roma Tre University of Rome, Italy*

14:30   **COTS Components for Space Applications: the Evaluation of Apparent Activation Energy (Eaa)**
          Enrico Petritoli, Università degli Studi "Roma Tre", Italy
          Fabio Leccese, Università degli Studi "Roma Tre", Italy

14:50   **Proposal of NFC Type Access Structure for Sensors Configuration in Aerospace Scenario**
          Mariagrazia Leccisi, Università degli Studi "Roma Tre", Italy
          Marco Cagnetti, Università degli Studi "Roma Tre", Italy
          Fabio Leccese, Università degli Studi "Roma Tre", Italy

15:10   **A THz Imaging Scanner to Detect Structural and Fire Damage on Glass Fiber Composite**
          Manuel Greco, Università degli Studi "Roma Tre", Italy
          Emilio Giovenale, ENEA, Fusion and Nuclear Dept, Italy
          Fabio Leccese, Università degli Studi "Roma Tre", Italy
          Andrea Doria, ENEA, Fusion and Nuclear Dept, Italy
          Eduardo De Francesco, SeTeL s.r.l, Italy
          Gian Piero Gallerano, ENEA, Fusion and Nuclear Dept, Italy

15:30   **CO2 Recycling into CH4 and H2O over Ru/CeO2 Catalyst Prepared by one-pot Synthesis**
          Simonetta Tuti, "Roma Tre" University, Rome, Italy
          Umberto Pasqual Laverdura, "Roma Tre" University, Rome, Italy
          Igor Luisetto, Dept. of Energy Technologies, ENEA, Italy
          Sergio Lo Mastro, "Roma Tre" University, Rome, Italy
          Stefano Stendardo, Dept. of Energy Technologies, ENEA, Italy

15:50   **Physical and chemical flexible sensors as valuable tool for monitoring space activities**
          Francesco Maita, CNR - IMM, Italy
          Ivano Lucarini, CNR - IMM, Italy
          Marco Scatto, University of Ca' Foscari, Italy
          Massimiliano Ruggeri, CNR - STEMS, Italy
          Luca Maiolo, CNR - IMM, Italy

16:10 - 16:30
COFFEE BREAK
Room: Le Benedettine Congress Center

16:30 - 17:10
TUTORIAL SESSION 3
Room: Room A - Le Benedettine Congress Center
Chair: Gianluca Caposciutti, *University of Pisa, Italy*

Investigation of Muzzle Flow Using Background Oriented Schlieren and Particle Image Velocimetry Techniques

Abdelhafidh Moumen, Royal Military Academy, Belgium

16:30 - 17:10
TUTORIAL SESSION 4
Room: Room B - Le Benedettine Congress Center
Chair: Alice Buffi, *University of Pisa, Italy*

From Needs to Solutions: Hydrogen in the Aerospace Sector, but not only

Michele Ferrazzini, Sanjiv Sharma, *ECONSCIENCE-H2*

20:00
GALA DINNER
Chiostro Santa Maria del Carmine - *Corso Italia, 85*

09:00 - 12:00
REGISTRATION
Room: Le Benedettine Congress Center

09:00 - 09:50
PLENARY SESSION
Room: Room A - Le Benedettine Congress Center
Chair: Marco Pertile, *University of Padova, Italy*

Small spacecraft requirement verification methods and the metrology needed to support them

Larry Fineberg, *EMBRY-RIDDLE AERONAUTICAL UNIVERSITY*

09:50 - 11:30
SESSION 7.1
Space to Space: Scientific and Technological Challenges for Human and Robotic Space Exploration - Part 1
Room: Room A - Le Benedettine Congress Center
Chairs: Vittorio Ancona, Thales Alenia Space, Italy
         Pietro Ferraro, CNR - Institute of Applied Sciences and Intelligent Systems, Italy, CTS ASI
         Paolo Maggiore, Politecnico di Torino, Italy
         Piero Messidoro, Politecnico di Torino, Italy

09:50 - 10:45   **ROUND TABLE**
         Space to Space: Scientific and Technological Challenges for Human and Robotic Space Exploration

         Moderator
         Gennaro Russo, *Center for Near Space (IIF- Italian Institue for Future) & Distretto Aerospaziale della Campania*

         Speakers
         Pasquale Daponte, *University of Sannio, Italy*
         Mario Cosmo, *ASI*
         Ernesto Ciaramella, *Scuola Superiore Sant'Anna di Pisa*
         Pier Luca Maffettone, *University of Naples Federico II, representative for spoke HABITAT & SPACE SCIENCE - Space for the sustainable development of the planet*

10:45   **Adaptive Vertical Farm for Fresh Food Production in Orbital Stations and Future Lunar Settlements**
Patrizia Bagnerini, University of Genoa, Italy
Mauro Gaggero, National Research Council, Italy
Marco Ghio, Space V S.r.l., Italy
Franco Malerba, Space V S.r.l., Italy
Michele Angelo Malerba, Space V S.r.l., Italy

11:00   **Design, fabrication and test of functional panels for multi-mission modular satellite platform**
Sara Coppola, CNR - Institute of Applied Sciences and Intelligent Systems, Italy
Ciro Tortora, CNR - Institute of Applied Sciences and Intelligent Systems, Italy
Massimo Rippa, CNR - Institute of Applied Sciences and Intelligent Systems, Italy
Pietro Pasolini, S.R.S. Engineering Design s.r.l., Italy
Giovanni D'Aniello, S.R.S. Engineering Design s.r.l., Italy
Annalaura Fabbricatore, University of Salerno, Italy
Vittorio Alfieri, University of Salerno, Italy
Fabrizia Caiazzo, University of Salerno, Italy
Pietro Ferraro, CNR - Institute of Applied Sciences and Intelligent Systems, Italy

11:15   **Customized Free-standing Thin Liquid Film Forming Based On Controllable Iris**
Vincenzo Ferraro, University of Naples Federico II, Italy
Zhe Wang, University of Naples Federico II, Italy
Sara Coppola, CNR - Institute of Applied Sciences and Intelligent Systems, Italy
Veronica Vespini, CNR - Institute of Applied Sciences and Intelligent Systems, Italy
Volodymyr Tkachenko, CNR - Institute of Applied Sciences and Intelligent Systems, Italy
Lisa Miccio, CNR - Institute of Applied Sciences and Intelligent Systems, Italy
Pier Luca Maffettone, University of Naples Federico II, Italy

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09:50 - 11:10
SESSION 7.2
General Session - Part 4
Room: Room B - Le Benedettine Congress Center
Chair: Gianluca Caposciutti, *University of Pisa, Italy*

09:50   **Design of Enhanced Adaptive Filter for Integrated Navigation System of FOG-SINS and Star Tracker**
Nassim Bessaad, Tong University, China
Qilian Bao, Tong University, China
Zhao Jiangkang, Tong University, China

10:10   **Navigation Under Abrupt Motion Disturbances: A Convex Programming Perspective**
Natnael S. Zewge, KAIST, South Korea
Taeho Kim, KAIST, South Korea
Hyochoong Bang, KAIST, South Korea

10:30   **Hera Inter-Satellite link Doppler characterization for Didymos Gravity Science experiments**

Edoardo Gramigna, University of Bologna, Italy
Jeppe Græsdal Johansen, GomSpace A/S, Denmark
Riccardo Lasagni Manghi, University of Bologna, Italy
José Magalhães, GomSpace Luxembourg SARL, Luxembourg
Marco Zannoni, University of Bologna, Italy
Paolo Tortora, University of Bologna, Italy
Etienne Le Bras, GomSpace Luxembourg SARL, Luxembourg
Andrea Togni, University of Bologna, Italy

10:50   **Design of an optical Butler matrix for beamforming in satellite communications**

Luca Rodio, Politecnico di Bari, Italy
Vincenzo Devito, Politecnico di Bari, Italy
Marco Grande, Politecnico di Bari, Italy
Giovanna Calò, Politecnico di Bari, Italy
Antonella D'Orazio, Politecnico di Bari, Italy

09:50 - 11:30
SESSION 7.3
Terrestrial and In-Flight Verification of the Guidance, Navigation and Control Systems for Aerospace Vehicles
Room: Room C - Le Benedettine Congress Center
Chairs: Yevgeny Somov, *Samara State Technical University, Russia*
            Paolo Castaldi, *University of Bologna, Italy*

09:50   **Intelligent hybrid robust fault detection and isolation of reaction wheels in satellite attitude control system**

Paolo Castaldi, University of Bologna, Italy
H. A. Nozari, Babol Noshirvani University of Technology, Iran
Jalil Sadati-Rostami, Babol Noshirvani University of Technology, Iran
H. D. Banadaki, Islamic Azad University, Iran
Silvio Simani, University of Ferrara, Italy

10:06   **Analysis of the Space Robot Control Accuracy at Checking a Geostationary Satellite State**

Yevgeny Somov, Samara State Technical University, Russian Academy of Sciences, Russia
Sergey Butyrin, Samara State Technical University, Russian Academy of Sciences, Russia
Sergey Somov, Samara State Technical University, Russian Academy of Sciences, Russia

10:23   **Checking Autonomous Control of a Geostationary Satellite during Long-term Conservation**

Yevgeny Somov, Samara State Technical University, Russia
Sergey Butyrin, Samara State Technical University, Russia
Sergey Somov, Samara State Technical University, Russia

Nikolay Rodnishchev, Kazan National Research Technical University named after A.N. Tupolev – KAI, Russia
Tatyana Somova, Samara State Technical University, Russia

10:40 **Design of passive fault-tolerant attitude controller for a fractional order flexible satellite model**
Siva Kumar Mallipeddi, University of Bologna, Italy
Paolo Castaldi, University of Bologna, Italy
Hasan Abbasi Nozari, Babol Noshirvani University of Technology, Iran
Silvio Simani, University of Ferrara, Italy

11:56 **Minimizing the Trajectory of a Low Flying Unmanned Aerial Vehicles without Information about the Earth Physical Fields**
Alexander Knyazhsky, Saint Petersburg State University of Aerospace Instrumentation, Russia
Alexander Nebylov, Saint Petersburg State University of Aerospace Instrumentation, Russia

11:13 **Efficiency of Ekranoplanes Application for Chemical Processing of Agricultural Fields**
Alexander Nebylov, Saint Petersburg State University of Aerospace Instrumentation, Russia
Vladimir Nebylov, Saint Petersburg State University of Aerospace Instrumentation, Russia
Alexander Panferov, Saint Petersburg State University of Aerospace Instrumentation, Russia

09:50 - 11:30
SESSION 7.4
University satellites and aerospace research and development
Room: Room E - Le Benedettine Congress Center
Chairs: Vladimir Saetchnikov, *Belarusian State University, Belarus*

09:50 **Hardware Accelerated Digital Signal Processing for Weather Satellite University Ground Station**
Siarhei Liashkevich, Belarusian State University, Belarus
Vasilina Baranova, Belarusian State University, Belarus
Vladimir Saetchnikov, Belarusian State University, Belarus
Oh Suchan, Belarusian State University, Belarus

10:10 **Shared CubeSat Bus Approach for the design and development of the Sapienza S5Lab nano satellites**
Lorenzo Frezza, DIMA - Sapienza University of Rome, Italy
Paolo Marzioli, DIMA - Sapienza University of Rome, Italy
Alessandro Moretti, DIMA - Sapienza University of Rome, Italy
Sidhant Kumar, DIMA - Sapienza University of Rome, Italy
Michela Boscia, DIMA - Sapienza University of Rome, Italy
Emanuele Bedetti, DIMA - Sapienza University of Rome, Italy
Niccolò Picci, DIMA - Sapienza University of Rome, Italy
Andrea Gianfermo, DIMA - Sapienza University of Rome, Italy
Diego Amadio, DIMA - Sapienza University of Rome, Italy

Federico Curianò, DIMA - Sapienza University of Rome, Italy
Fabrizio Piergentili, DIMA - Sapienza University of Rome, Italy
Luca Gugliermetti, DIAEE - Sapienza University of Rome, Italy
Fabio Santoni, DIAEE - Sapienza University of Rome, Italy

10:30   Orbital Parameters Pre-launch Calculation Methods for a Piggyback Launched University Small Satellite
Alexander Spiridonov, Belarusian State University, Belarus
Vasilina Baranova, Belarusian State University, Belarus
Dmitrii Ushakov, Belarusian State University, Belarus
Vladimir Saetchnikov, Belarusian State University, Belarus
Vladimir Cherny, Belarusian State University, Belarus

10:50   Formulation and Experimental design of Reusable launchers through Multiple Investigations (FERMI) : preliminary study of single stage to orbit concept
Sanjay Lakshminarayana, University of Pisa, Italy
Mario Rosario Chiarelli, University of Pisa, Italy

11:10   A preliminary feasibility analysis of a new data-relay small satellites constellation
Carla Cicala, University of Naples Federico II, Italy
Chiara Abbundo, University of Naples Federico II, Italy
Stefano Cannavacciuolo, University of Naples Federico II, Italy
Maria Daniela Graziano, University of Naples Federico II, Italy
Valerio Striano, Distretto Aerospaziale Campano, Italy
Roberto Del Prete, University of Naples Federico II, Italy

11:30 - 11:50
COFFEE BREAK
Room: Le Benedettine Congress Center

11:50 - 13:05
SESSION 8.1
Space to Space: Scientific and Technological Challenges for Human and Robotic Space Exploration - Part 2
Room: Room A - Le Benedettine Congress Center
Chairs: Vittorio Ancona, Thales Alenia Space, Italy
Pietro Ferraro, CNR - Institute of Applied Sciences and Intelligent Systems, Italy, CTS ASI
Paolo Maggiore, Politecnico di Torino, Italy
Piero Messidoro, Politecnico di Torino, Italy

11:50   Envision Mission
Renato Carbone, Thales Alenia Space, Italy
Serena Sette, Thales Alenia Space, Italy
Thomas Voirin, ESA - ESTEC, The Netherlands
Robert Buchwald, ESA - ESTEC, Italy

12:05   Euclid Mission
Franco Gilardi, Thales Alenia Space, Italy
Osvaldo Piersanti, ESA - ESTEC, The Netherlands

12:20   Innovative sensor networks for massive distributed thermal measurements in space applications under different environmental testing conditions
Alessandro Aimasso, Politecnico di Torino, Italy
Matteo D.L. Dalla Vedova, Politecnico di Torino, Italy
Paolo Maggiore, Politecnico di Torino, Italy

12:35   Topological optimization and additive manufacturing of a metal functional panel for multimission modular satellite platform
Fabrizia Caiazzo, University of Salerno, Italy
Vittorio Alfieri, University of Salerno, Italy
Annalaura Fabbricatore, University of Salerno, Italy
Paolo Argenio, University of Salerno, Italy

12:50   Regenerative Fuel Cell System (RFCS) for Lunar Night Survival of the European Large Logistic Lander (EL3)
Stewart Pelle, Thales Alenia Space, Italy
Andrea Festa, Thales Alenia Space, Italy

11:30 - 12:15
POSTER SESSION 1
Room: Le Benedettine Congress Center
Chairs: Gianluca Caposciutti, *University of Pisa, Italy*
Bernardo Tellini, *University of Pisa, Italy*

PS1-1   Mass and volume consumption of selected polymer composites under dry friction conditions
Jerzy Józwik, Lublin University of Technology, Poland
Katarzyna Biruk-Urban, Lublin University of Technology, Poland

PS1-2   Influence of Technological Parameters on Vibrations During Cutting of Difficult-to-Cut Materials with Using Water-Jet Machine
Michał Leleń, Lublin University of Technology, Poland
Jerzy Józwik, Lublin University of Technology, Poland

PS1-3   I-Box: An Automated Remote Sensing System for Space Scientific Instrumentation
Felipe Serrano, National Institue of Aerospace of Technology, Spain
Javier Martínez Oter, National Institue of Aerospace of Technology, Spain
Victor Apestigue, National Institue of Aerospace of Technology, Spain
Jesus Nuñez, National Institue of Aerospace of Technology, Spain

Saturnino Montalbo, National Institue of Aerospace of Technology, Spain
Jose R. de Mingo, National Institue of Aerospace of Technology, Spain
Isaías Carrasco, National Institue of Aerospace of Technology, Spain
Daniel Toledo, National Institue of Aerospace of Technology, Spain
Ignacio Arruego, National Institue of Aerospace of Technology, Spain

PS1-4   Point contact spectroscopy: a powerful technique for the low temperature characterization of superconducting materials

Paola Romano, University of Sannio, Italy
Francesco Avitabile, University of Sannio, Italy
Antonio Di Bartolomeo, University of Salerno, Italy
Filippo Giubileo, CNR-SPIN Salerno, Italy

PS1-5   Measurement of the fluidic resistance of the MicroMED optical particle counter

Diego Scaccabarozzi, Politecnico di Milano, Italy
Bortolino Saggin, Politecnico di Milano, Italy
Elimar Vieira Vaz Junior, Politecnico di Milano, Italy
Marco Giovanni Corti, Politecnico di Milano, Italy
Pietro Valnegri, Politecnico di Milano, Italy
Francesca Esposito, INAF - Osservatorio Astronomico di Capodimonte, Italy
Fabio Cozzolino, INAF - Osservatorio Astronomico di Capodimonte, Italy
Giuseppe Mongelluzzo, INAF - Osservatorio Astronomico di Capodimonte, Italy
Gabriele Franzese, INAF - Osservatorio Astronomico di Capodimonte, Italy
Carmen Porto, INAF - Osservatorio Astronomico di Capodimonte, Italy
Alan Cosimo Ruggeri, INAF - Osservatorio Astronomico di Capodimonte, Italy
Cesare Molfese, INAF - Osservatorio Astronomico di Capodimonte, Italy
Daniele Brienza, INAF – Institute for Space Astrophysics and Planetology, Italy
Fausto Cortecchia, INAF – Osservatorio di astrofisica e scienza dello spazio, Italy
Alberto Martin-Ortega, Instituto Nacional de Técnica Aeroespacial (INTA), Spain
Ignacio Arruego, Instituto Nacional de Técnica Aeroespacial (INTA), Spain
Nuria Andrés Santiuste, Instituto Nacional de Técnica Aeroespacial (INTA), Spain

PS1-6   Experimental Evaluation of Pose Initialization Methods for Relative Navigation Between Non-Cooperative Satellites

Sebastiano Chiodini, CISAS "Giuseppe Colombo", University of Padova, Italy
Marco Pertile, University of Padova, Italy
Pierdomenico Fracchiolla, University of Padova, Italy
Andrea Valmorbida, University of Padova, Italy
Enrico Lorenzini, University of Padova, Italy
Stefano Debei, University of Padova, Italy

PS1-7   DORA telescope project: preliminary characterization of the deployment mechanism

Pietro Valnegri, Politecnico di Milano, Italy
Bortolino Saggin, Politecnico di Milano, Italy
Diego Scaccabarozzi, Politecnico di Milano, Italy
Stefano Arrigoni, Politecnico di Milano, Italy
Fabrizio Capaccioni, INAF – Istituto di Astrofisica e Planetologia Spaziali, Italy
Giancarlo Bellucci, INAF – Istituto di Astrofisica e Planetologia Spaziali, Italy
Giovanna Rinaldi, INAF – Istituto di Astrofisica e Planetologia Spaziali, Italy

PS1-8 **Surface Ice Detection and Accretion Monitoring on Composite Structures employing Electromechanical Impedance Method**
Nicolas Christophel, University of Frankfurt, Germany
Sebastian Kohl, University of Frankfurt, Germany
Leandro Maio, University of Naples Federico II, Italy
Vittorio Memmolo, University of Naples Federico II, Italy
Jochen Moll, University of Frankfurt, Germany

12:15 - 13:00
POSTER SESSION 2
Room: Le Benedettine Congress Center
Chairs: Gianluca Caposciutti, *University of Pisa, Italy*
Bernardo Tellini, *University of Pisa, Italy*

PS2-1 **Design of the optical bench for the DORA telescope**
Stefano Arrigoni, Politecnico di Milano, Italy
Diego Scaccabarozzi, Politecnico di Milano, Italy
Pietro Valnegri, Politecnico di Milano, Italy
Bortolino Saggin, INAF – Istituto di Astrofisica e Planetologia Spaziali, Italy
Fabrizio Capaccioni, INAF – Istituto di Astrofisica e Planetologia Spaziali, Italy
Giancarlo Bellucci, INAF – Istituto di Astrofisica e Planetologia Spaziali, Italy
Giovanna Rinaldi, INAF – Istituto di Astrofisica e Planetologia Spaziali, Italy

PS2-2 **Coverage optimization of satellite formations using Instantaneous overlap area**
Karthick Dharmarajan, Sapienza University of Rome, Italy

PS2-3 **Development of highly reliable UVM-based Verification Environment for SpaceWire Codec**
Simone Vagaggini, University of Pisa, IngeniArs S.r.l, Italy
Roberto Ciardi, University of Pisa, IngeniArs S.r.l, Italy
Marco Trafeli, IngeniArs S.r.l, Italy
Luca Fanucci, University of Pisa, Italy

PS2-4 **Design of a Test Equipment Prototype for SpaceWire Data Generation and Processing in a Specific Time-Constrained Test Scenario**
Roberto Ciardi, University of Pisa, IngeniArs S.r.l, Italy
Simone Vagaggini, University of Pisa, IngeniArs S.r.l, Italy
Antonino Marino, IngeniArs S.r.l, Italy
Luca Fanucci, University of Pisa, Italy

PS2-5 **Temperature Compensation Strategies for Lamb Wave Inspection using Distributed Sensor Networks**
Massimiliano Olino, University of Naples Federico II, Italy
Yevgeniya Lugovtsova, Federal Institute for Materials Research and Testing, Germany
Vittorio Memmolo, University of Naples Federico II, Italy
Jens Prager, Federal Institute for Materials Research and Testing, Germany

PS2-6   Optical Alignment of DORA Telescope: design and description of the laboratory setup
Igor Di Varano, INAF - Institute for Space Astrophysics and Planetology, Italy
Fabrizio Capaccioni, INAF - Institute for Space Astrophysics and Planetology, Italy
Gianrico Filacchione, INAF - Institute for Space Astrophysics and Planetology, Italy
Giovanna Rinaldi, INAF - Institute for Space Astrophysics and Planetology, Italy
Giancarlo Bellucci, INAF - Institute for Space Astrophysics and Planetology, Italy
Vincenzo della Corte, INAF - Institute for Space Astrophysics and Planetology, Italy
Bortolino Saggin, Politecnico di Milano, Italy
Pietro Valnegri, Politecnico di Milano, Italy

PS2-7   Remote sensing by drones of areas infected by Xylella Fastidiosa by using multispectral techniques
Francesco Adamo, Politecnico di Bari, Italy
Gregorio Andria, Politecnico di Bari, Italy
Filippo Attivissimo, Politecnico di Bari, Italy
Attilio Di Nisio, Politecnico di Bari, Italy

PS2-8   Beamriding Homing Systems for UAV: New Approaches and Applications
Enrico Petritoli, Roma Tre University, Italy
Fabio Leccese, Roma Tre University, Italy

PS2-9   University Mobile Optical Surveillance System For Low-Earth Space Object Orbit Determination
Alexander Spiridonov, Belarusian State University, Belarus
Vasilina Baranova, Belarusian State University, Belarus
Dmitrii Ushakov, Belarusian State University, Belarus
Vladimir Saetchnikov, Belarusian State University, Belarus
Zoya Kenko, Belarusian State University, Belarus
Dzianis Zasmuzhats, Belarusian State University, Belarus
Vitaly Mechinsky, Belarusian State University, Belarus

PS2-10   Simple and Economical Shearography System for Testing of Aeronautical Composite Material
Giuseppe Schirripa Spagnolo, Roma Tre University, Italy
Mariagrazia Leccisi, Roma Tre University, Italy
Fabio Leccese, Roma Tre University, Italy

13:00 - 14:20
LUNCH
Room: Le Benedettine Congress Center

14:20 - 16:00

SESSION 9.1

Space to Space: Scientific and Technological Challenges for Human and Robotic Space Exploration - Part 3

Room: Room A - Le Benedettine Congress Center

Chairs: Vittorio Ancona, Thales Alenia Space, Italy
Pietro Ferraro, CNR - Institute of Applied Sciences and Intelligent Systems, Italy, CTS ASI
Paolo Maggiore, Politecnico di Torino, Italy
Piero Messidoro, Politecnico di Torino, Italy

14:20 **Combining Visible Light Communication and Bifocal Metrology for Space Applications**
Veronica Spirito, Scuola Superiore Sant'Anna, Italy
Giulio Cossu, Scuola Superiore Sant'Anna, Italy
Ernesto Ciaramella, Scuola Superiore Sant'Anna, Italy

14:40 **Multifunctional Smart Skin Lighting System (MiSS-LS)**
Donata Valletti, Thales Alenia Space, Italy
Lucia Grizzaffi, Thales Alenia Space, Italy

14:55 **LuNaDrone: Small Autonomous Spacecraft for Lunar Lava Tubes Exploration**
Stefano Pescaglia, Politecnico di Torino, Italy
Giuseppe Bortolato, Politecnico di Torino, Italy
Paolo Maggiore, Politecnico di Torino, Italy
Piero Messidoro, Politecnico di Torino, Italy

15:10 **Innovative biosensor for testing the astronaut health during spaceflight**
Danila del Giudice, CNR - Institute of Applied Sciences and Intelligent Systems, Italy
Simona Itri, CNR - Institute of Applied Sciences and Intelligent Systems, Italy
Martina Mugnano, CNR - Institute of Applied Sciences and Intelligent Systems, Italy
Silvia Mari, Italian Space Agency, Italy
Francesca Ferranti, Italian Space Agency, Italy
Volodymyr Tkachenko, CNR - Institute of Applied Sciences and Intelligent Systems, Italy
Simonetta Grilli, CNR - Institute of Applied Sciences and Intelligent Systems, Italy
Pier Luca Maffettone, University of Naples Federico II, Italy

15:25 **Development and exploration of space weightlessness physiological effect tester**
Yongchao Zhang, Beijing Aerospace Institute for Metrology and Measurement Technology, China
Tieli Zhang, Beijing Aerospace Institute for Metrology and Measurement Technology, China
Xiaoxu Liu, Beijing Aerospace Institute for Metrology and Measurement Technology, China
Lin Liu, Beijing Aerospace Institute for Metrology and Measurement Technology, China
Yulu Wang, Beijing Aerospace Institute for Metrology and Measurement Technology, China
Fan Yang, Beijing Aerospace Institute for Metrology and Measurement Technology, China

15:40 **OrbiTecture: Technologies for New Space Habitats Paradigms**
Gennaro Russo, Center for Near Space, Italy

14:20 - 15:00
TUTORIAL SESSION 5
Room: Room B - Le Benedettine Congress Center
Chair: Gabriele Bandini, *University of Pisa, Italy*

Experimental implementation and study of the lightning swept-stroke along an aircraft

Vincent Andraud, *THE FRENCH AEROSPACE LAB ONERA, FRANCE*

14:20 - 15:40
SESSION 9.3
Sensors and Solutions for Autonomous Aerospace Systems
Room: Room C - Le Benedettine Congress Center
Chairs: Domenico Accardo, *University of Naples Federico II, Italy*
Giorgio de Alteriis, *University of Naples Federico II, Italy*
Verdiana Bottino, *University of Naples Federico II, Italy*

14:20 **System Architecture Design of a UAV for Automated Cinematography in GNSS-Challenging Scenarios**
Verdiana Bottino, University of Naples Federico II, Italy
Giorgio de Alteriis, University of Naples Federico II, Italy
Rosario Schiano Lo Moriello, University of Naples Federico II, Italy
Domenico Accardo, University of Naples Federico II, Italy

14:40 **Trajectory Prediction and Conflict Detection for Unmanned Traffic Management: a Performance Comparison of Neural Network-Based Approaches**
Dario De Dominicis, University of Naples Federico II, Italy
Claudia Conte, University of Naples Federico II, University of Bergamo, Italy
Fausta Mattei, University of Naples Federico II, Italy
Giancarlo Rufino, University of Naples Federico II, Italy
Domenico Accardo, University of Naples Federico II, Italy

15:00 **Development of an Embedded System-Based Dropper Payload for Drones**
Enzo Caputo, University of Naples Federico II, Italy
Giorgio de Alteriis, University of Naples Federico II, Italy
Claudia Conte, University of Naples Federico II, Italy
Martina Nocerino, University of Naples Federico II, Italy
Paola Pepe, University of Naples Federico II, Italy
Sonia Elia, University of Naples Federico II, Italy
Antonio Bosco, University of Naples Federico II, Italy
Giuseppe Cringoli, University of Naples Federico II, Italy
Laura Rinaldi, University of Naples Federico II, Italy
Giancarlo Rufino, University of Naples Federico II, Italy
Domenico Accardo, University of Naples Federico II, Italy

15:20 **Innovative Fusion Strategy for MEMS Redundant-IMU Exploiting Custom 3D Components**
Giorgio de Alteriis, University of Naples Federico II, Italy
Alessia Teresa Silvestri, University of Naples Federico II, Italy
Verdiana Bottino, University of Naples Federico II, Italy
Enzo Caputo, University of Naples Federico II, Italy
Francesco Bonavolontà, University of Naples Federico II, Italy
Rosario Schiano Lo Moriello, University of Naples Federico II, Italy
Antonino Squillace, University of Naples Federico II, Italy
Domenico Accardo, University of Naples Federico II, Italy

14:20 - 15:40
SESSION 9.4
Measurements in the Research of Aerodynamics and Control of Unmanned Aerial Vehicles
Room: Room E - Le Benedettine Congress Center
Chairs: Zbigniew Czyż, *Lublin University of Technology, Poland*
Jerzy Józwik, *Lublin University of Technology, Poland*

14:20 **Effect of fuel injection timing variation in a newly designed opposite piston diesel engine for unmanned aerial vehicles**
Karthick Chinnadurai, Vellore Institute of Technology, India
Nanthagopal Kasianantham, Vellore Institute of Technology, India
Michał Jan Gęca, Lublin University of Technology, Poland
Łukasz Stradomski, WSK PZL-KALISZ S.A., Poland

14:40 **Analysis of the energy balance of a newly designed opposite piston diesel engine for unmanned aerial vehicles in the event of a change in the fuel injection angle**
Paweł Magryta, Lublin University of Technology, Poland
Piotr Borowiec, WSK PZL-KALISZ S.A., Poland

15:00 **Temperature Measurement of the Selected UAV Electronic Components**
Zbigniew Czyż, Polish Air Force University, Poland
Paweł Karpiński, Lublin University of Technology, Poland
Krzysztof Skiba, Lublin University of Technology, Poland
Paweł Magryta, Lublin University of Technology, Poland

15:20 **Deformation measurement system for the fuselage of an unmanned aircraft vehicle**
Zbigniew Czyż, Polish Air Force University, Poland
Paweł Karpiński, Lublin University of Technology, Poland
Krzysztof Skiba, Lublin University of Technology, Poland
Patryk Jakubczak, Lublin University of Technology, Poland
Piotr Podolak, Lublin University of Technology, Poland
Magda Droździel-Jurkiewicz, Lublin University of Technology, Poland

15:40 - 16:00
COFFEE BREAK
Room: Le Benedettine Congress Center

16:00 - 16:30
Closing and Award Ceremony
Room: Room A - Le Benedettine Congress Center