



Report on the 3rd IEEE AESS Workshop on Metrology for AeroSpace

MetroAeroSpace 2016

June 21-23, 2016, Florence, Italy

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The world of measurements has always been crucial in the aerospace sector. To date, apart from industry conferences where there are specific issues related to the field of metrological interest, it was never organized a conference cycle, which saw together experts in the aerospace metrology.

The topic is of great interest when considering investments in the aerospace sector and the creation of industrial districts for aerospace. In this framework the third edition of the *IEEE International Workshop on Metrology for Aerospace* (*MetroAeroSpace*, www.metroaerospace.org), was proposed as an international meeting place in the world of research in the field of metrology for aerospace involving national and international 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 academic.

MetroAeroSpace was technical co-sponsored by Aerospace and Electronic Systems Society and IEEE Instrumentation and Measurement Society, financial sponsored by AESS. It was held in Florence, Italy, on June 21-23, 2016. Florence is the cradle of the Renaissance and appreciated by millions of tourists, Florence has been UNESCO World Heritage Site since 1982. Florence's museums, palaces, and churches house some of the greatest artistic treasures in the world. The location of *MetroAeroSpace 2016* was few hundred meters from the Cathedral and the Baptistery.



MetroAeroSpace 2016 was jointly organized by Pasquale Daponte, University of Sannio, Italy, and Robert Rassa, Raytheon, US, acting as executive co-chairs. Technical Program Chairs were Stephen Dyer, Kansas State University, US, and Marcantonio Catelani, University of Florence, while Lorenzo Ciani, University of Florence and Cosimo Stallo, University of Rome "Tor Vergata", Italy, served as a Publicity Chair and Treasury Chair, respectively. Honorary Chair was Marina Ruggieri, University of Rome "Tor Vergata", Italy.

After the remarkable success of the first two IEEE International Workshops on Metrology for Aerospace (*MetroAeroSpace*), involving for each edition more than one hundred researchers, it was deemed appropriate to promote a third edition of this event, which aimed to strengthen and support partnerships among researchers working on the development of instrumentation and measurement methods for the aerospace industry.

The presence of the Italian Air Force (IAF) during the work of the first two editions of the Workshop received unanimous praise in the metrology world for aerospace for both the high scientific contribution made by speakers from IAF Departments involved in metrology fields and for the visibility given to areas such as the drones, of great interest to the results achieved. The exhibition of simulacra of drones (*Predator* and *StixC*) stressed the IAF presence at the two previous events.

The third edition of the Workshop saw the presence of the Italian Space Agency, the European Space Agency and the National Institute of Metrological Research. A special session dedicated to the important Italian contribution to the success of the mission "Rosetta" was organized, too.

The event has received the support of many public institutions and private companies, listed on the web site <http://www.metroaerospace.org/index.php/sponsorship-exhibition/institutional-patronage>

In this context it should be noted the presence, for the first time in the history of the Workshop, of Air Force of Italian Army, Italian Navy and Italian Air Force, in particular, it was displayed in static form;

- Unmanned SHADOW 200 - RQ-7B V2 by AAI/Textron Systems, by Air Force of Italian Army and Rigel srl - AAI/Textron Systems,
- SARAD - Automatic Data Analysis and Recording, by the Italian Navy.



Static exhibition of SARAD - Automatic Data Analysis and Recording, and Unmanned SHADOW 200 - RQ-7B V2

A parallel event "*Military Metrology for AeroSpace*" at the 3rd IEEE International Workshop on Metrology for AeroSpace was held at the Institute of Aeronautical Military Sciences in Florence, June 21, organized by the AFCEA Chapter of Naples, a web page of the event can be found at: <http://www.metroaerospace.org/military/>



Italian Institute of Aeronautical Military Sciences in Florence, June 21, “Military Metrology for AeroSpace”, organized dall’AFCEA Chapter of Naples as parallel event to MetroAeroSpace Workshop.



The programme of *Military Metrology* included, the welcome addresses of D. Gen. Stefano Fort, Head of Institute of Military Aeronautical Sciences, Florence, B. Gen. (a) Dario Nicoletta, President of AFCEA Chapter of Naples, Prof. Pasquale Daponte, University of Sannio, and the following presentations;

- *Modelling & Simulation Application for RPAS Integration Test*, Lt. Col. GArn Eng. Ferdinando Dolce, Experimental Flight Department, Italian Air Force
- *Live Air Space Controller: a new method to evaluate and face the turbulence in flight*, Eng. Gaetano Rizzi, Evolve The Future
- *Space-based Measurements for Operational Meteorology*, Lt. Col. Daniele Biron, Operational Centre for Meteorology, COMET, Italian Air Force
- *Tektronix Solutions for Radar and Electronic Warfare applications*, Eng. Gabriele Vittori, Tektronix/Keithley.

The *Military Metrology* Workshop was attended from a wide group of civil and military experts in the field of metrology for military applications.

The technical program of the 3rd IEEE International Workshop on Metrology for AeroSpace was particularly difficult to be arranged since we received 155 abstracts from all over the world.

Due to the time limits of the conference only 129 papers have been selected after a review activity of the program committee and additional reviewers. Authors from 23 countries attended the Workshop. All papers submitted to Workshop that have been accepted in a peer-reviewed process are made globally accessible via IEEE Xplore®.

This Workshop was improved by adding a significant number of Special Sessions, for two reasons:

- So many are the application fields of the metrology for aerospace that a single track could have been too much dispersive.
- In spite of a centralized research address definition, a spontaneous aggregation of well-focused themes has been gathered, with specific aim of providing a forum of specific debate very close to the single research field.

The technical program included several events and activities. The keynote speeches were held by experts in the field of metrology for aerospace:

- Dr. William H. Prosser NASA Engineering and Safety Center - Langley Research Center, USA, talked about "*Applications of Advanced Nondestructive Measurement Techniques to Address Safety Issues of Flight on NASA Spacecraft*",
- Dr. Alessandro Cozzani European Space Research and Technology Centre, which described the "*Trend and research of contactless measurements for environmental testing of space systems*".

This edition of the Workshop included for the second time a half day of tutorials offering three subjects;

- *Precise time scales and navigation systems*, Patrizia Tavella, INRIM, Italy
- *RADAR role: from the underground to the outer space*, Alfonso Farina, LFIEEE, AESS BoG
- *Measurement for Planetary Exploration: Mars and ExoMars*, Stefano Debei, Center of Studies and Activities for Space, Padua, Italy.



For the first time MetroAeroSpace included Demo Sessions, they were organized as "Live Demonstration" track to allow an interactive and tangible form of presentation, which is quite different from the oral and poster sessions. Conference delegates were invited to experience the demonstrations directly, to interact with, play with, and challenge them. Presenters had the opportunity to show direct proof of their working systems and to create a lasting impression.

It is worth to note that the programme of the 3rd IEEE International Workshop on Metrology for AeroSpace included:

- The annual meeting of the Italian URSI Committee.
- The meeting of the "Opus Suite" User Group.

These events will give further opportunities for contacts between the conference participants.

To encourage the attendance in particular of young researchers, some awards were offered:

Best paper, awarded with a plaque, of the 3rd IEEE International Workshop on Metrology for AeroSpace;

The BepiColombo ISA accelerometer: ready for launch

Valerio Iafolla, Emiliano Fiorenza, Carlo Lefevre, David M. Lucchesi, Marco Lucente, Carmelo Magnafico, Roberto Peron, Francesco Santoli,
Istituto di Astrofisica e Planetologia Spaziali, Italy

Best paper of the poster session, awarded with a plaque;

High Frequency Propagation in Large and Multiply Connected Electromagnetic Environments

Hayan Nasser, Christopher Smartt, David Thomas, Gabriele Gradoni, Stephen Creagh, Gregor Tanner, University of Nottingham, United Kingdom
Davide Micheli, Telecom Italia S.p.A., Italy

Best paper presented by a woman, the award, a plaque, was offered by CISAS – University of Padua;

Experimental characterization of the distribution of resonance widths in chaotic reverberation chambers

Elodie Richalot, Université Paris-Est, France

Ulrich Kuhl, Olivier Legrand, Fabrice Mortessagne, Université Nice-Sophia Antipolis, France

J.B. Gros, Université de Toulouse, France

Stefano Grivet-Talocia, Politecnico di Torino, Italy

Best paper presented by a young researcher, awarded with a plaque offered by Lions Club Firenze Amerigo Vespucci;

Integrated NRM/EKF for LEO satellite GPS based orbit determination

Murat Bagci, Turkish Air Force Academy, Turkey

Chingiz Hajiyev, Istanbul Technical University, Turkey

Best demo, awarded with a plaque offered by AFCEA Chapter of Naples;

Improving a sounding rocket technology demonstrator for experimental measurements

Matteo Poli, Nimbus Project, Center of Studies and Activities for Space (CISAS), Italy

Eugenio Di Iorio, Francesco Nalin, Stefano Debei, Carlo Bettanini,

Center of Studies and Activities for Space (CISAS), Italy

Mattia Pezzato, Filippo Trevisi, Davide Scalzi, University of Padova, Italy

Alberto Madonna, Italian National Institute for Astrophysics, Italy

Finally, each Chair organizing a Special Session received as an award the book “*Guidebook for Travels in Tuscany*” offered by Italian Geographical Military Institute.



Award Ceremony.



The social events included a Welcome Party held in “Giardino dei Semplici” and a Gala Dinner held at Grand Hotel Baglioni Terrace, both with music entertainments.



Finally, it worth to underline that the attendees had the possibility to follow the events held in Florence on June 24th.

It's St. John day, the patron saint of the city, the saint to whom the famous Baptistery is dedicated, and during the day there were different events around the city to celebrate it! At the conclusion, on the evening of the June 24th, there was a traditional fireworks display in Piazzale Michelangelo called St. John's fireworks.



The 4th IEEE International Workshop on Metrology for AeroSpace will be held in Padua, Italy, June 22-23, 2016. Take note about these dates;

- January 20, 2017 - Submission of Extended Abstract
- April 14, 2017 - Notification of Acceptance
- May 19, 2017 - Submission of Final Paper

Padua is a city with two distinct faces yet with one heart: both a living religious monument and centre of revolutionary scientific learning, embodies many of the virtues of Veneto: arts, history and nature are in fact integral part of its essence.

Its centre fuses the architecture and relics of its illustrious past with the lively university which has always nourished the town: the squares and alleyways, and brightly-coloured fruit and vegetable stalls in the shadow of the *Palazzo della Ragione* endow it with an aura of eternal presence. Holidays in Padua are a joyful plunge into this picturesque and elegant atmosphere.

Padua is also known as the city of the 'Saint with no name', the 'field without grass' and the 'café with no doors': because the Basilica of S. Anthony, that has for 800 years been calling the faithful, is usually called simply 'The Saint', the *Prato della Valle*, Europe's largest square after Moscow's Red Square, is almost bare of grass, and once the famous *Caffè Pedrocchi* had no doors!

From Giotto to Mantegna, Donatello to Galileo, Padua has been host to the greatest artists and scientists of the ages, making it a temple to knowledge. The surrounding area of this most 'learned city' is also rich in culture: the countryside still resounds with the sonnets of Petrarch, the Middle

Ages breathe through the noble walls, and the aristocratic villas and their rich cultural history lay sparkling in the landscape.



The 4th Workshop is organized by CISAS (Centre for Space Studies and Activities “Giuseppe Colombo”). CISAS aims to promote, coordinate and carry out studies, research and space activities that promote the connection between Science, Basic Disciplines, Applied Research and Industrial Activities. Through space researches and PhD in Science Technologies and Space Measures, CISAS aims to contribute to the training of new graduates and researchers with a multidisciplinary preparation. CISAS cooperates with the space programmes of the major space Agencies including ASI, ESA, JAXA, NASA, Roskosmos.

We are pleased to invite you to contribute to the 4th *International IEEE Workshop on Metrology for Aerospace*. The event includes, but it is not limited to, new technology for metrology-assisted production in aerospace industry, aircraft component measurement, sensors and associated signal conditioning for aerospace, calibration methods for electronic test and measurement for aerospace.

Special Sessions have the main aim of creating a mini-workshop on a specific topic, where researchers working on the same argument can make knowledge, familiarize, exchange ideas, create cooperation.

You may find more how to submit a Special Session proposal at;
www.metroaerospace.org/index.php/program/special-session

For more information, please contact: Pasquale Daponte, email: daponte@unisannio.it