

TABLE OF CONTENT

Welcome Message from the Chairpersons.....	2
MetroAeroSpace 2019 Committee	5
MetroAeroSpace 2019 Keynote Speakers	7
MetroAeroSpace 2019 Tutorials.....	9
Awards and Distinctions.....	11
Location – ALTEC Company	12
Access and Registration - ALTEC Company.....	14
Social Functions	15
MetroAeroSpace 2019 Supports.....	16
Program Schedule - Wednesday, June 19	18
Program Schedule – Thursday, June 20.....	20
Program Schedule - Friday, June 21	21
Wednesday, June 19 – Military Metrology for AeroSpace.....	22
Wednesday, June 19 - Tutorials.....	23
Thursday, June 20 - Technical Sessions	24
Friday, June 21 - Technical Sessions.....	39



Welcome Message from the Chairpersons

On behalf of the whole Organizing Committee, we cordially welcome you to the 6th IEEE Workshop on Metrology for AeroSpace (*MetroAeroSpace*) in Torino, Italy.

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 conference.

The event is organized in Torino, at ALTEC S.p.A. (Aerospace Logistics Technology Engineering Company), as is well known, the public-private company is a center of excellence for the provision of engineering and logistic services to support operations and use of the International Space Station and to support the development and implementation of planetary exploration missions.

Special thanks goes to ALTEC and Thales Alenia Space for their hospitality and support to the *MetroAeroSpace* organization.

Torino is renowned for its long history, its prestigious monuments and its welcoming social and cultural life. We think this makes it the ideal venue for the 2019 edition of *MetroAeroSpace* and we hope that our attendees will enjoy the conference, the city and its surroundings!

The *MetroAeroSpace* organization was a complex 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.

A special thanks to Italian Defence General Staff (STATO MAGGIORE DELLA DIFESA) for supporting with several actions the Workshop.

The *MetroAeroSpace* Technical Program consists of 28 oral and poster sessions scheduled over three days. 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.

The technical program was particularly difficult to be arranged since we received, for this sixth Workshop 197 abstracts from all over the world. Due to the time limits of the conference, only 149 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 Issue on Sensors Journal.

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

Yonina Eldar, Weizmann Institute of Science, Rehovot, Israel will speak about *Recovering lost information in analog-to-digital conversion*, Dr Roberto Orosei, National Institute of Astrophysics, Institute for Radio Astronomy, Italy will present *the Radar evidence of subglacial liquid water on Mars*.

We are honoured 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 includes;

- "*Military Metrology for AeroSpace*", is organized by AFCEA Naples Chapter, Torino (Italy), June 19th, 2019.
- a half day of tutorials offering three subjects:
 - Optical Metrology for Measuring Earth's Gravity, *Stefano Cesare, Thales Alenia Space*;
 - Probabilistic-Risk-Analysis in Aerospace Human-in-the-Loop Problems, *Ephraim Suhir, Portland State University*.

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

As in the previous edition MetroAeroSpace programme includes a Demo Session, organized as "*Live Demonstration*" track to allow an interactive and tangible form of presentation. Conference delegates are invited to experience the demonstrations directly, to interact with, play with, and challenge them.

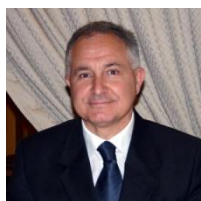
With the aim of providing a common ground for researches to share their findings about the metrology for aerospace, the Workshop was improved by adding a significant number of Special Sessions. This allows a spontaneous aggregation providing a forum of discussion close to the single research field. We wish to thank the organizers of these Special Sessions for their cooperation and support to the Workshop organization.

Several Awards offered by International Institution and Companies will be assigned, in particular to young researchers. In particular, the best contributions will be awarded, including the "*Best Paper Award*", the "*Best Paper Presented by a Young Researcher*", the



"Best Paper Authored and Presented by a Woman", the "Best Demonstration Award" and the "Best Paper of the Poster Session".

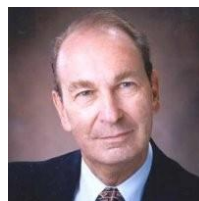
The Workshop is about to begin. You are now in a position to enjoy the fellowship of colleagues and experts and to pass free time in natural and artistic beauties. It is up to you to appreciate the Workshop worth! Be critical! We, metrologists, colleagues, and friends, we know that this is the best way to improve quality, and to achieve lasting excellences.



General Co-Chair
Pasquale DAPONTE
University of Sannio, Italy



General Co-Chair
Stefano DEBEI
University of Padova, Italy



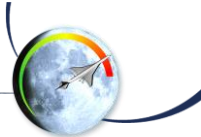
General Co-Chair
Robert RASSA
Raytheon, USA



Technical Program Co-Chair
Stephen DYER
Kansas State University, USA



Technical Program Co-Chair
Marco PERTILE
University of Padova, Italy



MetroAeroSpace 2019 Committee

HONORARY CHAIR

Marina Ruggieri, *University of Rome "Tor Vergata", Italy*

GENERAL CHAIRS

Pasquale Daponte, *University of Sannio, Italy*

Stefano Debei, *University of Padova, Italy*

Robert Rassa, *Raytheon, US*

TECHNICAL PROGRAM CO-CHAIRS

Stephen Dyer, *Kansas State University, US*

Marco Pertile, *University of Padova, Italy*

PUBLICATION CHAIR

Luca De Vito, *University of Sannio, Italy*

TREASURY CHAIR

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INDUSTRY LIAISON CHAIR

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INTERNATIONAL PROGRAM COMMITTEE

Domenico Acierno, *University of Naples, Italy*

Carlo Albanese, *Telespazio, Italy*

Giovanni Betta, *University of Cassino and Southern Lazio, Italy*

Erik P. Blasch, *US Air Force Research Lab, US*

Paolo Carbone, *University of Perugia, Italy*

Luigi Carrino, *Distretto Aerospaziale Campania, Italy*

Goutam Chattopadhyay, *NASA, US*

Xiyuan Chen, *Southeast University, China*

Marcello Coradini, *ASI/JPL*

Walter Cugno, *Thales Alenia Space*

Murat Efe, *Ankara University, Turkey*

Pietro Ferraro, *ISASI-CNR, Italy*



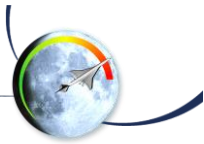
Jesus Garcia, *University Carlos III, Spain*
Domenico Giunta, *ESA - ESTEC, Netherlands*
Maria S. Greco, *University of Pisa, Italy*
Richard Hochberg, *Landmark Technologies, US*
Satoshi Ikezawa, *Waseda University, Japan*
Stephen Johnson, *ARAMIS Engineering, US*
Marian K Kazimierczuk, *Wright State University, US*
Karel Kudela, *Institute for Experimental Physics, Slovak Rep.*
Fabio Leccese, *University of Roma Tre, Italy*
Chin E. Lin, *National Cheng Kung University, Taiwan*
Walter Matta, *Vitrociset, Italy*
Daniele Mortari, *Texas A&M University, US*
Aldo Napoli, *Centre de recherche sur les Risques et les Crises, France*
Pavel Paces, *Czech Technical University, Czech*
William Prosser, *NASA, US*
Jacek Pieniżek, *Rzeszow University of Technology, Poland*
Vasily Popovich, *Russian Academy of Science, Russia*
Helena G. Ramos, *Instituto Superior Técnico - Universidade de Lisboa, Portugal*
Artur L. Ribeiro, *Instituto Superior Técnico - Universidade de Lisboa, Portugal*
Roberto Sabatini, *RMIT University, Australia*
Nicolas Sklavos, *University of Patras, Greece*
Patrizia Tavella, *INRIM, Italy*
Fabrizio Francesco Vinaccia, *MDBA Italia, Italy*
Graham Wild, *RMIT University, Australia*
Ruqiang Yan, *P.R. China*
Ho-Soon Yang, *KRISS, Republic of Korea*
Mark Yeary, *University of Oklahoma, US*
David Zucconi, *SAB Aerospace, Italy*

LOCAL COMMITTEE

Antonio Gammarota, *Thales Alenia Space*
Marco Pisani, *INRiM, Italy*

LOCAL ARRANGEMENTS





MetroAeroSpace 2019 Keynote Speakers

Keynote - Thursday, June 20, 2019

Yonina Eldar

WEIZMANN INSTITUTE OF SCIENCE, RECHOVOT, ISRAEL

“Recovering lost information in analog-to-digital conversion”



ABSTRACT - The famous Shannon-Nyquist theorem has become a landmark in analog to digital conversion and the development of digital signal processing algorithms. However, in many modern applications, the signal bandwidths have increased tremendously, while the acquisition capabilities have not scaled sufficiently fast. Furthermore, the resulting high rate digital data requires storage, communication and processing at very high rates which is computationally expensive and requires large amounts of power.

In the context of medical imaging sampling at high rates often translates to high radiation dosages, increased scanning times, bulky medical devices, and limited resolution.

In this talk we consider a general framework for sub-Nyquist sampling and processing in space, time and frequency which allows to dramatically reduce the number of antennas, sampling rates and band occupancy in a variety of applications. We consider applications of these ideas to a variety of problems in communications, radar, and ultrasound imaging and show several demos of real-time sub-Nyquist prototypes including a wireless ultrasound probe, sub-Nyquist MIMO radar, cognitive radio, shared spectrum radar, and an analog combiner prototype.

Yonina Eldar is a Professor in the Department of Mathematics and Computer Science, Weizmann Institute of Science, Rehovot, Israel where she heads the center for Biomedical Engineering and Signal Processing. She was previously a Professor in the Department of Electrical Engineering at the Technion, where she held the Edwards Chair in Engineering. She is also a Visiting Professor at MIT, a Visiting Scientist at the Broad Institute, and an Adjunct Professor at Duke University and was a Visiting Professor at Stanford.

Keynote - Friday, June 21, 2019

Roberto Orosei

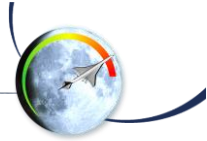
*NATIONAL INSTITUTE OF ASTROPHYSICS
INSTITUTE FOR RADIO ASTRONOMY, ITALY*

**“Radar evidence of subglacial
liquid water on Mars”**



ABSTRACT - The presence of liquid water at the base of the Martian polar caps has long been suspected but not observed. We surveyed the Planum Australe region using the Mars Advanced Radar for Subsurface and Ionosphere Sounding, a low-frequency radar on the Mars Express spacecraft. Radar profiles collected between May 2012 and December 2015, contain evidence of liquid water trapped below the ice of the South Polar Layered Deposits. Anomalously bright subsurface reflections were found within a well-defined, 20km wide zone centered at 193°E, 81°S, surrounded by much less reflective areas. Quantitative analysis of the radar signals shows that this bright feature has high dielectric permittivity >15 , matching water-bearing materials. We interpret this feature as a stable body of liquid water on Mars.

Dr. Roberto Orosei was born in Reggio Emilia, Italy. He studied at the University of Bologna and received a Ph.D. degree from the University of Rome "La Sapienza". After spending two years as a Research Fellow at the European Space Research and Technology Centre in Noordwijk, the Netherlands, he moved to the Institute for Space Astrophysics in Rome, where he participated in the design and realization of instruments for solar system exploration missions. He is a science team member of space experiments for the Rosetta and Jupiter Icy Moons Explorer missions of the European Space Agency, and for NASA's Cassini, Mars Reconnaissance Orbiter, Dawn and Juno probes. He is the principal investigator of the MARSIS radar on board ESA's Mars Express spacecraft, which provided evidence of the presence of liquid water beneath the South polar cap of Mars. He is a member of the Italian Astronomical Society and of the International Astronomical Union. Main belt asteroid 1993 RJ3 has been named 19224 Orosei in 2007. He currently works at the Institute for Radioastronomy in Bologna and teaches a course of astrobiology at the University of Bologna.



MetroAeroSpace 2019 Tutorials

Wednesday, June 19, 2019 - SESSION 1

Stefano Cesare

THALES ALENIA SPACE

“Optical metrology for measuring Earth’s gravity”

ABSTRACT - The analysis of Earth’s gravitational field provides unique information, not achievable with other techniques, about the morphology and composition of our planet and on all geophysical phenomena involving the redistribution of its mass.

Global maps of Earth’s gravity can be obtained in short timescales only using satellites. The current demand of monitoring the variations of Earth’s gravity with higher and higher spatial and temporal resolution can be fulfilled exploiting the satellite-to-satellite tracking technique together with the laser interferometry. The effectiveness of this measurement technique was fruitfully demonstrated by the US-German GRACE (Gravity Recovery and Climate Experiment) mission (2002-2017) using a microwave ranging instrument (MRI). Recently, the GRACE Follow-On (GFO) mission, launched in 2018 and still using the MRI as primary payload, has carried and successfully operated on orbit for the first time the technological demonstrator of a laser interferometer. The Next Generation Gravity Mission (NGGM), under study since more than a decade in Europe, will be optimized for exploiting at best the performance of the laser interferometer for enhancing by more than a factor two the spatial and temporal resolution of the gravity field maps provided by GRACE and GFO.

In this lecture the principle of the satellite-to-satellite tracking technique for measuring Earth’s gravity will be explained and the laser interferometer schemes under study for the NGGM will be presented. The role of the mission architecture and of the auxiliary measurement instruments in achieving the mission objectives will be also discussed.

Stefano Cesare received the degree in Physics from University of Torino, Italy in 1985. Since 1987 he has been working in Thales Alenia Space in Italy where he is currently the Product Line Manager for the Science Spacecraft and Payloads. He has been the mission & payload performance engineer of the Gravity and Ocean Circulation Explorer (GOCE) mission that flown between 2009 and 2013 providing a high-resolution map of Earth’s gravity, and managed some of the preparatory studies and technological development projects on the laser metrology for the Next Generation Gravity Mission (NGGM). Stefano Cesare has authored/co-authored several publications (technical papers, book chapters, patents) about Earth’s gravity missions and related technologies.



Wednesday, June 19, 2019 - SESSION 2

Ephraim Suhir

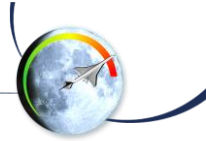
Portland State University, USA

“Probabilistic-Risk-Analysis in Aerospace Human-in-the-Loop Problems”

ABSTRACT - There is a significant potential for the reduction in aerospace accidents and in assuring mission success and safety through better understanding the roles that various uncertainties play in the planner's and operator's worlds of work. In this review lecture the rationale behind the probabilistic risk analysis (PRA) incentive in aerospace human-in-the-loop (HITL) related tasks, including decision making problems and tasks, is explained, and several recently suggested PRA models are indicated and briefly discussed: convolution model, with applications to the helicopter-landing ship (HLS), the famous miracle-on-the-Hudson event and the concept of anticipation in aviation; route segmentation model, with application to an aerospace mission outcome and double-exponential-probability-distribution-function (DEPDF) model for the probability of human non-failure, with application to the relative roles of the human capacity factor (HCF) and mental workload (MWL). The multi-parametric BAZ equation was suggested by the author about a decade ago as a physically meaningful predictive model in the probabilistic-design-for-reliability (PDFr) concept, when the highly focused and highly cost-effective failure-oriented accelerated testing (FOAT) data are used to predict the operational reliability of aerospace electronics.

Ephraim Suhir is Foreign Full Member (Academician) of the National Academy of Engineering, Ukraine (he was born in that country); Life Fellow of the Institute of Electrical and Electronics Engineers (IEEE); the American Society of Mechanical Engineers (ASME), the Society of Optical Engineers (SPIE) and the International Microelectronics and Packaging Society (IMAPS); Fellow of the American Physical Society (APS), the Institute of Physics (IoP), UK, and the Society of Plastics Engineers (SPE); and Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA). Ephraim has authored about 400+ publications (patents, technical papers, book chapters, books), presented numerous keynote and invited talks worldwide, and received many professional awards, including the 1996 Bell Labs Distinguished Member of Technical Staff Award and the 2004 ASME Worcester Read Warner Medal for outstanding contributions to the permanent literature of engineering. He is the third Russian American, after Stephen Timoshenko and Igor Sikorsky, who received this prestigious award.





Awards and Distinctions

BEST CONFERENCE PAPER AWARD

Description: To recognize the most outstanding paper presented at the annual IEEE International Workshop on Metrology for AeroSpace.

The award is sponsored by MDPI Sensors. The award will consist of a certificate and a prize money amounting to 500 CHF.



BEST PAPER PRESENTED BY A WOMAN

Description: An exclusive plaque will be given for the best paper authored and presented by a woman.

BEST PAPER PRESENTED BY A YOUNG RESEARCHER

Description: An exclusive plaque will be given for the best paper authored and presented by a researcher younger than 35 years.

The award is sponsored by ALTEC.



BEST PAPER OF THE POSTER SESSION

Description: An exclusive plaque will be given for the best poster presented.

The award is sponsored by Thales Alenia Space.



BEST LIVE DEMONSTRATION

Description: To highlight the importance of the Demo Session, an exclusive plaque will be given for the best demo.

The award is sponsored by AFCEA Naples Chapter.



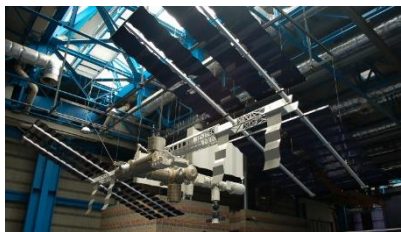
Location – ALTEC Company

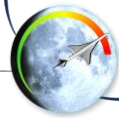
The Workshop will take place at **ALTEC Company, Corso Marche 79, Torino.**



ALTEC - Aerospace Logistics Technology Engineering Company - is the Italian center of excellence for the provision of engineering and logistics services to support operations and utilization of the International Space Station and the development and implementation of planetary exploration missions.

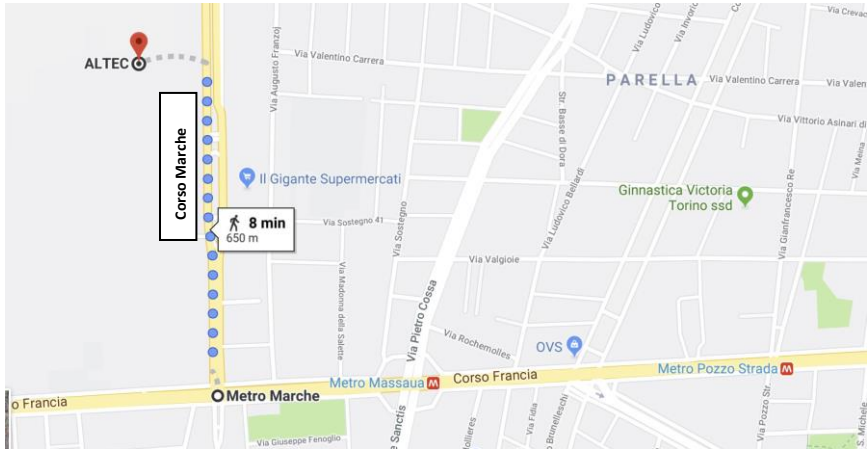
ALTEC is a public-private company owned by the major European space company, Thales Alenia Space and the Italian Space Agency, ASI. ALTEC is based in Turin and has liaison offices at NASA and ESA. ALTEC services ranging from engineering and logistics support, training of astronauts, to support experiments in biomedicine in particular, the processing of scientific data, the development and management of the ground segment of space programs and the promotion of space culture.





HOW TO REACH US

ALTEC Company is located in Corso Marche, about 600 meters from Metro Station “Marche” (10 minutes walk following the itinerary indicated in this map).



BY CAR

This route will give you a heads up on the route between Turin Caselle Airport and ALTEC. As you leave the airport follow exit (uscita) - you will soon merge onto a four-lane highway. Follow the green signs towards “autostrade”. Go about 7-8 Km or 4 miles and take the exit for the “autostrade”. Take the “autostrade” towards Piacenza/Savona AND NOT Milano. Follow the “autostrada” until exit Regina Margherita. Take Regina Margherita and follow it looking on the right side for signs reading Corso Marche. Take the exit for Corso Marche and follow it until on the right you find the ALTEC Facility at Nr. 79.

BY TAXI

Taxi ride from the airport to ALTEC costs approximately 40 euros.

BY METRO

The closest metro Station is Marche, 10 MINUTES WALKING DISTANCE FROM ALTEC.

BY TRAIN

The closest Train Station is Torino Porta Susa. From Porta Susa you can take the metro or a taxi (approximately 20 euros).

BY BUS

The SADEM bus service between Turin Airport and the city center has several stops enroute including Porta Nuova railway station and Porta Susa railway station.

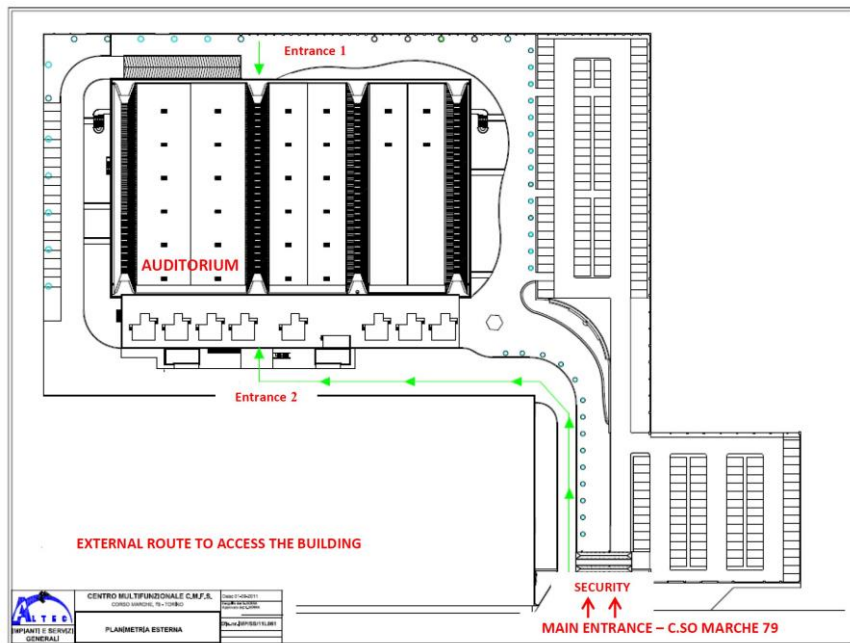
Access and Registration - ALTEC Company

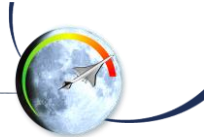
IMPORTANT

When accessing the premises on the first day you will be asked to show your National ID card or Passport at the main entrance in order to check your name on the participant's list.

After leaving the main entrance, follow directions to the meeting's area (see plant below). Registration for the Workshop will take place at the entrance of Auditorium.

The workshop organization staff will give you an IEEE Workshop badge. When accessing the premises the days after, you will only need to show your badge.





Social Functions

WELCOME PARTY

The Welcome Party will be held at **Osteria "Rabazzana** on Wednesday **June 19, 2019 - 19.00.**

Address: Osteria Rabazzana

Via San Francesco d'Assisi, 23/C
Torino



GALA DINNER

We are glad to announce that the Gala Dinner will be held at Restaurant **"Caprera 1883" - "Circolo Canottieri Caprera"** on **June 20, 2019 - H 20.00.**

Address: "Caprera 1883" Restaurant - "Circolo Canottieri Caprera"

C.so Moncalieri n. 22, Torino

A free shuttle bus will be available, from ALTEC Company, with several stops. The time table and meeting points will be announced at the Registration Desk.



MetroAeroSpace 2019 Supports

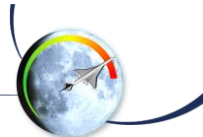


UNIVERSITÀ
DEGLI STUDI
DEL
SANNIO
Benevento



CIPMaG

Centro Interdipartimentale
del Politecnico di Bari
"Magna Grecia" – Taranto





Program Schedule - Wednesday, June 19

Military Metrology for AeroSpace

ALTEC – AUDITORIUM – 09:30

2019 IEEE INTERNATIONAL WORKSHOP ON METROLOGY FOR AEROSPACE WEDNESDAY - JUNE 19, 2019	
09:30 - 13:00	MILITARY METROLOGY FOR AEROSPACE - AUDITORIUM ALTEC Corso Marche, 79 - Torino
09:30 - 09:50	WELCOME ADDRESSES B.Gen. (aus) Dario NICOLELLA - <i>President of AFCEA Chapter Naples</i> Eng. Armando Ciampolini - <i>ALTEC Operative Director</i>
09:50 - 10:20	EMERGING TECHNOLOGIES IN AEROSPACE ENVIRONMENT Maj.Gen. (aus) Maurizio Astolfi, <i>Italian Air Force Logistic Command</i>
10:20 - 10:50	SPACE RIDER: Development for Payloads Return Dr Angelo DENARO - <i>Program Design Authority & Chief Engineer - Program Space Rider</i>
10:50 - 11:30	CAPABILITIES AND POTENTIAL OF RPAS SYSTEM IN A CIVILIAN AND INDUSTRIAL ENVIRONMENT B.Gen. (res.) Giovanni SAVOLDELLI PEDROCCHI
11:30 - 12:00	USE OF THE S3000 FOR THE OPTIMIZATION OF PROJECTS IN ORDER TO REDUCE THE RISK OF OBSOLESCENCE OF COMPLEX SYSTEMS Eng. Eduardo DE FRANCESCO, <i>FederLazio Aerospazio e Difesa</i>
12:00 - 12:30	METROLOGY IN MILITARY AIRCRAFT MAINTENANCE Col. GArn. Roberto LO CONTE, <i>1st RMV Director - Cameri</i>
12:30 - 13:00	FROM ISS INTEGRATED LOGISTICS TO SPACE RIDER PAYLOADS END-TO-END SERVICE Eng. Armando Ciampolini - <i>ALTEC Operative Director</i>
13:00 - 13:10	CLOSING SESSION



Program Schedule - Wednesday, June 19

TUTORIALS

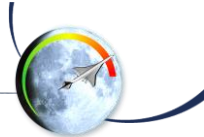
15:30 - 17:45	TUTORIALS <i>ALTEC Company - Corso Marche 79 - Torino</i>
15:30 - 16:15	Session #1 - Stefano Cesare, Thales Alenia Space Optical Metrology for Measuring Earth's Gravity
16:15 - 17:00	Session #2 - Ephraim Suhir, Portland State University Probabilistic-Risk-Analysis in Aerospace Human-in-the-Loop Problems

19:00	WELCOME RECEPTION Osteria "Rabazzana" - June 19 - H 19.00
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Program Schedule – Thursday, June 20

2019 IEEE INTERNATIONAL WORKSHOP ON METROLOGY FOR AEROSPACE THURSDAY - JUNE 20, 2019				
09:20 - 09:50	OPENING CEREMONY			
	ALTEC - AUDITORIUM	ALTEC - DEIMOS HALL	ALTEC - FOBOS HALL	ALTEC - NEPTUNE HALL
09:50 - 11:30	SPECIAL SESSION ON MEASUREMENT AND INSTRUMENTATION FOR AEROSPACE APPLICATION - PART I	SPECIAL SESSION ON DESIGN FOR RELIABILITY OF AEROSPACE INSTRUMENTATION - PART I	GENERAL SESSION PART 1	SPECIAL SESSION ON STRUCTURAL HEALTH MONITORING AND NONDESTRUCTIVE TESTING FOR AEROSPACE - PART I
11:30 - 11:50	COFFEE BREAK			
11:50 - 13:30	SPECIAL SESSION ON MEASUREMENT AND INSTRUMENTATION FOR AEROSPACE APPLICATION - PART II	SPECIAL SESSION ON DESIGN FOR RELIABILITY OF AEROSPACE INSTRUMENTATION - PART II	SPECIAL SESSION ON METROLOGY AND INSTRUMENTATION FOR UNMANNED AERIAL VEHICLES - PART I	SPECIAL SESSION ON STRUCTURAL HEALTH MONITORING AND NONDESTRUCTIVE TESTING FOR AEROSPACE - PART II
13:30 - 14:50	LUNCH			
14:50 - 15:40	Invited Talk - Yonina Eldar <i>Recovering lost information in analog-to-digital conversion</i>			
15:40 - 16:00	COFFEE BREAK			
	ALTEC - AUDITORIUM	ALTEC - DEIMOS HALL	ALTEC - FOBOS HALL	ALTEC - NEPTUNE HALL
16:00 - 17:40	SPECIAL SESSION ON COMPLEX SYSTEMS OPERATIONAL AVAILABILITY: MEASUREMENTS, METHODOLOGIES AND REQUIREMENTS	SPECIAL SESSION ON MEASUREMENT FOR IMPROVING QUALITY, RELIABILITY AND SAFETY IN AEROSPACE APPLICATIONS	SPECIAL SESSION ON METROLOGY AND INSTRUMENTATION FOR UNMANNED AERIAL VEHICLES - PART II	INDUSTRIAL SESSION ON METROLOGY AND MEASUREMENT FOR AEROSPACE COMPLEX SYSTEM APPLICATIONS
20:00	GALA DINNER "Caprera 1883" Restaurant			



Program Schedule - Friday, June 21

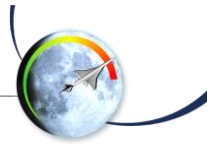
2019 IEEE INTERNATIONAL WORKSHOP ON METROLOGY FOR AEROSPACE FRIDAY - JUNE 21, 2019				
09:00 - 10:00	Invited Talk - Roberto Orsei <i>Radar evidence of subglacial liquid water on Mars</i>			
10:00 - 11:40	ALTEC - AUDITORIUM	ALTEC - DEIMOS HALL	ALTEC - FOBOS HALL	ALTEC - NEPTUNE HALL
	SPECIAL TRACK ON FUTURE SCIENCE OBJECTIVES AND TECHNOLOGIES FOR PLANETARY EXPLORATION - PART I	SPECIAL SESSION ON METROLOGY FOR RADAR SYSTEMS	SPECIAL SESSION ON METROLOGICAL AND TECHNOLOGICAL ASPECTS OF MANUFACTURING IN THE AEROSPACE INDUSTRY - PART I	GENERAL SESSION PART 2
11:40 - 12:00	COFFEE BREAK POSTER SESSION LIVE DEMONSTRATION SESSION			
12:00 - 13:10	SPECIAL TRACK ON FUTURE SCIENCE OBJECTIVES AND TECHNOLOGIES FOR PLANETARY EXPLORATION - PART II	<i>ALTEC - Mars Area</i>		
13:10 - 14:30	LUNCH			
14:30 - 16:10	ALTEC - AUDITORIUM	ALTEC - DEIMOS HALL	ALTEC - FOBOS HALL	ALTEC - NEPTUNE HALL
	GENERAL SESSION PART 3	SPECIAL SESSION ON TERRESTRIAL AND IN-FLIGHT VERIFICATION OF THE GNC SYSTEMS FOR AEROSPACE VEHICLES	SPECIAL SESSION ON METROLOGICAL AND TECHNOLOGICAL ASPECTS OF MANUFACTURING IN THE AEROSPACE INDUSTRY - PART II	SPECIAL SESSION ON DISTRIBUTED SYSTEMS AND SENSOR FUSION APPLICATIONS FOR AEROSPACE
16:10 - 16:30	COFFEE BREAK			
16:30 - 17:50	GENERAL SESSION PART 4	SPECIAL SESSION ON GARFIELD - GREEN, ACCESSIBLE AND SAFE GRASSY AIRFIELDS. METROLOGY, METHODS AND INSTRUMENTATION	GENERAL SESSION PART 5	GENERAL SESSION PART 6
17:50 - 18:10	CLOSING AND AWARD CEREMONY			



Wednesday, June 19 – Military Metrology for Aerospace

ALTEC - AUDITORIUM *Corso Marche, 79 - Torino*

- 09:30 WELCOME ADDRESSES**
B. Gen. (a) Dario NICOLELLA, *President of AFCEA Chapter of Naples, Italy*
Eng. Armando CIAMPOLINI, *ALTEC Operative Director*
- 09:50 EMERGING TECHNOLOGIES IN AEROSPACE ENVIRONMENT**
Maj.Gen. (aus) Maurizio ASTOLFI, *Italian Air Force Logistic Command*
- 10:20 SPACE RIDER: DEVELOPMENT FOR PAYLOADS RETURN**
Angelo DENARO, *Thales Alenia Space*
- 10:50 CAPABILITIES AND POTENTIAL OF RPAS SYSTEM IN A CIVILIAN AND INDUSTRIAL ENVIRONMENT**
B.Gen. (res.) Giovanni SAVOLDELLI PEDROCCHI
- 11:30 USE OF THE S3000 FOR THE OPTIMIZATION OF PROJECTS IN ORDER TO REDUCE THE RISK OF OBSOLESCENCE OF COMPLEX SYSTEMS**
Eng. Eduardo DE FRANCESCO, *FederLazio Aerospazio e Difesa*
- 12:00 METROLOGY IN MILITARY AIRCRAFT MAINTENANCE**
Col. Garn. Roberto LO CONTE, *1° RMV Director - Cameri*
- 12:30 FROM ISS INTEGRATED LOGISTICS TO SPACE RIDER PAYLOADS END-TO-END SERVICE**
Armando CIAMPOLINI, *ALTEC Operative Director*
- 13:00 CLOSING SESSION**



Wednesday, June 19 - Tutorials

ALTEC - AUDITORIUM
Corso Marche, 79 - Torino

15:00 - 17:30 **REGISTRATIONS**
Place: *ALTEC COMPANY*

15:30 - 16:15 **SESSION 1**

Optical Metrology for Measuring Earth's Gravity
Stefano Cesare, Thales Alenia Space

16:15 - 17:00 **SESSION 2**

Probabilistic-Risk-Analysis in Aerospace Human-in-the-Loop Problems
Ephraim Suhir, Portland State University

19:00 - 22:00 **WELCOME RECEPTION**
Osteria Rabezzana
Via San Francesco d'Assisi, Torino



Thursday, June 20 - Technical Sessions

09:00 - 17:30

REGISTRATION

Place: ALTEC COMPANY

09:20 - 09:50

OPENING CEREMONY

Room: ALTEC - AUDITORIUM

09:50 - 11:30

SPECIAL SESSION ON MEASUREMENT AND INSTRUMENTATION FOR AEROSPACE APPLICATION - PART I

Chairs: Marco Pertile, *University of Padova, Italy*
Sebastiano Chiodini, *University of Padova, Italy*

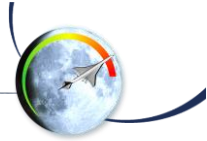
Room: ALTEC - AUDITORIUM

09:50 LIDAR-based model reconstruction for spacecraft pose determination

Davide Maria Perfetto, *University of Naples 'Federico II' Italy*
Roberto Opromolla, *University of Naples 'Federico II' Italy*
Michele Grassi, *University of Naples 'Federico II' Italy*
Christoph Schmitt, *Jena-Optronik GmbH, Germany*

10:10 Uncertainty evaluation of vision-based approaches for distance measurement of a tether tip-mass

Marco Pertile, *University of Padova, Italy*
Sebastiano Chiodini, *University of Padova, Italy*
Andrea Valmorbidia, *University of Padova, Italy*
Riccardo Giubilato, *University of Padova, Italy*
Stefano Debei, *University of Padova, Italy*
Enrico C. Lorenzini, *University of Padova, Italy*



- 10:30 Analysis of Ganymede rotational state using JANUS telescope**
Alessio Aboudan, *University of Padova, Italy*
Giacomo Colombatti, *University of Padova, Italy*
Stefano Debei, *University of Padova, Italy*
Pasquale Palumbo, *University of Naples Parthenope, Italy*
- 10:50 Measurement Digital Watermarking for Automated Test System Data Integrity**
Christopher Geiger, *Lockheed Martin Corporation, USA*
- 11:10 Design of a SpaceWire/SpaceFibre EGSE system based on PXI industry standard**
Luca Dello Sterpaio, *University of Pisa, Italy*
Pietro Nannipieri, *University of Pisa, Italy*
Antonino Marino, *University of Pisa, Italy*
Luca Fanucci, *IngeniArs S.r.l., Italy*

09:50 - 11:30

SPECIAL SESSION ON DESIGN FOR RELIABILITY OF AEROSPACE INSTRUMENTATION - PART I

Chairs: Ephraim Suhir, *Portland State University*
Alfonso Farina, *LFIEEE, Distinguished Lecturer of AES*

Room: ALTEC - DEIMOS HALL

- 09:50 Failure-Oriented-Accelerated-Testing and Its Role in Making a Device into a Product**
Ephraim Suhir, *Portland State University, USA*
Johann Nicolics, *Technical University, Austria*
Sung Yi, *Portland State University, USA*
- 10:10 SELECTION OF PRECISE SENSORS FOR WIG-CRAFT ALTITUDE CONTROL**
Alexander Nebylov, *State University of Aerospace Instrumentation, Russia*
Vladimir Nebylov, *State University of Aerospace Instrumentation, Russia*
Alexander Panferov, *State University of Aerospace Instrumentation, Russia*



- 10:30 Degraded situation awareness risk assessment in the aerospace domain**
Jean-Marc Salotti, *Univ. Bordeaux, CNRS, INRIA, France*
Ephraim Suhir, *Portland State University, USA*
- 10:50 Physical design for reliability of solder joint interconnections for aerospace electronics applications**
Ephraim Suhir, *Portland State University, USA*
Sung Yi, *Portland State University, USA*
Johann Nicolics, *Technical University, Austria*
- 11:10 Outline of the reliability and durability estimation method of aircraft on-board accumulator batteries**
Sławomir Stępień, *Military University of Technology, Poland*
Michał Jasztal, *Military University of Technology, Poland*

09:50 - 11:30

GENERAL SESSION PART 1

Chairs: Luca De Vito, *University of Sannio, Italy*
Ioan Tudosa, *University of Sannio, Italy*

Room: ALTEC - FOBOS HALL

- 09:50 Design and characterization of innovative 3D printed embedded strain gauges**
Anna Lanzolla, *Polytechnic University of Bari, Italy*
Gregorio Andria, *Polytechnic University of Bari, Italy*
Attilio Di Nisio, *Polytechnic University of Bari, Italy*
Gianluca Percoco, *Polytechnic University of Bari, Italy*
Giovanni Stano, *Polytechnic University of Bari, Italy*
- 10:10 Degarbling Technique for Low Cost ADS-B Receivers**
Mauro Leonardi, *University of Rome Tor Vergata*
Marco Maisano, *University of Rome Tor Vergata*
- 10:30 The J2 Relativistic Effect and Other Periodic Variations in the Galileo Satellite Clocks**
Valerio Formichella, *INRiM, Italy*
Lorenzo Galleani, *Politecnico di Torino, Italy*
Giovanna Signorile, *INRiM, Italy*
Ilaria Sesia, *INRiM, Italy*



10:50 Ellipsoid multi-axial sensor calibration with temperature compensation
Jacek Pieniasek, *Rzeszow University of Technology, Poland*

11:10 Performance Characterisation of Wearable Cardiac Monitoring Devices for Aerospace Applications

Nichakorn Pongsakornsathien, *RMIT University, Australia*

Alessandro Gardi, *RMIT University, Australia*

Yixiang Lim, *RMIT University, Australia*

Roberto Sabatini, *RMIT University, Australia*

Trevor Kistan, *RMIT University, THALES, Australia*

Neta Ezer, *Northrop Grumman Corporation, USA*

09:50 - 11:30

SPECIAL SESSION ON STRUCTURAL HEALTH MONITORING AND NONDESTRUCTIVE TESTING FOR AEROSPACE - PART I

Chairs: Tribikram Kundu, *University of Arizona, USA*

Luca Zanotti Fragonara, *Cranfield University, USA*

Room: ALTEC - NEPTUNE HALL

09:50 Robotic Geometric and Volumetric Inspection of High Value and Large Scale Aircraft Wings

Carmelo Mineo, *University of Strathclyde, UK*

Charles MacLeod, *University of Strathclyde, UK*

Riliang Su, *University of Strathclyde, UK*

Dave Lines, *University of Strathclyde, UK*

Santi Davi, *University of Strathclyde, UK*

Bruce Cowan, *University of Strathclyde, UK*

S. Gareth Pierce, *University of Strathclyde, UK*

Scott Paton, *Spirit AeroSystems, UK*

Gavin Munro, *Spirit AeroSystems, UK*

Coreen McCubbin, *Spirit AeroSystems, UK*

David Watson, *Spirit AeroSystems, UK*

10:10 Surface Ice Detection on Composite Plates with Ultrasonic Guided Waves

Jochen Moll, *Goethe University of Frankfurt am Main, Germany*

Jonas Simon, *Goethe University of Frankfurt am Main, Germany*

Vittorio Memmolo, *University of Naples 'Federico II', Italy*



10:30 Comparison of different non-destructive testing techniques for bonding quality evaluation

Bengisu Yilmaz, *Kaunas University of Technology, Lithuania*

Abdoulaye Ba, *University of Nantes, France*

Elena Jasiuniene, *Kaunas University of Technology, Lithuania*

Huu Kien Bui, *University of Nantes, France*

Gerard Berthiau, *University of Nantes, France*

10:50 Acoustic Source Localization – Recent Advances and Remaining Challenges

Tribikram Kundu, *University of Arizona, USA*

11:10 Research on Aero-engine Vibration Fault Based on Statistical Feature and Artificial Intelligence Method

Yahui Wu, *AVIC Changcheng Institute of Metrology and Measurement, China*

11:30 - 11:50

COFFEE BREAK

Room: ALTEC - MARS ZONE

11:50 - 13:30

SPECIAL SESSION ON MEASUREMENT AND INSTRUMENTATION FOR AEROSPACE APPLICATION - PART II

Chairs: Marco Pertile, *University of Padova, Italy*

Sebastiano Chiodini, *University of Padova, Italy*

Room: ALTEC - AUDITORIUM

11:50 The Shadow Position Sensors (SPS) metrology subsystem on-board PROBA-3 mission

Vladimiro Noce, *University of Florence, Italy*

Gerardo Capobianco, *INAF, Italy*

Alessandro Bemporad, *INAF, Italy*

Steven Buckley, *SensL Technologies Ltd., Ireland*

Marco Romoli, *University of Florence, Italy*

Marta Casti, *INAF, Italy*

Massimiliano Belluso, *INAF, Italy*

Silvano Fineschi, *INAF, Italy*

Sergio Billotta, *INAF, Italy*

Davide Loreggia, *INAF, Italy*



Cédric Thizy, *Centre Spatial de Liège, Belgium*
Luca Naponiello, *University of Florence, Italy*

12:10 Measuring the mass of a main belt comet: Proteus Mission

Riccardo Lasagni Manghi, *University of Bologna, Italy*
Marco Zannoni, *University of Bologna, Italy*
Paolo Tortora, *University of Bologna, Italy*
Dario Modenini, *University of Bologna, Italy*

12:30 Fine positioning algorithms for the ESA/PROBA-3 formation flying mission

Marta Casti, *INAF P/L, ALTEC, Italy*
Silvano Fineschi, *INAF, Italy*
Alessandro Bemporad, *INAF, Italy*
Vladimiro Noce, *University of Florence, Italy*
Cedric Thizy, *Centre Aerospacial de Liege, Belgium*
Damien Galano, *ESTEC, The Netherlands*

12:50 Progress on Laser Gauge Interferometer (LIG-A) for high resolution accelerometers

Massimo Zucco, *INRiM, Italy*
Marco Pisani, *INRiM, Italy*
Raffaello Pegna, *University of Pisa, INFN, Italy*

13:10 Design validation of MicroMED, a particle analyzer for ExoMars 2020.

Diego Scaccabarozzi, *University of Milan, Italy*
Bortolino Saggin, *University of Milan, Italy*
Riccardo Somaschini, *University of Milan, Italy*
Marianna Magni, *University of Milan, Italy*
Pietro Valnegri, *University of Milan, Italy*
Arash Valiesfahani, *University of Milan, Italy*
Marco Tarabini, *University of Milan, Italy*
Francesca Esposito, *OAC, Italy*
Cesare Molfese, *OAC, Italy*
Fausto Cortecchia, *OAC, Italy*
Giuseppe Mongelluzzo, *OAC, Italy*
Daniele Brienza, *IAPS, Italy*
Alberto Martin Ortega Rico, *INTA, Spain*
Ignacio Arruego Rodriguez, *INTA, Spain*.



11:50 - 13:30

SPECIAL SESSION ON DESIGN FOR RELIABILITY OF AEROSPACE INSTRUMENTATION - PART II

Chairs: Ephraim Suhir, *Portland State University*
Alfonso Farina, *LFIEEE, Distinguished Lecturer of AESS*

Room: ALTEC - DEIMOS HALL

11:50 Features of designing control systems for WIG-craft

Alexander Panferov, *State University of Aerospace Instrumentation, Russia*
Alexander Nebylov, *State University of Aerospace Instrumentation, Russia*
Sergey Brodsky, *State University of Aerospace Instrumentation, Russia*

12:10 Theoretical preconditions for development of perfect communication channels "small satellites - earth"

Anatoliy Platonov, *Warsaw University of Technology, Poland*

12:30 A 1.15 Grad total-ionizing-dose tolerant parallel-operation-oriented optically reconfigurable

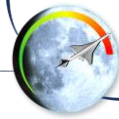
Takumi Fujimori, *Shizuoka University, Japan*
Minoru Watanabe, *Shizuoka University, Japan*

12:50 Current Status, and Future of Research on Optical and Electrical Semiconductor Devices

Takashi Matsuoka, *Tohoku University; Japan*

13:10 STRATEGY AND ALGORITHMS OF PILOTED WIG-CRAFT AUTOMATIC CONTROL AT POSSIBLE FAILURES OF PRIMARY SENSORS

Alexander Nebylov, *State University of Aerospace Instrumentation, Russia*
Vladimir Nebylov, *State University of Aerospace Instrumentation, Russia*
Benzerrouk Hamza, *LASSENA, ÉTS, Canada*



11:50 - 13:30

SPECIAL SESSION ON METROLOGY AND INSTRUMENTATION FOR UNMANNED AERIAL VEHICLES - PART I

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

Room: ALTEC - FOBOS HALL

11:50 Open source, low-cost and modular fixed-wing UAV with BVLOS flight capabilities for geohazards monitoring and surveying

Diego Guenzi, *CNR, Italy*
Marco Baldo, *CNR, Italy*
Paolo Allasia, *CNR, Italy*
Daniele Giordan, *CNR, Italy*

12:10 Experimental method of controller tuning for quadcopters

Michał Waliszewicz, *Military University of Technology, Poland*
Konrad Wojtowicz, *Military University of Technology, Poland*
Zdzisław Rochala, *Military University of Technology, Poland*

12:30 Small UAV's position and attitude estimation using tightly coupled multi baseline multi constellation GNSS and inertial sensor fusion

Marton Farkas, *MTA SZTAKI, Hungary*
Balint Vanek, *MTA SZTAKI, Hungary*
Szabolcs Rozsa, *BME, Hungary*

12:50 Wireless Local Positioning System for Controlled UAV Landing in GNSS-Denied Environment

Tatiana Pavlenko, *Universität Erlangen-Nürnberg, Germany*
Martin Schütz, *Universität Erlangen-Nürnberg, Germany*
Martin Vossiek, *Universität Erlangen-Nürnberg, Germany*
Thomas Walter, *University Wuerzburg, Germany*
Sergio Montenegro, *University Wuerzburg, Germany*

13:10 Link performance evaluation procedure for the introduction of unmanned air vehicles in civil airspace

Gabriella Serafino, *Leonardo S.p.a., Italy*
Damiano Derin, *University of Trieste, Italy*
Fulvio Babich, *University of Trieste, Italy*
Ermanno Pietrosevoli, *ICTP, Italy*
Maurizio Goiak, *Leonardo S.p.a., Italy*



11:50 - 13:30

SPECIAL SESSION ON STRUCTURAL HEALTH MONITORING AND NONDESTRUCTIVE TESTING FOR AEROSPACE - PART II

Chairs: Bengisu Yilmaz, *Kaunas University of Technology (LT)*
Santi Davì, *University of Strathclyde (UK)*

Room: ALTEC - NEPTUNE HALL

11:50 An innovative method based on nonlinear Lamb waves for locating disbonds in Single-Lap joints

Stefano Carrino, *University of Salento, Italy*
Francesco Nicassio, *University of Salento, Italy*
Gennaro Scarselli, *University of Salento, Italy*

12:10 Design of Slot Antenna Based Sensors for Blade Tip Clearance Measurement in Turbine Engines

Xie Xingjuan, *AVIC Changcheng Institute of Metrology and Measurement, China*

12:30 Nonlinear Dynamics of Cracked, Cantilevered Beam-like Structures Undergoing Large Deflections

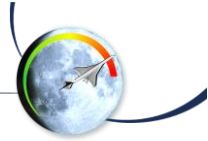
Marco Civera, *Politecnico di Torino, Italy*
Luca Zanotti Fragonara, *Cranfield University, UK*
Cecilia Surace, *Politecnico di Torino, Italy*

12:50 Ultrasonic Phased Array Imaging Technology for the Inspection of Aerospace Composite Structures

Reza Mohammadkhani, *Cranfield University, UK*
Luca Zanotti Fragonara, *Cranfield University, UK*
Janardhan Padiyar M., *Cranfield University, UK*
Ivan Petrunin, *Cranfield University, UK*
Antonios Tsourdos, *Cranfield University, UK*
Iain Gray, *Cranfield University, UK*

13:10 A multi-channel system for on-line structural health monitoring using guided waves

Vittorio Memmolo, *University of Naples 'Federico II', Italy*
Leandro Maio, *University of Naples 'Federico II', Italy*
Ernesto Monaco, *University of Naples 'Federico II', Italy*
Nicola Ciminiello, *Italsystem s.r.l., Italy*
Barbara di Giampaolo, *Italsystem s.r.l., Italy*



13:30 - 14:50

LUNCH

Room: ALTEC - MARS ZONE

14:50 - 15:40

PLENARY TALK

Chair: Alfonso Farina, *LFIEEE, Distinguished Lecturer of AESS*

Room: ALTEC - AUDITORIUM

Recovering lost information in Analog-to-Digital Conversion

Yonina Eldar

Weizmann Institute of Science, Rehovot Israel

15:40 - 16:00

COFFEE BREAK

Room: MARS ZONE

16:00 - 17:40

**SPECIAL SESSION ON COMPLEX SYSTEMS OPERATIONAL AVAILABILITY:
MEASUREMENTS, METHODOLOGIES AND REQUIREMENTS**

Chairs: Fabio Leccese, *University of Roma Tre, Italy*
Enrico Petritoli, *University of Roma Tre, Italy*

Room: ALTEC - AUDITORIUM

**16:00 Probe Position Error Compensation in Near-field to Far-field Pattern
Measurements**

Enrico Petritoli, *Università degli Studi "Roma Tre", Italy*
Fabio Leccese, *Università degli Studi "Roma Tre", Italy*
Lorenzo Ciani, *University of Florence, Italy*

Giuseppe Schirripa Spagnolo, *Università degli Studi "Roma Tre", Italy*

16:20 Inertial Navigation Systems for UAV: Uncertainty and Error Measurements

Enrico Petritoli, *Università degli Studi "Roma Tre", Italy*

Fabio Leccese, *Università degli Studi "Roma Tre", Italy*

Mariagrazia Leccisi, *Università degli Studi "Roma Tre", Italy*

16:40 Wireless sensor networks and flexible electronics as innovative solution for smart greenhouse monitoring in long-term space missions

Davide Polese, *IMM, CNR, Italy*

Luca Maiolo, *IMM, CNR, Italy*

Luca Pazzini, *IMM, CNR, Italy*

Guglielmo Fortunato, *IMM, CNR, Italy*

Alessio Mattocchia, *Università degli studi di Roma Tor Vergata, Italy*

Pier Gianni Medaglia, *Università degli studi di Roma Tor Vergata, Italy*

17:00 Rare Earth Modified Ni- γ Alumina Catalysts for CO₂ Recycling into Life Support Consumables and Fuel

Eleonora Marconi, *"Roma Tre" University, Italy*

Simonetta Tuti, *"Roma Tre" University, Italy*

Igor Luisetto, *ENEA, Italy*

Elisabetta Di Bartolomeo, *"Tor Vergata" University, Italy*

Mariarita Santoro, *"Tor Vergata" University, Italy*

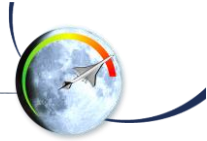
Barbara Orioni, *"Roma Tre" University, Italy*

17:20 Use of the ASD S3000L for the Optimization of Projects in order to Reduce the Risk of Obsolescence of Complex Systems

Ettore De Francesco, *SeTeL s.r.l, Italy*

Ruggero De Francesco, *SeTeL s.r.l, Italy*

Fabio Leccese, *Università degli Studi "Roma Tre", Italy*



16:00 - 17:40

SPECIAL SESSION ON MEASUREMENT FOR IMPROVING QUALITY, RELIABILITY AND SAFETY IN AEROSPACE APPLICATIONS

Chair: Lorenzo Ciani, *University of Florence, Italy*

Room: ALTEC - DEIMOS HALL

16:00 Assemble Torque Measurement of Aero-Engine Rotor Blisk inside Deep and Confined Cavity

Te Li, *Dalian University of Technology, China*

Kuo Liu, *Dalian University of Technology, China*

Guiben Tuo, *Dalian University of Technology, China*

Jiali Zhang, *Dalian University of Technology, China*

Yue Ma, *Dalian University of Technology, China*

16:20 Thickness measurement using ultrasonic scanning method for large aerospace thin-walled parts

Haibo Liu, *Dalian University of Technology, China*

Yongqing Wang, *Dalian University of Technology, China*

Meng Lian, *Dalian University of Technology, China*

Tongyu Zhang, *Dalian University of Technology, China*

Baoliang Liu, *Dalian University of Technology, China*

16:40 Safe Return Path Mapping for Drone Applications

Joao Morais, *Universidade de Lisboa, Portugal*

Jose Sanguino, *Universidade de Lisboa, Portugal*

Pedro Sebastiao, *ISCTE, Instituto de Telecomunicacoes, Portugal*

17:00 Condition monitoring of a morphing laminate with MFC piezoelectric patches via model-based approach

Gianpietro Di Rito, *University of Pisa, Italy*

Benedetto Luciano, *AESIS srl, Italy*

Mario Rosario Chiarelli, *University of Pisa, Italy*

Roberto Galatolo, *University of Pisa, Italy*

17:20 Development of an Automatic Calibration System for Brazilian Airspace Control Activities

Carlos Alexandre Pontes Pizzino, *DECEA, PAME-RJ, FAB Brazil*



16:00 - 17:40

SPECIAL SESSION ON METROLOGY AND INSTRUMENTATION FOR UNMANNED AERIAL VEHICLES - PART II

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

Room: ALTEC - FOBOS HALL

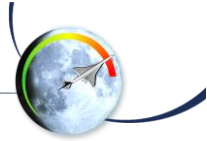
16:00 ArUco markers pose estimation in UAV landing aid system
Adam Marut, *Military University of Technology, Poland*
Konrad Wojtowicz, *Military University of Technology, Poland*
Krzysztof Falkowski, *Military University of Technology, Poland*

16:20 Calibration of an imaging system for monitoring light pollution from small UAVs
Pietro Fiorentin, *University of Padova, Italy*
Carlo Bettanini, *University of Padova, Italy*
Damiano Bogoni, *University of Padova, Italy*
Alessio Aboudan, *University of Padova, Italy*
Giacomo Colombatti, *University of Padova, Italy*

16:40 UAV Pre-flight Structural Strength Verification during On-ground Static Load Test
Artur Kurnyta, *Air Force Insitute of Technology, Poland*
Wojciech Zieliński, *Air Force Insitute of Technology, Poland*
Piotr Reymer, *Air Force Insitute of Technology, Poland*
Michał Dziendzikowski, *Air Force Insitute of Technology, Poland*
Krzysztof Dragan, *Air Force Insitute of Technology, Poland*

17:00 Preliminary performance assessment of Radar-aided monocular Visual Odometry for small aerial platforms
Antonio Fulvio Scannapieco, *University of Naples 'Federico II', Italy*
Alfredo Renga, *University of Naples 'Federico II', Italy*
Maria Daniela Graziano, *University of Naples 'Federico II', Italy*
Giancarmine Fasano, *University of Naples 'Federico II', Italy*

17:20 Specific Problems of Selecting and Integrating Equipment Components in the Course of Developing a Technology Demonstrator for the mini-UAV
Aleksander Olejnik, *Military University of Technology, Poland*
Robert Rogólski, *Military University of Technology, Poland*



Łukasz Kiskowskiak, *Military University of Technology, Poland*
Michał Szcześniak, *Military University of Technology, Poland*

16:00 - 17:40

**INDUSTRIAL SESSION ON METROLOGY AND MEASUREMENT FOR AEROSPACE
COMPLEX SYSTEM APPLICATIONS**

Chairs: Rosa Sapone, *ALTEC*
Vittorio Ancona, *Thales Alenia Space*

Room: ALTEC - NEPTUNE HALL

**16:00 The Mars Terrain Simulator: a high level measurement facility in support to
the ExoMars mission**

Lorenzo Bramante, *ALTEC, Italy*
Maurizio Deffacis, *ALTEC, Italy*
Diego Bussi, *ALTEC, Italy*
Marco Barrera, *ALTEC, Italy*
Chiara Picco, *ALTEC, Italy*
Paola Franceschetti, *Thales Alenia Space, Italy*

16:25 The Optical Payload System facility

Silvano Fineschi, *INAF, Italy*
Marta Casti, *ALTEC, Italy*
Gerardo Capobianco, *INAF, Italy*
Giuseppe Massone, *INAF, Italy*
Federico Landini, *INAF, Italy*
Maurizio Deffacis, *ALTEC, Italy*
Alessandro Bellomo, *ALTEC, Italy*

16:50 Space START: the TAS concept for in orbit servicing

Carlo Cassi, *Thales Alenia Space, Italy*
Morena Bernardini, *Thales Alenia Space, Italy*
Cometto Ferdinando, *Thales Alenia Space, Italy*
Couzin Patrice, *Thales Alenia Space, Italy*
Vincent Dubanchet, *Thales Alenia Space, Italy*
Gautier Durand, *Thales Alenia Space, Italy*



Cristina Fedele, *Thales Alenia Space, Italy*
Genny Scalise, *Thales Alenia Space, Italy*
Stefania Voi, *Thales Alenia Space, Italy*

17:15 High accuracy spacecraft attitude measurement: the Euclid Fine Guidance Sensor

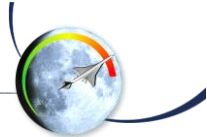
Andrea Bosco, *Thales Alenia Space, Italy*
M. Saponara, *Thales Alenia Space, Italy*
D. Procopio, *Leonardo S.p.A*
F. Carnesecchi, *Leonardo S.p.A*
G. Saavedra, *ESA – ESTEC, The Netherlands*

20:00 - 23:00

GALA DINNER

CIRCOLO CANOTTIERI "CAPRERA 1883" Restaurant
C.so Moncalieri n. 22, 10131 Torino

*A free shuttle bus will be available, from ALTEC Company, with several stops.
The time table and meeting points will be announced at the Registration Desk.*



Friday, June 21 - Technical Sessions

09:00 - 10:00

PLENARY TALK

Room: ALTEC - AUDITORIUM

Radar evidence of subglacial liquid water on Mars

Roberto Orosei

National Institute of Astrophysics, Institute for Radio Astronomy, Italy

10:00 - 11:40

SPECIAL TRACK ON FUTURE SCIENCE OBJECTIVES AND TECHNOLOGIES FOR PLANETARY EXPLORATION - PART I

Chairs: Armando Tempesta, *Thales Alenia Space (TAS-I), Italy*
Federico Tosi, *INAF-IAPS, Italy*

Room: ALTEC - AUDITORIUM

10:00 Radar for Icy Moon Exploration (RIME): Science and measurements, and instrument design

Lorenzo Bruzzone, *University of Trento, Italy*
Renato Croci, *Thales Alenia Space, Italy*

10:30 Scientific objectives and key technical solutions for JANUS instrument onboard the JUICE mission

Pasquale Palumbo, *Parthenope University, Naples*
Giovanni Enrico Noci, *Leonardo S.p.A., Italy*

11:00 Scientific goals and technical challenges of the MAJIS imaging spectrometer on board the JUICE mission

Giuseppe Piccioni, *INAF-IAPS, Italy*
Leonardo Tommasi, *Leonardo S.p.A., Italy*



10:00 - 11:40

SPECIAL SESSION ON METROLOGY FOR RADAR SYSTEMS

Chairs: Alfonso Farina, *LFIEEE, Distinguished Lecturer of AES*
Silvia Ullo, *University of Sannio, Italy*

Room: ALTEC - DEIMOS HALL

10:00 Exploitation of GNSS signals as illuminators of opportunity in Passive Coherent Location (PCL) systems

Edoardo Detoma, *LIT Associates, Columbia*

10:20 Environmental Effects on Ground-based Radar Measurements

Gaspere Galati, *Tor Vergata University, Italy*

Gabriele Pavan, *Tor Vergata University, Italy*

10:40 On the Exploitability of the Ka Band for Spaceborne Radar Debris Detection and Tracking Measurements

Marco Maffei, *University of Naples 'Federico II', Italy*

Augusto Aubry, *University of Naples 'Federico II', Italy*

Antonio De Maio, *University of Naples 'Federico II', Italy*

Alfonso Farina, *Selex ES, Italy*

11:00 Passive Radar Test Transponder

Sergio Gallone, *Leonardo S.p.A, Italy*

11:20 Radar Architectures Against Coherent Interferers

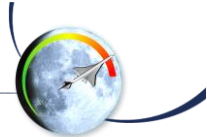
Linjie Yan, *Chinese Academy of Sciences, China*

Chengpeng Hao, *Chinese Academy of Sciences, China*

Pia Addabbo, *Università degli Studi Giustino Fortunato, Italy*

Danilo Orlando, *Università degli Studi Niccolò Cusano, Italy*

Alfonso Farina, *Technical Consultant, Via Helsinki 14, Italy*



10:00 - 11:40

**SPECIAL SESSION ON METROLOGICAL AND TECHNOLOGICAL ASPECTS OF
MANUFACTURING IN THE AEROSPACE INDUSTRY - PART I**

Chairs: Jerzy Józwik, *Lublin University of Technology, Poland*
Arkadiusz Tofil, *The State School of Higher Education in Chelm, Poland*

Room: ALTEC - FOBOS HALL

10:00 Monitoring of the intensity of the electromagnetic field during the aircraft operation in the field of high frequencies

Joanna Michałowska, *The State School of Higher Education in Chelm, Poland*
Jerzy Józwik, *Lublin University of Technology, Poland*
Arkadiusz Tofil, *The State School of Higher Education in Chelm, Poland*

10:20 Effect of Milling Technology on Selected Surface Layer Properties

Mariusz Kłonica, *Lublin University of Technology, Poland*
Jakub Matuszak, *Lublin University of Technology, Poland*
Ireneusz Zagórski, *Lublin University of Technology, Poland*

10:40 Measurement and Analysis of Vibration in the Milling Process of Sintered Carbide Workpiece

Jerzy Jozwik, *Lublin University of Technology, Poland*
Stanislaw Legutko, *Poznan University of Technology, Poland*
Jarosław Pytka, *Lublin University of Technology, Poland*
Joanna Michalowska, *The State School of Higher Education, Poland*

11:00 An Automatic Measurement System for Camera and Star-sensor Alignment during GF-2 Assembly

Zaihua Yang, *Beijing Institute, China*

11:20 Surface Morphology Analysis After Sintered Carbon Milling Process

Jerzy Jozwik, *Lublin University of Technology, Poland*
Stanislaw Legutko, *Poznan University of Technology, Poland*
Jarosław Pytka, *Lublin University of Technology, Poland*
Arkadiusz Tofil, *The State School of Higher Education, Poland*



10:00 - 11:40

GENERAL SESSION PART 2

Chairs: Roberto Opromolla, *University of Naples Federico II, Italy*
Marco Pertile, *University of Padova, Italy*

Room: ALTEC - NEPTUNE HALL

10:00 Issues on Uncertainty to Train Positioning in Hybridized-GNSS Approaches

Susanna Spinsante, *Università Politecnica delle Marche, Italy*
Cosimo Stallo, *Italian Space Agency, Italy*

10:20 Deformation analysis of ATHENA test filters made of plastic thin films supported by a mesh under differential static pressure

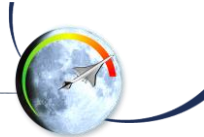
Nicola Montinaro, *INAF University of Palermo, Italy*
Fabio D'Anca, *Consiglio Nazionale delle Ricerche, Italy*
Ugo Lo Cicero, *INAF, Italy*
Paolo Giglio, *University of Palermo, Italy*
Salvatore Ferruggia Bonura, *University of Palermo, Italy*
Daniele Gulli, *INAF, Italy*
Marco Barbera, *University of Palermo, Italy*
Elena Puccio, *INAF, Italy*

10:40 Design of COTS-Based Radio-Frequency Receiver for Cubesat Applications

Antonio Lovascio, *Politecnico di Bari, Italy*
Antonella D'Orazio, *Politecnico di Bari, Italy*
Vito Centonze, *Sitael S.p.A., Italy*

11:00 Rapid RF test system for antennas integrated on microsatellites

Maria Alberica Saporetti, *Microwave Vision, Italy*
Francesco Saccardi, *Microwave Vision, Italy*
Francesca Mioc, *Microwave Vision, Italy*
Lars Jacob Foged, *Microwave Vision, Italy*
Marco Righero, *Links Foundation, Italy*
Giorgio Giordanengo, *Links Foundation, Italy*
Giuseppe Vecchi, *Politecnico di Torino, Italy*



11:20 A Time-Interleaved Non-Uniform Wavelet Bandpass Sampling Scheme for CS-based A-to-I Converters
Ioan Tudosa, *University of Sannio, Italy*

11:40 - 12:00

COFFEE BREAK

Room: MARS ZONE

12:00 - 13:10

SPECIAL TRACK ON FUTURE SCIENCE OBJECTIVES AND TECHNOLOGIES FOR PLANETARY EXPLORATION - PART II

Chairs: Armando Tempesta, *Thales Alenia Space (TAS-I), Italy*
Federico Tosi, *INAF-IAPS, Italy*

Room: ALTEC - AUDITORIUM

12:00 Future science goals of in situ Lunar explorations

Matteo Massironi, *University of Padova, Italy*

Sabrina Ferrari, *University of Padova, Italy*

12:15 Back to the Moon

Maria Antonietta Perino

12:30 LICIACube, the Italian Witness of DART Impact on Didymos

Paolo Tortora, *University of Bologna, Italy*

Valerio Di Tana, *Argotec S.r.l., Italy*

13:00 Government – Industry Collaboration Creating Commercial Opportunities

Silvano Casini



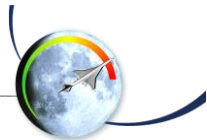
12:00 - 13:10

POSTER SESSION

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

Room: MARS ZONE

- PS1 STRATEGY AND ALGORITHMS OF PILOTED WIG-CRAFT AUTOMATIC CONTROL AT POSSIBLE FAILURES OF PRIMARY SENSORS**
Alexander Nebylov, *State University of Aerospace Instrumentation, Russia*
Vladimir Nebylov, *State University of Aerospace Instrumentation, Russia*
Benzerrouk Hamza, *LASSENA, ÉTS, Canada*
- PS2 Human-in-the-Loop Ekranoplane Motion Control System Design**
Sergey Brodsky, *IJAAT, SUAI, Russia*
Alexander Nebylov, *IJAAT, SUAI, Russia*
Alexander Panferov, *IJAAT, SUAI, Russia*
- PS3 Radars for Probing the Terrestrial Ionosphere: an Overview of Old and New Techniques**
Umberto Sciacca, *Istituto Nazionale di Geofisica e Vulcanologia, Italy*
Enrico Zuccheretti, *Istituto Nazionale di Geofisica e Vulcanologia, Italy*
- PS4 Radars with the function of detecting and tracking artillery shells - selected methods of field testing**
Marek Brzozowski, *AFIT, Poland*
Mariusz Pakowski, *AFIT, Poland*
Mirośław Nowakowski, *AFIT, Poland*
Mirośław Myszka, *AFIT, Poland*
Mirośław Michalczewski, *AFIT, Poland*
- PS5 Research on radar angular and range resolution with the use of a system assisting the pilots in maintenance of flight parameters**
Mariusz Pakowski, *AFIT, Poland*
Marek Brzozowski, *AFIT, Poland*
Mirośław Nowakowski, *AFIT, Poland*
Mirośław Myszka, *AFIT, Poland*
Mirośław Michalczewski, *AFIT, Poland*



- PS6 Advanced Architectures for Detection and Estimation in Heterogeneous Environments**
Jun Liu, *University of Science and Tech. of China, China*
Davide Massaro, *Elettronica S.p.A., Italy*
Danilo Orlando, *University “Niccolo Cusano”, Italy*
Alfonso Farina, *Selex ES (retired), Italy*
- PS7 High-resolution topographic surveys and earth features extraction through LiDARs. Discussion of some Case Studies.**
Chiara Zarro, *University of Sannio, Italy*
Silvia Liberata Ullo, *University of Sannio, Italy*
- PS8 New Precise Point Positioning Software for Upgrade of the Time Monitoring and Steering Service of the H2020 DEMETRA Project**
WEI HUANG, *INRiM, Italy*
Pascale Defraigne, *Observatoire Royal de Belgique, Belgium*
Giovanna Signorile, *INRiM, Italy*
Ilaria Sesia, *INRiM, Italy*
- PS9 A High Accuracy Horizon Sensor for Small Satellites**
Dario Modenini, *University of Bologna, Italy*
Marco Zannoni, *University of Bologna, Italy*
- PS10 A Novel Demodulation Method Based on Partial Period Curve-fitting for FM Signal in Impact Acceleration Calibration by Using Laser Interference Methods**
Zhiguo Liang, *Changcheng Institute of Metrology Measurement, China*
Yahui Wu, *Changcheng Institute of Metrology Measurement, China*
Xiao Yin, *Changcheng Institute of Metrology Measurement, China*
Haolin Sun, *Changcheng Institute of Metrology Measurement, China*
Dazhi Zhang, *Changcheng Institute of Metrology Measurement, China*
- PS11 Reliable and Robust UTC(IT) Generation Based on Master and Backup Time Scales Alignment at INRiM**
Giovanna Signorile, *INRiM, Italy*
Valerio Formichella, *INRiM, Italy*
T. T. Thai, *INRiM, Italy*
A. Perucca, *INRiM, Italy*
E. Cantoni, *INRiM, Italy*



Marco Sellone, *INRiM, Italy*
Alberto Mura, *INRiM, Italy*
Marco Siccardi, *SKK Electronics, Italy*
Giovanni Daniele Rovera, *Sorbonne Université, France*
Ilaria Sesia, *INRiM, Italy*
Filippo Levi, *INRiM, Italy*

PS12 Learning to detect features from spaceborne images. Boulders detection on the martian surface

Mattia Mazzucato, *University of Padova, Italy*

PS13 Characterization of commercial Fast Steering Mirrors for space application

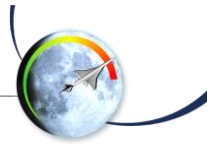
Riccardo Somaschini, *Department of Mechanical Engineering, Italy*
Giovanni Bianchi, *Department of Mechanical Engineering, Italy*
Diego Scaccabarozzi, *Department of Mechanical Engineering, Italy*
Simone Cinquemani, *Department of Mechanical Engineering, Italy*
Fabio Zocchi, *MediaLario Srl, Italy*
Fabio Marioni, *MediaLario Srl, Italy*

PS14 Rover Relative Localization Testing in Martian Relevant Environment

Sebastiano Chiodini, *CISAS University of Padova, Italy*
Marco Pertile, *CISAS University of Padova, Italy*
Riccardo Giubilato, *CISAS University of Padova, Italy*
Federico Salvioli, *ALTEC S.p.A., Italy*
Diego Bussi, *ALTEC S.p.A., Italy*
Marco Barrera, *ALTEC S.p.A., Italy*
Paola Franceschetti, *Thales Alenia Space, Italy*
Stefano Debei, *CISAS University of Padova, Italy*

PS15 Testing of a controlled parafoil with airdrop tests from UAV

Carlo Bettanini, *University of Padova, Italy*
Mirco Bartolomei, *University of Padova, Italy*
Alessio Aboudan, *University of Padova, Italy*
Giacomo Colombatti, *University of Padova, Italy*



PS16 The in-flight calibration procedures of the Shadow Position Sensors (SPS), a very accurate optical metrology system of the ESA/PROBA-3 formation flying mission

Gerardo Capobianco, *INAF Astrophysical Observatory of Torino, Italy*
Silvano Fineschi, *INAF Astrophysical Observatory of Torino, Italy*
Davide Loreggia, *INAF Astrophysical Observatory of Torino, Italy*
Alessandro Bemporad, *INAF Astrophysical Observatory of Torino, Italy*
Federico Landini, *INAF Astrophysical Observatory of Torino, Italy*
Marta Casti, *Astrophysical Observatory of Torino - INAF, ALTEC, Italy*
Vladimiro Noce, *University of Florence, Italy*
Marco Romoli, *University of Florence, Italy*
Damien Galano, *ESTEC*
Cédric Thizy, *Centre Spatial de Liège, Belgium*

PS17 The Occulter Position Sensor Emitters (OPSE) metrology sub-system for the PROBA-3 mission

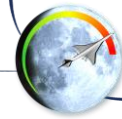
Davide Loreggia, *INAF, Italy*
Gerardo Capobianco, *INAF, Italy*
Silvano Fineschi, *INAF, Italy*
Giuseppe Massone, *INAF, Italy*
Cedric Thizy, *CSL, Belgium*
Camille Galy, *CSL, Belgium*
Aline Hermans, *CSL, Belgium*
Ariane Pirard, *CSL, Belgium*
Ileana Cernica, *IMT, Romania*
Octavian Ionescu, *IMT, Romania*
Munizer Purica, *IMT, Romania*
Damien Galano, *ESA, The Netherlands*

PS18 Qualification of MEMS differential pressure sensors in Martian-like environment

Bortolino Saggin, *Politecnico di Milano, Italy*
Diego Scaccabarozzi, *Politecnico di Milano, Italy*
Arash Valiesfahani, *Politecnico di Milano, Italy*
Pietro Valnegri, *Politecnico di Milano, Italy*
Riccardo Somaschini, *Politecnico di Milano, Italy*



- PS19 Optical metrology for measuring Earth's gravity**
Stefano Cesare, *Thales Alenia Space, Italy*
Gino Bruno Amata, *Thales Alenia Space, Italy*
Alberto Anselmi, *Thales Alenia Space, Italy*
Luciana Bonino, *Thales Alenia Space, Italy*
Bruno Leone, *ESA/ECSAT, UK*
Luca Massotti, *ESA/ECSAT, UK*
Sergio Mottini, *Thales Alenia Space, Italy*
Kolja Nicklaus, *SpaceTech GmbH, Germany*
Marco Pisani, *Istituto Nazionale di Ricerca Metrologica, Italy*
Massimo Zucco, *Istituto Nazionale di Ricerca Metrologica, Italy*
- PS20 A Rotors Spin-up and Checking a Switching on the Redundant Controlling Gyro Cluster into Spacecraft Attitude Control System**
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*
Tatyana Somova, *Samara State Technical University, Russia*
- PS21 Identification and Stochastic Checking a Control Safety at a Landing of Aerospace Vehicles**
Nikolay Rodnishchev, *Kazan National Research Technical University, Russia*
Tatyana Somova, *Samara State Technical University, Russia*
- PS22 Prediction and verification of an aircraft takeoff trajectory with high-altitude obstacles**
Andrey Shevchenko, *Russian Academy of Sciences, Russia*
Boris Pavlov, *Russian Academy of Sciences, Russia*
Galina Nachinkina, *Russian Academy of Sciences, Russia*
- PS23 Diagnosability of GNSS/IMU System without Hardware Redundancy**
Paolo Castaldi, *University of Bologna, Italy*
Nicola Mimmo, *University of Bologna, Italy*
Massimiliano Menghini, *University of Bologna, Italy*



PS24 UAS for positioning and field mapping using LIDAR and IMU sensors data: Kalman filtering and integration

Gennaro Ariante, *University of Naples "Parthenope", Italy*
Umberto Papa, *University of Naples "Parthenope", Italy*
Salvatore Ponte, *University of Studies of Campania "Luigi Vanvitelli", Italy*
Giuseppe Del Core, *University of Naples "Parthenope", Italy*

PS25 Open source, low-cost and modular fixed-wing UAV with BVLOS flight capabilities for geohazards monitoring and surveying

Diego Guenzi, *CNR, IRPI, Italy*
Marco Baldo, *CNR, IRPI, Italy*
Paolo Allasia, *CNR, IRPI, Italy*
Daniele Giordan, *CNR, IRPI, Italy*

PS26 Optimized observation arrangement based on multi-agent

Runle Du, *National Key Laboratory, China*
Xue Qin, *National Key Laboratory, China*
Yi Shu, *National Key Laboratory, China*
Jiaqi Liu, *National Key Laboratory, China*
Zhenhong Niu, *National Key Laboratory, China*

PS27 Cloud Detection System for UAV Sense and Avoid: First Results of Cloud Segmentation in a Simulation Environment

Adrian Dudek, *University of the Bundeswehr Munich, Germany*
Franziska Funk, *University of the Bundeswehr Munich, Germany*
Martin Russ, *University of the Bundeswehr Munich, Germany*
Peter Stütz, *University of the Bundeswehr Munich, Germany*

PS28 Concept of wireless measurement system of UAV jet engine rotor

Paulina Kurnyta-Mazurek, *Military University of Technology, Poland*
Artur Kurnyta, *Military University of Technology, Poland*
Maciej Henzel, *Military University of Technology, Poland*

PS29 Precise Remote Sensing Using Unmanned Helicopter

Aleksander Olejnik, *Military University of Technology, Poland*
Łukasz Kiszковиak, *Military University of Technology, Poland*
Robert Rogólski, *Military University of Technology, Poland*
Grzegorz Chmaj, *DRI Solutions Sp. z o.o., Poland*
Michał Radomski, *Military University of Technology, Poland*



Maciej Majcher, *Military University of Technology, Poland*

Łukasz Omen, *Military University of Technology, Poland*

PS30 An Innovative Bifocal Metrology System based on projective techniques for Aerospace Applications

Fulvio Bresciani, *Thales Alenia Space, Italy*

PS31 Cluster Layout for an Optical Wireless Sensor Network for Aerospace Applications

Fabio Leccese, *Università degli Studi "Roma Tre", Italy*

Mariagrazia Leccisi, *Università degli Studi "Roma Tre", Italy*

Marco Cagnetti, *Università degli Studi "Roma Tre", Italy*

PS32 A multi-channel system for on-line structural health monitoring using guided waves

Vittorio Memmolo, *University of Naples 'Federico II', Italy*

Leandro Maio, *University of Naples 'Federico II', Italy*

Ernesto Monaco, *University of Naples 'Federico II', Italy*

Nicola Ciminiello, *Italsystem s.r.l., Italy*

Barbara di Giampaolo, *Italsystem s.r.l., Italy*

PS33 Electromechanical Impedance Measurement for De-Icing Applications based on Piezoelectric Actuators

Leandro Maio, *University of Naples Federico II, Italy*

PS34 Embedded ADC testing challenges: proposals from research

Eulalia Balestrieri, *University of Sannio, Italy*

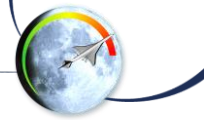
Pasquale Daponte, *University of Sannio, Italy*

Luca De Vito, *University of Sannio, Italy*

Francesco Picariello, *University of Sannio, Italy*

Sergio Rapuano, *University of Sannio, Italy*

Ioan Tudosa, *University of Sannio, Italy*



12:00 - 13:10

LIVE DEMONSTRATIONS SESSION

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

Room: *MARS ZONE*

DEMO1 ROVER IVBB – IMX

Organized by *Thales Alenia Space*

DEMO2 ROVER ROXY

Organized by *Thales Alenia Space*

DEMO3 Trinity Rover - An engineering model of a martian assistance rover

Organized by *Team DIANA*

DEMO4 POLYTILE: Self-Compensating IMU Exploiting Redundant Configuration on Regular POLYhedron of SensorTILES

Organized by *Giorgio De Alteriis, Domenico Accardo, Rosario Schiano Lo Moriello, Raffaele Ruggiero, University of Naples Federico II*

DEMO5 Experimental method of controller tuning for quadcopters

Organized by *Konrad Wojtowicz, Michał Walisziewicz, Zdzisław Rochala, Military University of Technology, Poland*

13:10 - 14:30

LUNCH

Room: *ALTEC - MARS ZONE*



14:30 - 16:10

GENERAL SESSION PART 3

Chairs: Paola Romano, *University of Sannio, Italy*
Antonio Feoli, *University of Sannio, Italy*

Room: ALTEC - AUDITORIUM

14:30 Low temperature point contact spectroscopy and transport measurements on filled skutterudite compounds

Paola Romano, *University of Sannio, Italy*
F. Avitabile, *University of Sannio, Italy*
Lei Shu, *Fudan University, China*
Jian Zhang, *Fudan University, China*
A. Nigro, *University of Salerno, Italy*
A. Leo, *University of Salerno, Italy*
G. Grimaldi, *University of Salerno, Italy*
F. Giubileo, *University of Salerno, Italy*

14:50 The contribution of a large baseline intersatellite link to relativistic metrology

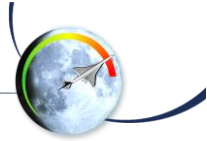
Gael Cascioli, *Sapienza University of Rome, Italy*
Fabrizio De Marchi, *Sapienza University of Rome, Italy*
Antonio Genova, *Sapienza University of Rome, Italy*
Luciano Iess, *Sapienza University of Rome, Italy*
David E. Smith, *Massachusetts Institute of Technology, USA*
Maria T. Zuber, *Massachusetts Institute of Technology, USA*

15:10 A Unified Sensor-Centric Approach to Cooperative and Non-Cooperative Spacecraft Collision Avoidance

Samuel Hilton, *RMIT University, Australia*
Alessandro Gardi, *RMIT University, Australia*
Roberto Sabatini, *RMIT University, Australia*

15:30 An experimental test of the relation $M / R\epsilon_3$ and of the corresponding model to estimate the efficiency of a supermassive black hole

Antonio Feoli, *University of Sannio, Italy*
Antonella Lucia Iannella, *University of Sannio, Italy*



15:50 Analysis on the solar irradiance fluctuations effect on the BepiColombo Superior Conjunction Experiment

Ivan di Stefano, *Sapienza University of Rome, Italy*
Paolo Cappuccio, *Sapienza University of Rome, Italy*
Luciano Iess, *Sapienza University of Rome, Italy*

14:30 - 16:10

SPECIAL SESSION ON TERRESTRIAL AND IN-FLIGHT VERIFICATION OF THE GNC SYSTEMS FOR AEROSPACE VEHICLES

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

Room: ALTEC - DEIMOS HALL

14:30 A new method for satellite navigation signals FDI

Paolo Castaldi, *University of Bologna, Italy*
Matteo Zanzi, *University of Bologna, Italy*

14:50 Stratospheric Balloon Attitude and Position Determination System Based on the VHF Omnidirectional Range Signal Processing: TARDIS experiment

Luigi di Palo, *S5Lab, DIMA, Sapienza University of Rome, Italy*
Veronica Bandini, *S5Lab, DIMA, Sapienza University of Rome, Italy*
Emanuele Bedetti, *S5Lab, DIMA, Sapienza University of Rome, Italy*
Giulia Broggi, *S5Lab, DIMA, Sapienza University of Rome, Italy*
Luca Colletti, *S5Lab, DIMA, Sapienza University of Rome, Italy*
Paola Celesti, *DIAEE Sapienza University of Rome, Italy*
Davide Di Ienno, *S5Lab, DIMA, Sapienza University of Rome, Italy*
Riccardo Garofalo, *S5Lab, DIMA, Sapienza University of Rome, Italy*
Francesco Iovanna, *S5Lab, DIMA, Sapienza University of Rome, Italy*
Giulio Mattei, *S5Lab, DIMA, Sapienza University of Rome, Italy*
Paolo Marzioli, *DIMA, Sapienza University of Rome, Italy*
Fabrizio Piergentili, *DIMA, Sapienza University of Rome, Italy*
Fabio Santoni, *DIAEE, Sapienza University of Rome, Italy*



- 15:10 Checking the Robot-manipulator Control System at Preparation and Capturing a Passive Satellite**
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*
Tatyana Somova, *Samara State Technical University, Russia*
- 15:30 Health Checking of a Spacecraft Control System in the Orientation Initial Modes**
Yevgeny Somov, *Samara State Technical University, Russia*
Nikolay Rodnishchev, *Kazan National Research Technical University, Russia*
Tatyana Somova, *Samara State Technical University, Russia*
- 15:50 Effective Method of Predicting and Checking the Brake-way of Aircraft**
Andrey Shevchenko, *Russian Academy of Sciences, Russia*
Boris Pavlov, *Russian Academy of Sciences, Russia*
Galina Nachinkina, *Russian Academy of Sciences, Russia*

14:30 - 16:10

SPECIAL SESSION ON METROLOGICAL AND TECHNOLOGICAL ASPECTS OF MANUFACTURING IN THE AEROSPACE INDUSTRY - PART II

Chairs: Jerzy Józwik, *Lublin University of Technology, Poland*
Arkadiusz Tofil, *The State School of Higher Education in Chelm, Poland*

Room: ALTEC - FOBOS HALL

- 14:30 Analysis of wear of cold forging dies using the technique of focal differentiation microscopy**
Adam Ćwikła, *The Institute of Technical Sciences and Aviation, Poland*
Arkadiusz Tofil, *Lublin University of Technology, Poland*



14:50 The Use of a 3D Scanner and Measuring Faro Arm for Measuring of Bend Angle Bars on a Three-roller Bending Machine.

Arkadiusz Tofil, *The Institute of Technical Sciences and Aviation, Poland*
Ireneusz Usydus, *The Institute of Technical Sciences and Aviation, Poland*

15:10 Comparative Assessment of Tribological Properties of Selected Polymers and Polymer Composites

Jerzy Józwiak, *Lublin University of Technology, Poland*
Krzysztof Dziedzic, *Lublin University of Technology, Poland*
Mychajło Paszczko, *Lublin University of Technology, Poland*
Marcin Barszcz, *Lublin University of Technology, Poland*

15:30 Effect of Brushing Conditions on Axial Forces in Ceramic Brush Surface Treatment

Jakub Matuszak, *Lublin University of Technology, Poland*
Mariusz Kłonica, *Lublin University of Technology, Poland*
Ireneusz Zagórski, *Lublin University of Technology, Poland*

15:50 Smart Inspection Tools in robotized aircraft panels manufacturing

Andrea Bruni, *Research for Innovation Loccioni, Italy*
Enrico Concettoni, *Research for Innovation Loccioni, Italy*
Cristina Cristalli, *Research for Innovation Loccioni, Italy*
Matteo Nisi, *Research for Innovation Loccioni, Italy*

14:30 - 16:10

SPECIAL SESSION ON DISTRIBUTED SYSTEMS AND SENSOR FUSION APPLICATIONS FOR AEROSPACE

Chair: Roberto Opromolla, *University of Naples 'Federico II', Italy*

Room: ALTEC - NEPTUNE HALL

14:30 In-flight estimation of magnetic biases on board of small UAVs exploiting cooperation

Roberto Opromolla, *University of Naples 'Federico II', Italy*
Giuseppe Esposito, *University of Naples 'Federico II', Italy*
Giancarmine Fasano, *University of Naples 'Federico II', Italy*



- 14:50 Redundant configuration of low-cost inertial sensors for advanced navigation of small unmanned aerial systems**
Domenico Accardo, *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*
Raffaele Ruggiero, *University of Naples 'Federico II', Italy*
- 15:10 GNSS-aware Path Planning for UAV swarm in complex environments**
Flavia Causa, *University of Naples 'Federico II', Italy*
Giancarmine Fasano, *University of Naples 'Federico II', Italy*
Michele Grassi, *University of Naples 'Federico II', Italy*
- 15:30 An Innovative Medium-Altitude Long-Endurance Unmanned Aircraft System with Advanced Flight Management and Navigation Features**
Domenico Accardo, *University of Naples 'Federico II', Italy*
Giancarlo Rufino, *University of Naples 'Federico II', Italy*
Claudia Conte, *University of Naples 'Federico II', Italy*

16:10 - 16:30

COFFEE BREAK

Room: MARS ZONE

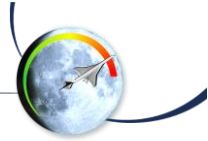
16:30 - 17:50

GENERAL SESSION PART 4

Chairs: Silvia Ullo, *University of Sannio, Italy*
Alessandro Gardi, *RMIT University, Australia*

Room: ALTEC - AUDITORIUM

- 16:30 High accuracy time and frequency dissemination for space geodesy and aerospace**
Cecilia Clivati, *INRIM, Italy*
Martina Gertosio, *INRIM, Italy*
Filippo Levi, *INRIM, Italy*
Alberto Mura, *INRIM, Italy*
Davide Calonico, *INRIM, Italy*



16:50 Impact damage investigation on glass fiber laminates at different temperatures by means of electronic speckle pattern interferometry

Vito Pagliarulo, *CNR, Italy*

Pietro Ferraro, *CNR, Italy*

Ilaria Papa, *University of Naples 'Federico II', Italy*

Valentina Lopresto, *University of Naples 'Federico II', Italy*

Antonio Langella, *University of Naples 'Federico II', Italy*

17:10 Preliminary characterization of a Rb Pulsed Optically Pumped clock for space applications

Salvatore Micalizio, *INRIM, Italy*

Claudio E. Calosso, *INRIM, Italy*

Filippo Levi, *INRIM, Italy*

Michele Gozzelino, *INRIM, Italy*

Marina Gioia, *Leonardo SpA, Italy*

Piergiorgio Arpesi, *Leonardo SpA, Italy*

Adalberto Sapia, *Leonardo SpA, Italy*

Romano Romani, *Leonardo SpA, Italy*

Jacopo Belfi, *Leonardo SpA, Italy*

Nicholas Marzoli, *Leonardo SpA, Italy*

Alberto Tuozi, *ASI, Italy*

Marco Belloni, *ESA, The Netherlands*

17:30 A method for measuring the moment of inertia of components for space and nanosats

M. Pisani

A. Malengo

M. Santiano

M. Astrua

Srijith Bangaru

Thirumalai Raj



16:30 - 17:50

**SPECIAL SESSION ON GARFIELD - GREEN, ACCESSIBLE AND SAFE GRASSY AIRFIELDS.
METROLOGY, METHODS AND INSTRUMENTATION**

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

Jerzy Józwik, *Lublin University of Technology, Poland*

Room: ALTEC - DEIMOS HALL

16:30 Measurement of Forces and Moments Acting on Aircraft Landing Gear Wheel

Jarosław Pytka, *Lublin University of Technology, Poland*

Jerzy Józwik, *Lublin University of Technology, Poland*

Tomasz Łyszczczyk, *Lublin University of Technology, Poland*

Piotr Budzyński, *Lublin University of Technology, Poland*

Jan Laskowski, *University College of Enterprise and Administration, Poland*

Ernest Gnapowski, *University College of Enterprise and Administration, Poland*

16:50 Measurement of Takeoff and Landing Ground Roll of Airplane on Grassy Runway

Jarosław Pytka, *Lublin University of Technology, Poland*

Piotr Budzyński, *Lublin University of Technology, Poland*

Jerzy Józwik, *Lublin University of Technology, Poland*

Tomasz Łyszczczyk, *Lublin University of Technology, Poland*

Jan Laskowski, *University College of Enterprise and Administration, Poland*

Ernest Gnapowski, *University College of Enterprise and Administration, Poland*

17:10 GRASSTAM – An Idea of a Notice on Grassy Runway Condition

Jarosław Pytka, *Lublin University of Technology, Poland*

Piotr Budzyński, *Lublin University of Technology, Poland*

Jerzy Józwik, *Lublin University of Technology, Poland*

Tomasz Łyszczczyk, *Lublin University of Technology, Poland*

Jan Laskowski, *University College of Enterprise and Administration, Poland*

Ernest Gnapowski, *University College of Enterprise and Administration, Poland*



- 17:30 GARFIELD Information System – Old Problems and New Perspectives**
Jarosław Pytka, *Lublin University of Technology, Poland*
Piotr Budzyński, *Lublin University of Technology, Poland*
Jerzy Józwik, *Lublin University of Technology, Poland*
Tomasz Łyszczuk, *Lublin University of Technology, Poland*
Jan Laskowski, *University College of Enterprise and Administration, Poland*
Ernest Gnapowski, *University College of Enterprise and Administration, Poland*

16:30 - 17:50

GENERAL SESSION PART 5

- Chairs:** Marco Pisani, *INRiM, Italy*
Ephraim Suhir, *Portland State University, Italy*
Room: ALTEC - *FOBOS HALL*
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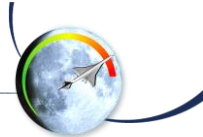
- 16:30 The Clean Sky 2 MIDAS Project - an Innovative Modular, Digital and Integrated Air Data System for Fly-by-Wire Applications**
Angelo Lerro, *Politecnico di Torino, Italy*
Manuela Battipede, *Politecnico di Torino, Italy*
Piero Gili, *Politecnico di Torino, Italy*
Michele Ferlauto, *Politecnico di Torino, Italy*
Alberto Brandl, *Politecnico di Torino, Italy*
Andrea Merlone, *Istituto Nazionale di Ricerca Metrologica, Italy*
Chiara Musacchio, *Istituto Nazionale di Ricerca Metrologica, Italy*
Giovanni Sangaletti, *SELT S.r.l., Italy*
Giuseppe Russo, *SELT S.r.l., Italy*
- 16:50 New applications for Compact Optical Attitude Sensor (COATS) for space**
Marco Pisani, *INRiM, Italy*
Massimo Zucco, *INRiM, Italy*
Andrea Egidi, *INRiM, Italy*
Sergio Mottini, *Thales Alenia Space*
- 17:10 LED-based attitude reconstruction and back-up light communication: experimental applications for the LEDSAT CubeSat**
Paolo Marzioli, *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*



Marco Acernese, *Sapienza University of Rome, Italy*
Leonardo Parisi, *Sapienza University of Rome, Italy*
Giammarco Cialone, *Sapienza University of Rome, Italy*
Maria Giulia Pancalli, *Sapienza University of Rome, Italy*
Eleonora Vestito, *Sapienza University of Rome, Italy*
Federico Curianò, *Sapienza University of Rome, Italy*
Niccolò Picci, *Sapienza University of Rome, Italy*
Fabrizio Piergentili, *Sapienza University of Rome, Italy*

17:30 Alignment and optical performance of the Metis coronagraph for the Solar Orbiter mission

Fabio Frassetto, *CNR-IFN Padova, Italy*
Vania Da Deppo, *CNR-IFN Padova, Italy*
Paola Zuppella, *CNR-IFN Padova, Italy*
Marco Romoli, *University of Florence, Italy*
Silvano Fineschi, *INAF-OATo, Italy*
Ester Antonucci, *INAF-OATo, Italy*
Giampiero Naletto, *University of Padova, Italy*
Gianalfredo Nicolini, *INAF-OATo, Italy*
Piergiorgio Nicolosi, *University of Padova, Italy*
Daniele Spadaro, *INAF-OACt, Italy*
Vincenzo Andretta, *INAF-OACn, Italy*
Marco Castronuovo, *ASI, Italy*
Gerardo Capobianco, *INAF-OATo, Italy*
Marta Casti, *INAF-OATo, Italy*
Federico Landini, *INAF-OATo, Italy*
Giuseppe Massone, *INAF-OATo, Italy*
Maurizio Pancrazzi, *University of Florence, Italy*
Roberto Susino, *INAF-OATo, Italy*
Luca Teriaca, *MPS, Germany*
Michela Uslenghi, *INAF-IASF, Italy*



16:30 - 17:50

GENERAL SESSION PART 6

Chairs: Luca De Vito, *University of Sannio, Italy*
Grazia Iadarola, *University of Sannio, Italy*

Room: ALTEC - NEPTUNE HALL

16:30 Space Metrology Problems of the Future Planetary Defense System with Pulsar Time, Navigation and Positioning

Maciej Mroczkowski, *Military University of Technology, Poland*
Stanisław Kachel, *Military University of Technology, Poland*
Adam Kozakiewicz, *Military University of Technology, Poland*

16:46 A New Cubature Kalman Filtering with M-method for Attitude Determination

Haoqian Huang, *University Nanjing, China*
Rengdu Shi, *University Nanjing, China*
Jun Zhou, *University Nanjing, China*
Xinhua Tang, *University Nanjing, China*
Tie Huang, *University Nanjing, China*
Guangsheng Wu, *University Nanjing, China*

17:02 Optimization of the sensor “MicroMED” for the ExoMars 2020 mission: the Flight Model design

Giuseppe Mongelluzzo, *INAF, University of Naples 'Federico II', Italy*
Francesca Esposito, *INAF, Italy*
Fabio Cozzolino, *INAF, Italy*
Diego Saccabarozi, *Politecnico di Milano, Italy*
Bortolino Saggin, *Politecnico di Milano, Italy*



17:18 On the effect of jitters and aberrations in the measurement of the LISA's spacecraft distances

Carlo Paolo Sasso, *INRIM, Italy*

Giovanni Mana, *INRIM, Italy*

Sergio Mottini, *Thales Alenia Space, Italy*

17:34 Airplane Subsystem Testing at The Military University of Technology

Konrad Wojtowicz, *Military University of Technology, Poland*

M. Henzel, *Military University of Technology, Poland*

M. Ważny, *Military University of Technology, Poland*

S.Kachel, *Military University of Technology, Poland*

Z. Rochala, *Military University of Technology, Poland*

A. Olejnik, *Military University of Technology, Poland*

M. Jaształ, *Military University of Technology, Poland*

R. Rogólski, *Military University of Technology, Poland*

S. Wrzesień, *Military University of Technology, Poland*

E. Balestrieri, *University of Sannio, Italy*

Pasquale Daponte, *University of Sannio, Italy*

Luca De Vito, *University of Sannio, Italy*

Francesco Lamonaca, *University of Sannio, Italy*

Sergio Rapuano, *University of Sannio, Italy*

Liliana Viglione, *University of Sannio, Italy*

17:50 - 18:10

CLOSING AND AWARD CEREMONY

Room: ALTEC - AUDITORIUM

