

# **2021 IEEE 8th International Workshop on Metrology for AeroSpace (MetroAeroSpace 2021)**

**Virtual Conference  
23 – 25 June 2021**



**IEEE Catalog Number: CFP2132W-POD  
ISBN: 978-1-7281-7557-7**

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IEEE Catalog Number:	CFP2132W-POD
ISBN (Print-On-Demand):	978-1-7281-7557-7
ISBN (Online):	978-1-7281-7556-0
ISSN:	2575-7482

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# WORKSHOP PROGRAM

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Wednesday, June 23

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## ***SESSION 1.1 - Special Session - Sensors and Solutions for Autonomous Aerospace Systems***

**Room: Virtual Room #1**

**Chairs:** Domenico Accardo, *University of Naples Federico II, Italy*  
Claudia Conte, *University of Naples Federico II, University of Bergamo, Italy*  
Giorgio de Alteriis, *University of Naples Federico II, University of Bergamo, Italy*

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*Giorgio de Alteriis, University of Naples Federico II, University of Bergamo, Italy*  
*Verdiana Bottino, University of Naples Federico II, Italy*  
*Claudia Conte, University of Naples Federico II, University of Bergamo, Italy*  
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*Francesco De Pandi, University of Naples Federico II, Italy*  
*Enzo Caputo, University of Naples Federico II, Italy*  
*Rosario Schiano Lo Moriello, University of Naples Federico II, Italy*  
*Giancarlo Rufino, University of Naples Federico II, Italy*  
*Domenico Accardo, University of Naples Federico II, Italy*

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## ***SESSION 1.2 - Special Session - Measurement for improving quality, reliability and safety in aerospace applications***

**Room: Virtual Room #2**

**Chairs:** Marcantonio Catelani, *University of Florence, Italy*  
Lorenzo Ciani, *University of Florence, Italy*  
Gabriele Patrizi, *University of Florence, Italy*

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*A. Ampollini, ENEA CR Frascati, Italy*  
*E. Cisbani, Istituto Superiore di Sanità (ISS), Italy*  
*C. De Angelis, Istituto Superiore di Sanità (ISS), Italy*  
*S. Della Monaca, Istituto Superiore di Sanità (ISS), Italy*  
*P. Nenzi, ENEA CR Frascati, Italy*  
*E. Nichelatti, ENEA CR Casaccia, Italy*  
*G.B. Palmerini, Sapienza University of Rome, Italy*  
*L. Picardi, ENEA CR Frascati, Italy*  
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*M. Sabatini, Sapienza University of Rome, Italy*
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*Giuseppe Martinotti, Tyvak International, Italy*  
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*Gianmarco Munaò, University of Messina, Italy*  
*Marcello Raffaele, University of Messina, Italy*  
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*Lorenzo Ciani, University of Florence, Italy*  
*Gabriele Patrizi, University of Florence, Italy*  
*Antonio Pietrosanto, University of Salerno, Italy*  
*Roberto Singuaroli, University of Florence, Italy*  
*Paolo Sommella, University of Salerno, Italy*

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## **SESSION 1.3 - General Session - Part I**

**Room:** Virtual Room #3

**Chairs:** Enrico Lorenzini, *University of Padova, Italy*

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*Anton Danici, Moldova State University, Republic of Moldova*  
*Petru Lozovanu, Moldova State University, Republic of Moldova*  
*Florentin Paladi, Moldova State University, Republic of Moldova*
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*Pietro Valnegri, Politecnico di Milano, Italy*  
*Francesca Esposito, INAF - Osservatorio Astronomico di Capodimonte, Italy*  
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*Marco Giovanni Corti, 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*
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*Piero Gili, Polytechnic University of Turin, Italy*  
*Marco Pisani, Istituto Nazionale di Ricerca Metrologica, Italy*

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**Chairs:** Konrad Wojtowicz, *Military University of Technology, Poland*

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*Umberto Papa, University of Naples “Parthenope”, Italy*  
*Giuseppe Del Core, University of Naples “Parthenope”, Italy*

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*Andrea Conte, University of Padova, Italy*  
*Daniele Panariti, University of Padova, Italy*  
*Lorenzo Olivieri, CISAS G. Colombo, University of Padova, Italy*

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## **SESSION 2.3 - General Session - Part II**

**Room: Virtual Room #3**

**Chairs:** Giancarlo Rufino, *University of Naples Federico II, Italy*

*Claudia Conte, University of Naples Federico II, University of Bergamo, Italy*

*Giorgio de Alteriis, University of Naples Federico II, University of Bergamo, Italy*

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*Mark Price, Queen's University Belfast, UK*  
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*Colm Higgins, Queen's University Belfast, UK*  
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*Walter Matta, Vitrociset S.p.A, Italy*  
*Antonio Romano, Vitrociset S.p.A, Italy*  
*Marilena Fittipaldi, Vitrociset S.p.A, Italy*  
*Ferdinando Dolce, Italian Ministry of Defence*  
*Andrea Ventimiglia, Italian Ministry of Defence*  
*Walter Villadei, Italian Ministry of Defence – Italian Air Force*  
*Riccardo Cipollone, Politecnico di Milano, Italy*  
*Pierluigi Di Lizia, Politecnico di Milano, Italy*  
*Giancarmine Fasano, University of Naples “Federico II”, Italy*
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**Thursday, June 24**

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**SESSION 3.1 - Special Session - Metrology for Radar Systems - Part I**

**Room: Virtual Room #1**

**Chairs:** *Alfonso Farina, Selex ES Consultant, Italy*  
*Silvia Liberata Ullo, University of Sannio, Italy*

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*Luca Timmoneri, Leonardo S.p.A., Italy*  
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*Mariusz Pakowski, Air Force Institute of Technology (AFIT), Poland*  
*Zbigniew Jakielaszek, Air Force Institute of Technology (AFIT), Poland*  
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*Marco Galloro, Leonardo S.p.A., Italy*

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**Room: Virtual Room #2**

**Chairs:** *Vito Pagliarulo, CNR-ISASI, Italy*  
*Pietro Ferraro, CNR-ISASI, Italy*  
*Ettore Stella, CNR-ISASI, Italy*  
*Nicola Gallo, Leonardo S.p.A.*

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*Pietro Russo, IPCB, CNR, Italy*  
*Antonio Langella, University of Naples "Federico II", Italy*  
*Giulia Leone, ISASI, CNR, Italy*  
*Gennaro D'Angelo, ISASI, CNR, Italy*  
*Pietro Ferraro, ISASI, CNR, Italy*  
*Vito Pagliarulo, ISASI, CNR, Italy*

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*Massimo Rippa, ISASI, CNR, Italy*  
*Vito Pagliarulo, ISASI, CNR, Italy*  
*Pasquale Mormile, ISASI, CNR, Italy*  
*Pietro Ferraro, ISASI, CNR, Italy*  
*Pietro Russo, IPCB, CNR, Italy*  
*Federica Donadio, University of Naples Federico II, Italy*  
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*Nicola Mosca, STIIMA, CNR, Italy*  
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*Massimiliano Nitti, STIIMA, CNR, Italy*  
*Ettore Stella, STIIMA, CNR, Italy*

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*Davide Palumbo, Politecnico di Bari, Italy*  
*Michele Attolico, National Research Council, Italy*  
*Giuseppe Bono, National Research Council, Italy*  
*Umberto Galietti, Politecnico di Bari, Italy*  
*Tiziana D'Orazio, National Research Council, Italy*



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**SESSION 3.3 - Special Session - Measurements and Instrumentation for Autonomous Spacecraft and Planetary Exploration - Part I**

**Room: Virtual Room #3**

**Chairs:** Sebastiano Chiodini, *University of Padua, Italy*  
Riccardo Giubilato, *German Aerospace Center (DLR), Germany*  
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*Andrea Ferrero, Keysight Technologies*  
*Ruihua Wang, Keysight Technologies*  
*Marco Garelli, Keysight Technologies*  
*Suren Singh, Keysight Technologies*  
*Say Phommakesone, Keysight Technologies*  
*Rusty Mayers, Keysight Technologies*  
*Derek Lee, Keysight Technologies*

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*Andrea Valmorbida, University of Padua, Italy*  
*Enrico Lungavia, University of Padua, Italy*  
*Enrico C. Lorenzini, University of Padua, Italy*

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*Gabriele Franzese, INAF, Italy*  
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*Francesca Esposito, INAF, Italy*  
*Alan Cosimo Ruggeri, INAF, Italy*  
*Carmen Porto, INAF, Italy*  
*Cesare Molfese, INAF, Italy*  
*Simone Silvestro, INAF, Italy, SETI Institute, USA*  
*Ciprian Ionut Popa, INAF, Italy*  
*Diego Scaccabarozzi, Politecnico di Milano, Italy*  
*Bortolino Saggin, Politecnico di Milano, Italy*  
*Alberto Martin-Ortega, Instituto Nacional de Técnica Aeroespacial, Spain*  
*Ignacio Arruego, Instituto Nacional de Técnica Aeroespacial, Spain*  
*José Ramon De Mingo, Instituto Nacional de Técnica Aeroespacial, Spain*  
*Nuria Andrés Santiuste, Instituto Nacional de Técnica Aeroespacial, Spain*  
*Daniele Brienza, INAF, Italy*  
*Fausto Cortecchia, INAF, Italy*  
*Jonathan P. Merrison, Aarhus University, Denmark*  
*Jens Jacob Iversen, Aarhus University, Denmark*

- 247 **MicroMED: study of the relation between signal durations and grain diameters**  
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*Giuseppe Mongelluzzo, INAF – Osservatorio Astronomico di Capodimonte, Italy*  
*Fabio Cozzolino, INAF – Osservatorio Astronomico di Capodimonte, Italy*  
*Carmen Porto, INAF – Osservatorio Astronomico di Capodimonte, Italy*  
*Alan Cosimo Ruggeri, INAF – Osservatorio Astronomico di Capodimonte, Italy*  
*Francesca Esposito, INAF – Osservatorio Astronomico di Capodimonte, Italy*  
*Fausto Cortecchia, INAF – Astrophysics and Space Science Observatory (OAS), Italy*  
*Alberto Martín-Ortega, Instituto Nacional de Técnica Aeroespacial, Spain*  
*Nuria Andrés Santiuste, Instituto Nacional de Técnica Aeroespacial, Spain*  
*José Ramon De Mingo, Instituto Nacional de Técnica Aeroespacial, Spain*  
*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*  
*Ignacio Arruego, Instituto Nacional de Técnica Aeroespacial, Spain*
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*Lorenzo Olivieri, CISAS "G. Colombo", University of Padova, Italy*  
*Giulia Sarego, CISAS "G. Colombo", University of Padova, Italy*  
*Alice Brunello, CISAS "G. Colombo", University of Padova, Italy*  
*Davide Vertuani, CISAS "G. Colombo", University of Padova, Italy*  
*Carlo Bettanini, University of Padova, Italy*  
*Marco Pertile, University of Padova, Italy*  
*Enrico C. Lorenzini, University of Padova, Italy*

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## **SESSION 4.1 - Special Session - Metrology for Radar Systems - Part II**

### **Room: Virtual Room #1**

**Chairs:** Alfonso Farina, *Selex ES Consultant, Italy*

*Silvia Liberata Ullo, University of Sannio, Italy*

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*Susanna Spinsante, Università Politecnica delle Marche, Italy*  
*Ennio Gambi, Università Politecnica delle Marche, Italy*
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*Mariusz Pakowski, Air Force Institute of Technology, Poland*  
*Mirosław Myszka, Air Force Institute of Technology, Poland*  
*Mirosław Michalczewski, Air Force Institute of Technology, Poland*  
*Peter Kovacs, Pro Patria Electronics, Hungary*  
*Szabolcs Makai, Pro Patria Electronics, Hungary*
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*Augusto Aubry, University of Napoli Federico II, Italy*  
*Vincenzo Carotenuto, University of Napoli Federico II, Italy*  
*Antonio De Maio, University of Napoli Federico II, Italy*
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*Augusto Aubry, University of Napoli Federico II, Italy*  
*Antonio De Maio, University of Napoli Federico II, Italy*  
*Massimo Rosamilia, University of Napoli Federico II, Italy*
- 283 **Measurements of the Radar Cross Section of a nano-drone at K-band**  
*Alessio Balleri, Cranfield University, Defence Academy of the UK, UK*

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## **SESSION 4.2 - General Session - Part III**

**Room: Virtual Room #1**

**Chairs:** Ioan Tudosa, *University of Sannio, Italy*

**288 Satellite-derived Time for Enhanced Telecom Networks Synchronization: the ROOT Project**

*Marco Pini, Fondazione LINKS, Italy*  
*Alex Minetto, Politecnico di Torino, Italy*  
*Andrea Vesco, Fondazione LINKS, Italy*  
*Diana Berbecaru, Politecnico di Torino, Italy*  
*Luis Miguel Contreras Murillo, Telefonica, Spain*  
*Pierre Nemry, Septentrio, Belgium*  
*Ivan De Francesca, Telefonica, Spain*  
*Benoit Rat, Seven Solutions, Spain*  
*Krel Callewaert, Valdani Vicari e Associati, Belgium*

**294 An FFT-based method for Doppler observables estimation in Deep Space tracking**

*Andrea Togni, Alma Mater Studiorum - Università di Bologna, Italy*  
*Marco Zannoni, Alma Mater Studiorum - Università di Bologna, Italy*  
*Luis Gómez Casajús, Alma Mater Studiorum - Università di Bologna, Italy*  
*Paolo Tortora, Alma Mater Studiorum - Università di Bologna, Italy*

**300 Interference Mitigation and T-RAIM for Robust GNSS Timing**

*Ciro Gioia, European Commission, Joint Research Centre*  
*Daniele Borio, European Commission, Joint Research Centre*

**305 Overview of optical observation strategies and systems: LEO and GEO measurements acquisition for position and attitude determination**

*Lorenzo Mariani, Sapienza University of Rome, Italy*  
*Paola Celesti, Sapienza University of Rome, Italy*  
*Federico Curianò, Sapienza University of Rome, Italy*  
*Lorenzo Cimino, Sapienza University of Rome, Italy*  
*Luigi di Palo, Sapienza University of Rome, Italy*  
*Shariar Hadji Hossein, Sapienza University of Rome, Italy*  
*Matteo Rossetti, Sapienza University of Rome, Italy*  
*Mascia Bucciarelli, Sapienza University of Rome, Italy*  
*Gaetano Zarcone, Sapienza University of Rome, Italy*

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## **SESSION 4.3 - Special Session - Measurements and Instrumentation for Autonomous Spacecraft and Planetary Exploration - Part II**

**Room: Virtual Room #3**

**Chairs:** Sebastiano Chiodini, *University of Padua, Italy*

*Riccardo Giubilato, German Aerospace Center (DLR), Germany*  
*Marco Pertile, University of Padua, Italy*

**311 Preliminary structural design of PANCAM, a bifocal panoramic camera for planetary observation**

*Diego Scaccabarozzi, Politecnico di Milano, Italy*  
*Bortolino Saggìn, Politecnico di Milano, Italy*  
*Marco Giovanni Corti, Politecnico di Milano, Italy*  
*Pietro Valnegri, Politecnico di Milano, Italy*  
*Claudio Pernechele, INAF - Osservatorio Astronomico di Padova, Italy*  
*Luigi Lessio, INAF - Osservatorio Astronomico di Padova, Italy*  
*Lorenzo Paoletti, INAF - Osservatorio Astronomico di Padova, Italy*  
*Luca Consolaro, LOBRE srl Brescia, Italy*

- 317 **Design of a user-friendly control system for planetary rovers with CPS feature**  
*Sebastiano Chiodini, CISAS "G. Colombo", University of Padova, Italy*  
*Riccardo Giubilato, Institute of Robotics and Mechatronics DLR, Germany*  
*Marco Pertile, University of Padova, Italy*  
*Annarita Tedesco, University of Bordeaux, France*  
*Domenico Accardo, University of Napoli Federico II, Italy*  
*Stefano Debei, University of Padova, Italy*
- 322 **A Robust Crater Matching Algorithm for Autonomous Vision-Based Spacecraft Navigation**  
*Roberto Del Prete, University of Naples Federico II, Italy*  
*Alfredo Renga, University of Naples Federico II, Italy*
- 328 **LIDAR pointing and parameters control for close proximity operations with uncooperative target**  
*Alessia Nocerino, University of Naples "Federico II", Italy*  
*Roberto Opromolla, University of Naples "Federico II", Italy*  
*Giancarmine Fasano, University of Naples "Federico II", Italy*  
*Michele Grassi, University of Naples "Federico II", Italy*
- 334 **Rovers Localization by using 3D-to-3D and 3D-to-2D Visual Odometry**  
*Simone Andolfo, Sapienza-University of Rome, Italy*  
*Flavio Petricca, Sapienza-University of Rome, Italy*  
*Antonio Genova, Sapienza-University of Rome, Italy*

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## **SESSION 5.1 - Special Session - Manufacturing and metrology in the aerospace industry**

### **Room: Virtual Room #1**

- Chairs:** *Jerzy Józwick, Lublin University of Technology, Poland*  
*Dariusz Mazurkiewicz, Lublin University of Technology, Poland*  
*Ireneusz Zagórski, Lublin University of Technology, Poland*
- 340 **Temperature Field During the Hot Pressing of Ceramic Gas Turbine Components**  
*Vasily Dutka, Ukraine National Academy of Sciences, Ukraine*  
*Edwin Gevorkyan, Ukrainian State University of Railway Transport, Ukraine*  
*Mirosław Rucki, Kazimierz Pulaski University of Technology and Humanities, Poland*  
*Zbigniew Siemiatkowski, Kazimierz Pulaski University of Technology and Humanities, Poland*  
*Dmitrij Morozow, Kazimierz Pulaski University of Technology and Humanities, Poland*  
*Vladimir Chishkala, V. N. Karazin Kharkiv National University, Ukraine*
- 344 **Influence of machining with ceramic brushes on the surface quality of EN-AW 7075 aluminum alloy after abrasive waterjet process**  
*Jakub Matuszak, Lublin University of Technology, Poland*
- 349 **Research on I/Q phase demodulation algorithm for synthetic wavelength ranging based on optical frequency comb**  
*Yongyao Xu, Beijing Aerospace Institute for Metrology and Measurement, China*  
*Xiaoqiang Gao, Beijing Aerospace Institute for Metrology and Measurement, China*  
*Lin Liu, Beijing Aerospace Institute for Metrology and Measurement, China*  
*Tieli Zhang, Beijing Aerospace Institute for Metrology and Measurement, China*
- 354 **Comparative analysis of the measurement accuracy of geometric features of aircraft components measured by 3D digitisation system and coordinate measuring technique**  
*Józef Kuczmazewski, Lublin University of Technology, Poland*  
*Jerzy Józwick, Lublin University of Technology, Poland*  
*Paweł Pieśko, Lublin University of Technology, Poland*  
*Magdalena Zawada-Michałowska, Lublin University of Technology, Poland*
- 359 **Mass Wear Measurement of Airport Baggage Belt Conveyor Systems**  
*Jerzy Józwick, Lublin University of Technology, Poland*  
*Ireneusz Zagórski, Lublin University of Technology, Poland*  
*Dariusz Mazurkiewicz, Lublin University of Technology, Poland*

- 365 **Design and FEM Analysis of an Unmanned Aerial Vehicle Wing**  
*Leszek Semotiuk, Lublin University of Technology, Poland*  
*Jerzy Jóźwik, Lublin University of Technology, Poland*  
*Kamila Kukielka, The State School of Higher Education in Chelm, Poland*  
*Krzysztof Dziedzic, Lublin University of Technology, Poland*
- 371 **Aviation Magnesium Alloys Milling - The Case Study**  
*Ireneusz Zagórski, Lublin University of Technology, Poland*  
*Jerzy Jóźwik, Lublin University of Technology, Poland*

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**SESSION 5.2 - Special Session - Complex systems operational availability: measurements, methodologies and requirements**

**Room: Virtual Room #1**

**Chairs:** Fabio Leccese, *Università Roma Tre, Italy*

- 376 **Navigation Equations, Uncertainty and Error Budget in Inertial Navigation Systems**  
*Enrico Petritoli, Università degli Studi "Roma Tre", Italy*  
*Fabio Leccese, Università degli Studi "Roma Tre", Italy*
- 381 **MPRR and Pegasis Routing Protocol comparison for Aerospace application**  
*Marco Cagnetti, Università degli Studi "Roma Tre", Italy*  
*Mariagrazia Leccisi, Università degli Studi "Roma Tre", Italy*  
*Fabio Leccese, Università degli Studi "Roma Tre", Italy*
- 387 **Characterization of high-sensitive thermoplastic strain gauge sensor as wearable tool for monitoring spacesuit movement impediment**  
*F. Maita, IMM - CNR, Italy*  
*A. Piccardi, IMM - CNR, Italy*  
*I. Lucarini, IMM - CNR, Italy*  
*M. Scatto, Nadir srl, Italy*  
*M. Ruggeri, ESTE srl, Italy*  
*L. Maiolo, IMM - CNR, Italy*
- 392 **Low temperature dielectrics for improving interface state density in SiC devices to be deployed in avionics**  
*Luca Maiolo, IMM - CNR, Italy*  
*Ivano Lucarini, IMM - CNR, Italy*  
*Armando Piccardi, IMM - CNR, Italy*  
*Francesco Maita, IMM - CNR, Italy*
- 397 **Flexible CMUT as smart tool for nondestructive testing of aircraft composite structures**  
*I. Lucarini, IMM - CNR, Università Degli Studi Roma Tre, Italy*  
*F. Maita, IMM - CNR, Italy*  
*L. Maiolo, IMM - CNR, Italy*  
*A. Savoia, Università Degli Studi Roma Tre, Italy*
- 402 **Design of a Thermographic System for Fire Prevention in Aircraft Cabins**  
*Giuseppe Schirripa Spagnolo, Università degli Studi "Roma Tre", Italy*  
*Fabio Leccese, Università degli Studi "Roma Tre", Italy*
- 407 **System to Monitor IR Radiation of LED Aircraft Warning Lights**  
*Giuseppe Schirripa Spagnolo, Università degli Studi "Roma Tre", Italy*  
*Fabio Leccese, Università degli Studi "Roma Tre", Italy*

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**SESSION 5.3 - Special Session - Measurements and Instrumentation for Autonomous Spacecraft and Planetary Exploration - Part III**

**Room: Virtual Room #3**

**Chairs:** Sebastiano Chiodini, *University of Padua, Italy*

*Riccardo Giubilato, German Aerospace Center (DLR), Germany*

*Marco Pertile, University of Padua, Italy*

- 412 **Acquisition Analysis for Small-Satellite Optical Crosslinks**  
*Francesco Sansone, Stellar Project s.r.l., Italy*  
*Francesco Branz, University of Padova, Italy*  
*Andrea Vettor, CISAS, University of Padova, Italy*  
*Alessandro Francesconi, Stellar Project s.r.l., University of Padova, Italy*
- 418 **Numerical Simulations for Planetary Rovers Safe Navigation and LIDAR Based Localization**  
*Anna Maria Gargiulo, Sapienza University of Rome, Italy*  
*Ivan di Stefano, Sapienza University of Rome, Italy*  
*Antonio Genova, Sapienza University of Rome, Italy*
- 424 **Characterization of a new positioning sensor for space capture**  
*Alex Caon, CISAS, University of Padova, Italy*  
*Francesco Branz, University of Padova, Italy*  
*Alessandro Francesconi, University of Padova, Italy*
- 430 **A conceptual study to characterize properties of space debris from hypervelocity impacts through Thin Film Heat Flux Gauges**  
*Leonardo Barilaro, Department of Aviation - MCAST, Malta*  
*Chiara Falsetti, University of Oxford, UK*  
*Lorenzo Olivieri, CISAS "G.Colombo", University of Padova, Italy*  
*Cinzia Giacomuzzo, University of Padova, Italy*  
*Alessandro Francesconi, University of Padova, Italy*  
*Paul Beard, University of Oxford, UK*  
*Robert Camilleri, University of Malta, Malta*
- 436 **Artificial Neural Network Calibration of Wide Range of Motion Biaxial Inclinometers**  
*Ilija Jovanovic, Ryerson University, Canada*  
*Shaghayegh Khodabakhshian Khonsari, Ryerson University, Canada*  
*John Enright, Ryerson University, Canada*
- 442 **JANUS Optical Head Line of Sight Temperature dependence Characterization and Validation by on ground test**  
*Andrea Turella, Leonardo S.p.A., Italy*  
*Vincenzo Della Corte, INAF-IAPS, Italy*  
*Pasquale Palumbo, Parthenope University, Italy*  
*Marilena Amoroso, ASI, Italy*  
*Raffaele Mugnuolo, ASI, Italy*  
*Giovanni Enrico Noci, Leonardo S.p.A., Italy*

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**Friday, June 25**

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**SESSION 6.1 - Special Session - S2S - Space to Space: Scientific and Technological Challenges for Human and Robotic Space Exploration - Part I**

**Room: Virtual Room #1**

**Chairs:** Vittorio Ancona, *Thales Alenia Space*

Pietro Ferraro, *CNR Institute of Applied Sciences and Intelligent Systems*

Paolo Maggiore, *Politecnico di Torino*

Piero Messidorio, *Politecnico di Torino*

448 **The new metrology for Space might not be SMART**

*Anilkumar Dave, INFINITE AREA, Italy*

*Stephan Reckie, Global Entrepreneurship Network, USA*

*Valerio Cometti, V12 Design Space, Italy*

*Marco Generali, V12 Design Space, Italy*

**453 A deployable and inflatable robotic arm concept for aerospace applications**

*Pierpaolo Palmieri, Politecnico di Torino, Italy*  
*Matteo Gaidano, Politecnico di Torino, Italy*  
*Mario Troise, Politecnico di Torino, Italy*  
*Laura Salamina, Politecnico di Torino, Italy*  
*Andrea Ruggeri, Politecnico di Torino, Italy*  
*Stefano Mauro, Politecnico di Torino, Italy*

**459 Biocompatible micro needles for smart therapy**

*Sara Coppola, ISASI- CNR, Italy*  
*Veronica Vespini, ISASI- CNR, Italy*  
*Gaetano D'Avino, Università di Napoli Federico II, Italy*  
*Simonetta Grilli, ISASI- CNR, Italy*  
*Pier Luca Maffettone, Università di Napoli Federico II, Italy*  
*Pietro Ferraro, ISASI- CNR, Italy*

**464 Label-free microfluidic platform for blood analysis based on phase-contrast imaging**

*Lisa Miccio, ISASI- CNR, Italy*  
*Flora Cimmino, Ceinge, Biotecnologie avanzate, Italy*  
*Ivana Kurelac, University of Bologna, Italy*  
*Massimiliano M. Villone, University of Naples Federico II, Italy*  
*Vittorio Bianco, ISASI- CNR, Italy*  
*Martina Mugnano, ISASI- CNR, Italy*  
*Francesco Merola, ISASI- CNR, Italy*  
*Pasquale Memmolo, ISASI- CNR, Italy*  
*Daniele Pirone, ISASI- CNR, Italy*  
*Mario Capasso, University of Naples Federico II, Italy*  
*Achille Iolascon, University of Naples Federico II, Italy*  
*PierLuca Maffettone, University of Naples Federico II, Italy*  
*Pietro Ferraro, ISASI- CNR, Italy*

**469 Nanotechnology-based Biosensor for the Detection of Harmful Pathogens in Potable Water**

*Francesca Petronella, National Research Council, Italy*  
*Melissa De Angelis, Sapienza University of Rome, Italy*  
*Daniela De Biase, Sapienza University of Rome, Italy*  
*Seok-Im Lim, Jeonbuk National University, Republic of Korea*  
*Kwang-Un Jeong, Jeonbuk National University, Republic of Korea*  
*Nicholas Godman, Wright-Patterson Air Force Base, USA*  
*Dean Evans, Wright-Patterson Air Force Base, USA*  
*Michael Mcconney, Wright-Patterson Air Force Base, USA*  
*Luciano De Sio, Sapienza University of Rome, Italy*

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**SESSION 6.2 - Special Session - Structural health monitoring and nondestructive testing for aerospace - Part I**

**Room: Virtual Room #1**

**Chairs:** *Marco Laracca, Sapienza University of Rome, Italy*  
*Vittorio Memmolo, University of Naples Federico II, Italy*  
*Leandro Maio, University of Naples Federico II, Italy*

**473 Temperature Effects and Damage Detection on CFRP through Electrical Impedance Spectroscopy**

*Gianluca Caposciutti, University of Pisa, Italy*  
*Gabriele Bandini, University of Pisa, Italy*  
*Mirko Marracci, University of Pisa, Italy*  
*Alice Buffi, University of Pisa, Italy*  
*Bernardo Tellini, University of Pisa, Italy*

- 479 **Characterization of porosity and defects on composite materials using X-ray computed tomography and image processing**  
*Alessio Trolli, Università Politecnica delle Marche, Italy*  
*Sara Casaccia, Università Politecnica delle Marche, Italy*  
*Giuseppe Pandarese, Università Politecnica delle Marche, Italy*  
*Gian Marco Revel, Università Politecnica delle Marche, Italy*
- 485 **Research on Non-destructive test of porous ceramic insulation material for spacecraft based on Terahertz continuous wave imaging technology**  
*Yonghong Wu, Institute of Beijing Aerospace Metrology and Measurement Technology, China*  
*Yuekui Zhang, Institute of Beijing Aerospace Metrology and Measurement Technology, China*  
*Zhu Jiang, Institute of Beijing Aerospace Metrology and Measurement Technology, China*  
*Yongyao Xu, Institute of Beijing Aerospace Metrology and Measurement Technology, China*  
*Lin Liu, Institute of Beijing Aerospace Metrology and Measurement Technology, China*  
*Yinxiao Miao, Institute of Beijing Aerospace Metrology and Measurement Technology, China*
- 490 **The Defect Identification and Localization using Ultrasonic Guided Waves in Aluminum Alloy**  
*Mastan Raja Papanaboina, Kaunas University of Technology, Lithuania*  
*Elena Jasiuniene, Kaunas University of Technology, Lithuania*
- 494 **Structural Health Monitoring of composite pressure vessels using multiple damage indicators**  
*Vittorio Memmolo, University of Naples Federico II, Italy*  
*Fabrizio Ricci, University of Naples Federico II, Italy*  
*Leandro Maio, University of Naples Federico II, Italy*

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**SESSION 6.3 - Special Session - Terrestrial and in-flight verification of the GNC systems for aerospace vehicles - Part I**

**Room: Virtual Room #3**

**Chairs:** *Yevgeny Somov, Samara State Technical University, Russia*

*Paolo Castaldi, University of Bologna, Italy*

- 499 **Ensuring the Survivability of Spacecraft Control System at Critical Failures in Flywheel Cluster**  
*Yevgeny Somov, Samara State Technical University, Russia*  
*Sergey Butyrin, Samara State Technical University, Russia*  
*Sergey Somov, Samara State Technical University, Russia*
- 505 **Real-Time Aerospace Vehicle Position Estimation Using Terrestrial Illumination Matching**  
*Liberty M. Shockley, Air Force Institute of Technology*  
*Robert A. Bettinger, Air Force Institute of Technology*
- 510 **In-flight Checking of an Autonomous Guidance, Navigation and Control Systems Accuracy for Earth-observing Satellites and Space Robots**  
*Yevgeny Somov, Samara State Technical University, Russia*  
*Sergey Butyrin, Samara State Technical University, Russia*  
*Sergey Somov, Samara State Technical University, Russia*  
*Nikolay Rodnischev, Kazan National Research Technical University, Russia*  
*Tatyana Somova, Samara State Technical University, Russia*
- 516 **Mathematical Model and Control System of an Ekranoplan under the Action of Large Aerodynamic Loads**  
*Alexander Nebylov, State University of Aerospace Instrumentation (SUAI), Russia*  
*Alexander Panferov, State University of Aerospace Instrumentation (SUAI), Russia*  
*Sergey Brodsky, State University of Aerospace Instrumentation (SUAI), Russia*

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**SESSION 7.1 - Special Session - S2S - Space to Space: Scientific and Technological Challenges for Human and Robotic Space Exploration - Part II**

**Room: Virtual Room #1**

**Chairs:** *Vittorio Ancona, Thales Alenia Space*

*Pietro Ferraro, CNR Institute of Applied Sciences and Intelligent Systems*

*Paolo Maggiore, Politecnico di Torino*

*Piero Messidorio, Politecnico di Torino*



- 521 A sensor fusion strategy based on a distributed optical sensing of airframe deformation applied to actuator load estimation**  
*Gaetano Quattrocchi, Politecnico di Torino, Italy*  
*Matteo D.L. Dalla Vedova, Politecnico di Torino, Italy*  
*Emanuele Frediani, Politecnico di Torino, Italy*  
*Paolo Maggiore, Politecnico di Torino, Italy*  
*Pier Carlo Berri, Politecnico di Torino, Italy*
- 526 Sustainable Food Production To Enable Long Term Human Space Exploration**  
*Giorgio Boscheri, Thales Alenia Space Italia, Italy*  
*Antonio Saverino, Thales Alenia Space Italia, Italy*  
*Cesare Lobascio, Thales Alenia Space Italia, Italy*
- 531 The Innovative Acquisition and Pointing Metrology for Next Generation Gravity Mission**  
*Luciana Bonino, Thales Alenia Space Italia, Italy*  
*Stefano Cesare, Thales Alenia Space Italia, Italy*  
*Bruno Leone, ESA - European Space Agency*  
*Luca Massotti, ESA - European Space Agency*  
*Marco Pisani, INRiM - Istituto Nazionale di Ricerca Metrologica, Italy*  
*Jessica Girella, Thales Alenia Space Italia, Italy*
- 536 Passive shielding for human space exploration**  
*Mariagabriella Pugliese, University of Naples Federico II, Italy*

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***SESSION 7.2 - Special Session - Structural health monitoring and nondestructive testing for aerospace - Part II***

**Room: Virtual Room #1**

- Chairs:** Marco Laracca, *Sapienza University of Rome, Italy*  
Vittorio Memmolo, *University of Naples Federico II, Italy*  
Leandro Maio, *University of Naples Federico II, Italy*
- 541 Health indicators for diagnostics and prognostics of composite aerospace structures**  
*Georgios Galanopoulos, University of Patras, Greece*  
*Dimitrios Milanoski, University of Patras, Greece*  
*Agnes A. R. Broer, Delft University of Technology, The Netherlands*  
*Dimitrios Zarouchas, Delft University of Technology, The Netherlands*  
*Theodoros Loutas, University of Patras, Greece*
- 547 Inspection of the undulation structure with an in-plane differential flexible array probe**  
*Lei Peng, Shanghai Tech University, China*  
*Chaofeng Ye, Shanghai Tech University, China*  
*Yu Tao, Shanghai Tech University, China*  
*Cai Long, Shanghai Tech University, China*  
*Ming Li, Shanghai Tech University, China*
- 552 Interaction of Guided Electromagnetic Waves with defects emerging in metallic plates**  
*Vittorio Memmolo, University of Naples "Federico II", Italy*  
*Jochen Moll, Goethe University of Frankfurt am Main, Germany*  
*Duy Hai Nguyen, Goethe University of Frankfurt am Main, Germany*  
*Viktor Krozer, Goethe University of Frankfurt am Main, Germany*
- 558 Non-contact CFRP pre-bond quality NDT by Ion Mobility Spectrometer: Preliminary Results**  
*Maria Salvato, DUEE-SIST - ENEA, Italy*  
*Ettore Massera, TERIN-FSD - ENEA, Italy*  
*Saverio De Vito, TERIN-FSD - ENEA, Italy*  
*Sara Kirchner, IRT Saint Exupéry, France*  
*Cécilia Gestraud, IRT Saint Exupéry, France*  
*Julie Lecomte, IRT Saint Exupéry, France*  
*Mara Miglietta, TERIN-FSD - ENEA, Italy*  
*Fabrizio Formisano, TERIN-FSD - ENEA, Italy*  
*Girolamo Di Francia, TERIN-FSD - ENEA, Italy*

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**SESSION 7.3 - Special Session - Terrestrial and in-flight verification of the GNC systems for aerospace vehicles - Part II**

**Room: Virtual Room #3**

**Chairs:** Yevgeny Somov, *Samara State Technical University, Russia*  
Paolo Castaldi, *University of Bologna, Italy*

**563 Stochastic Optimization of Fault-tolerant Spacecraft Control at Interorbital Flights**

*Yevgeny Somov, Samara State Technical University, Russia*  
*Nikolay Rodnischev, Kazan National Research Technical University, Russia*  
*Sergey Somov, Samara State Technical University, Russia*

**568 On-ground experimental verification of magnetic attitude control for nanosatellites**

*Anton Bahu, University of Bologna, Italy*  
*Dario Modenini, University of Bologna, Italy*

**574 WIG-craft Assistance for an Aerospace Plane in Its Horizontal Launch and Landing**

*Alexander Nebylov, State University of Aerospace Instrumentation (SUAI), Russia*  
*Vladimir Nebylov, International Institute for Advanced Aerospace Technologies of SUAI, Russia*  
*Alexander Panferov, State University of Aerospace Instrumentation (SUAI), Russia*

**579 Guidance and Control of a Space Robot at Additional Launching and Approaching a Communication Geostationary Satellite**

*Yevgeny Somov, Samara State Technical University, Russia*  
*Sergey Butyrin, Samara State Technical University, Russia*  
*Tatyana Somova, Samara State Technical University, Russia*

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**SESSION 8.1 - General Session - Part IV**

**Room: Virtual Room #1**

**Chairs:** Mario Marchetti, *Sapienza University of Rome, Italy*  
Andrea Delfini, *Sapienza University of Rome, Italy*

**585 Metrological Characterization of Ground-based Sensors for Space Surveillance and Tracking**

*Giorgio Isoletta, University of Naples "Federico II", Italy*  
*Carlo Lombardi, University of Naples "Federico II", Italy*  
*Roberto Opromolla, University of Naples "Federico II", Italy*  
*Giancarmine Fasano, University of Naples "Federico II", Italy*  
*Moreno Peroni, Flight Test Wing of the Italian Air Force, Italy*  
*Alessandro Panico, Flight Test Wing of the Italian Air Force, Italy*  
*Andrea Cecchini, Flight Test Wing of the Italian Air Force, Italy*  
*Antonio Romano, Vitrociset S.p.A, Italy*  
*Aniello Basile, Vitrociset S.p.A, Italy*  
*Walter Matta, Vitrociset S.p.A, Italy*

**591 Effects of Atomic Oxygen and UV rays ageing on the Reflection Coefficient of Carbon/Carbon Plates in the 12-18 GHz Frequency Range**

*Andrea Delfini, Sapienza Università di Roma, Italy*  
*Roberto Pastore, Sapienza Università di Roma, Italy*  
*Fabio Santoni, Sapienza Università di Roma, Italy*  
*Mario Marchetti, Sapienza Università di Roma, Italy*

**596 LEDSAT 1U CubeSat thermal analysis and steady state calibration for thermal-vacuum testing**

*Emanuele Bedetti, Sapienza University of Rome, Italy*  
*Niccolò Picci, Sapienza University of Rome, Italy*  
*Andrea Gianfermo, Sapienza University of Rome, Italy*  
*Lorenzo Frezza, Sapienza University of Rome, Italy*  
*Diego Amadio, Sapienza University of Rome, Italy*  
*Federico Curianò, Sapienza University of Rome, Italy*  
*Paolo Marzioli, Sapienza University of Rome, Italy*  
*Andrea Delfini, Sapienza University of Rome, Italy*

- 602 **Data-Driven Identification Method and Simulation Modeling of a Ground Robot**  
*Enza I. Trombetta, Politecnico di Torino, Italy*  
*Iris David Du Mutel de Pierrepont Franzetti, Politecnico di Torino, Italy*  
*Davide Carminati, Politecnico di Torino, Italy*  
*Matteo Scanavino, Politecnico di Torino, Italy*  
*Elisa Capello, Politecnico di Torino, Italy*
- 608 **Orbit Design for Satellite Formations devoted to Space Environment Measurements**  
*Karthick Dharmarajan, Sapienza Università di Roma, Italy*  
*Giovanni B. Palmerini, Sapienza Università di Roma, Italy*

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**SESSION 8.2 - Special Session - Structural health monitoring and nondestructive testing for aerospace - Part III**

**Room: Virtual Room #1**

- Chairs:** Marco Laracca, *Sapienza University of Rome, Italy*  
Vittorio Memmolo, *University of Naples Federico II, Italy*  
Leandro Maio, *University of Naples Federico II, Italy*
- 613 **Digital-Twins of composite aerostructures towards Structural Health Monitoring**  
*Dimitrios P. Milanoski, University of Patras, Greece*  
*Georgios K. Galanopoulos, University of Patras, Greece*  
*Theodoros H. Loutas, University of Patras, Greece*
- 619 **Contact and non-contact methods of vibration measurement in aircraft structures**  
*Aleksander Olejnik, Military University of Technology, Poland*  
*Robert Rogólski, Military University of Technology, Poland*  
*Michał Szcześniak, Military University of Technology, Poland*
- 625 **Low-velocity impact damage detection of CFRP composite panel based on Transfer Impedance approach to Structural Health Monitoring**  
*Michał Dziendzikowski, Instytut Techniczny Wojsk Lotniczych, Poland*  
*Artur Kurnyta, Instytut Techniczny Wojsk Lotniczych, Poland*  
*Alessio Beligni, Politecnico di Milano, Italy*  
*Claudio Sbarufatti, Politecnico di Milano, Italy*  
*Krzysztof Dragan, Instytut Techniczny Wojsk Lotniczych, Poland*  
*Marco Giglio, Politecnico di Milano, Italy*
- 631 **The use of silver conductive paint for crack propagation sensor customization**  
*Artur Kurnyta, Air Force Institute of Technology, Poland*  
*Kamil Kowalczyk, Air Force Institute of Technology, Poland*  
*Marta Baran, Air Force Institute of Technology, Poland*  
*Michał Dziendzikowski, Air Force Institute of Technology, Poland*  
*Krzysztof Dragan, Air Force Institute of Technology, Poland*
- 636 **Detection of ice accretions on composite panels using FMCW radars at 60GHz**  
*Leandro Maio, University of Naples Federico II, Italy*  
*Jochen Moll, Goethe-University Frankfurt, Germany*  
*Vittorio Memmolo, University of Naples Federico II, Italy*  
*Jonas Simon, Goethe-University Frankfurt, Germany*  
*Thomas Maetz, Goethe-University Frankfurt, Germany*  
*Viktor Krozer, Goethe-University Frankfurt, Germany*  
*Andreas Nuber, Wölfel Engineering GmbH + Co. KG, Germany*  
*Stefan Krause, Fraunhofer Institute for Wind Energy and Energy System Technology, Germany*  
*Oliver Bagemiel, Fraunhofer Institute for Wind Energy and Energy System Technology, Germany*

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**SESSION 8.3 - Special Session - Mechanical and Thermal Metrology for Aerospace Applications**

**Room: Virtual Room #3**

- Chairs:** Adolfo Martucci, *CIRA - Italian Aerospace Research Centre, Italy*  
Giovanni Cerasuolo, *CIRA - Italian Aerospace Research Centre, Italy*  
Orsola Petrella, *CIRA - Italian Aerospace Research Centre, Italy*

- 640 **Plasma and material temperature/emissivity knowledge by applied physics technique based on compact VNIR emission spectroscopy in aerospace re-entry**  
*Luigi Savino, CIRA - Italian Aerospace Research Centre, Italy*  
*Antonio Del Vecchio, CIRA - Italian Aerospace Research Centre, Italy*  
*Mario De Cesare, CIRA - Italian Aerospace Research Centre, Italy*
- 647 **TeraHertz inspections of painted steel samples**  
*Iliaria Catapano, Institute for Electromagnetic Sensing of the Environment - CNR, Italy*  
*Giovanni Ludeno, Institute for Electromagnetic Sensing of the Environment - CNR, Italy*  
*Francesco Soldovieri, Institute for Electromagnetic Sensing of the Environment - CNR, Italy*  
*Thibaud Toullier, Univ Gustave Eiffel, Inria, France*  
*Jean Dumoulin, Univ Gustave Eiffel, Inria, France*
- 653 **Experimental Trends of Spectral Emissivity by Dual-Colour Pyrometers During the Development of Re-entry Tests in Ground Facilities**  
*Carlo Purpura, Centro Italiano Ricerche Aerospaziali, Italy*  
*Mario De Stefano Fumo, Centro Italiano Ricerche Aerospaziali, Italy*
- 659 **Experimental investigation on the delamination onset and propagation in composite specimens subjected to compressive loads by using Digital Image Correlation**  
*Aniello Riccio, University of Campania "Luigi Vanvitelli", Italy*  
*Angela Russo, University of Campania "Luigi Vanvitelli", Italy*  
*Andrea Sellitto, University of Campania "Luigi Vanvitelli", Italy*  
*Valerio Acanfora, University of Campania "Luigi Vanvitelli", Italy*  
*Davide Alfano, Italian Aerospace Research Centre, Italy*  
*Mauro Zarrelli, Institute of Polymers, Composites, and Biomaterials, CNR, Italy*  
*Cinzia Toscano, Italian Aerospace Research Centre, Italy*
- 665 **Shape Memory Alloy-based actuator: experimental and modelling**  
*Aniello Riccio, University of Campania "Luigi Vanvitelli", Italy*  
*Salvatore Saputo, University of Campania "Luigi Vanvitelli", Italy*  
*Mauro Zarrelli, Institute for Composite and Biomedical Materials, CNR, Italy*  
*Andrea Sellitto, University of Campania "Luigi Vanvitelli", Italy*  
*Carmine Napolitano, University of Campania "Luigi Vanvitelli", Italy*  
*Valerio Acanfora, University of Campania "Luigi Vanvitelli", Italy*

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***SESSION 9.1 - Special Session - Measurements in the research of aerodynamics and control of drones***

**Room: Virtual Room #1**

- Chairs:** *Zbigniew Czyż, Military University of Aviation, Poland*  
*Jerzy Józwiak, Lublin University of Technology, Poland*  
*Dariusz Mika, The State School of Higher Education in Chełm, Poland*
- 672 **Wind tunnel investigation of the propellers for unmanned aerial vehicle**  
*Zbigniew Czyż, Military University of Aviation, Poland*  
*Paweł Karpiński, Lublin University of Technology, Poland*  
*Krzysztof Skiba, Lublin University of Technology, Poland*
- 677 **Vibration study of an Aircraft Diesel Opposed Piston Engine**  
*Michał Jan Gęca, Lublin University of Technology, Poland*  
*Grzegorz Barański, Lublin University of Technology, Poland*  
*Lukasz Grabowski, Lublin University of Technology, Poland*  
*Nanthagopal Kasianantham, Vellore Institute of Technology, India*
- 682 **Experimental study of propellers for the electric propulsion system**  
*Zbigniew Czyż, Military University of Aviation, Poland*  
*Paweł Karpiński, Lublin University of Technology, Poland*  
*Krzysztof Skiba, Lublin University of Technology, Poland*
- 687 **Measurement system for small propeller propulsion**  
*Jacek Pieniazek, Rzeszow University of Technology, Poland*  
*Piotr Ciecinski, Rzeszow University of Technology, Poland*

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**SESSION 9.2 - Special Session - GARFIELD - General Aviation Research and Development.  
Metrology, Methods and Instrumentation**

**Room: Virtual Room #1**

**Chairs:** Jaroslaw Pytka, *Lublin University of Technology, Poland*

**692 IMUMETER – AI-Based Sensor for Airplane Motion Measurements**

*Jarosław Pytka, Lublin University of Technology, Poland*  
*Piotr Budzyński, Lublin University of Technology, Poland*  
*Paweł Tomiło, Lublin University of Technology, Poland*  
*Jan Laskowski, Lublin University of Technology, Poland*  
*Joanna Michałowska, The State School of Higher Education, Poland*  
*Ernest Gnapowski, University College of Administration and Enterprise, Poland*  
*Dariusz Błażejczak, West University of Technology in Szczecin, Poland*  
*Andrzej Łukaszewicz, Białystok University of Technology, Poland*

**698 Simulation Researches of the PROPWING Airplane Propulsion System**

*Rafał Kliza, Lublin University of Technology, Poland*  
*Miroslaw Wendeker, Lublin University of Technology, Poland*  
*Jan Pytka, Military University of Aviation, Poland*  
*Piotr Kasprzak, Military University of Aviation, Poland*

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**SESSION 9.3 - General Session - Part V**

**Room: Virtual Room #3**

**Chairs:** Giancarmine Fasano, *University of Naples Federico II, Italy*

**704 Perception fields: analysing distributions of optical features as a proximity navigation tool for autonomous probes around asteroids**

*Marco Zaccaria Di Fraia, Cranfield University, UK*  
*Luke Feetham, Cranfield University, UK*  
*Leonard Felicetti, Cranfield University, UK*  
*Joan-Pau Sanchez, Cranfield University, UK*  
*Lounis Chermak, Cranfield University, UK*

**709 AMPERE: exploiting Galileo for electrical asset mapping in emerging countries**

*Giancarmine Fasano, University of Naples “Federico II”, Italy*  
*Flavia Causa, University of Naples “Federico II”, Italy*  
*Roberto Opromolla, University of Naples “Federico II”, Italy*  
*Marcello Ascioffa, University of Naples “Federico II”, Italy*  
*Marco Nisi, Free Soft & Tech S.R.L., Italy*  
*Leonardo Pozzoli, Free Soft & Tech S.R.L., Italy*  
*Marco Lisi, Free Soft & Tech S.R.L., Italy*  
*Alberto Mennella, Topview S.R.L., Italy*  
*Graziano Gagliarde, Topview S.R.L., Italy*  
*Gianluca Luisi, Topview S.R.L., Italy*  
*Pere Molina, Geonumerics S.L., Spain*  
*Marta Blázquez, Geonumerics S.L., Spain*  
*Ismael Colomina, Geonumerics S.L., Spain*  
*Pedro Cabrera, National University Pedro Henriquez Urena, Dominican Republic*  
*Gustavo Rodriguez, National University Pedro Henriquez Urena, Dominican Republic*  
*Riccardo Poggi, Business Integration Partners Belgium, Belgium*  
*Luigi Lisi, Business Integration Partners Belgium, Belgium*  
*Giulia Fagioli, Business Integration Partners Belgium, Belgium*  
*Roberto Muscinelli, Business Integration Partners Belgium, Belgium*

715 **Design of 3D printed holder for quartz crystal microbalances**

*Diego Scaccabarozzi, Politecnico di Milano, Italy*

*Bortolino Saggin, Politecnico di Milano, Italy*

*Marianna Magni, Politecnico di Milano, Italy*

*Pietro Valnegri, Politecnico di Milano, Italy*

*Marco Giovanni Corti, Politecnico di Milano, Italy*

*Ernesto Palomba, Istituto di Astrofisica e Planetologia Spaziale INAF-IAPS, Italy*

*Andrea Longobardo, Istituto di Astrofisica e Planetologia Spaziale INAF-IAPS, Italy*

*Fabrizio Dirri, Istituto di Astrofisica e Planetologia Spaziale INAF-IAPS, Italy*

*Emiliano Zampetti, Consiglio Nazionale delle Ricerche CNR, IIA-CNR, Italy*

720 **Validation Flight Experiment for a Sounding Balloon Photovoltaic-based Attitude Determination System**

*Giuseppe Cataldi, Università di Pisa, Italy*

*Matteo Gemignani, Università di Pisa, Italy*

*Salvo Marcuccio, Università di Pisa, Italy*