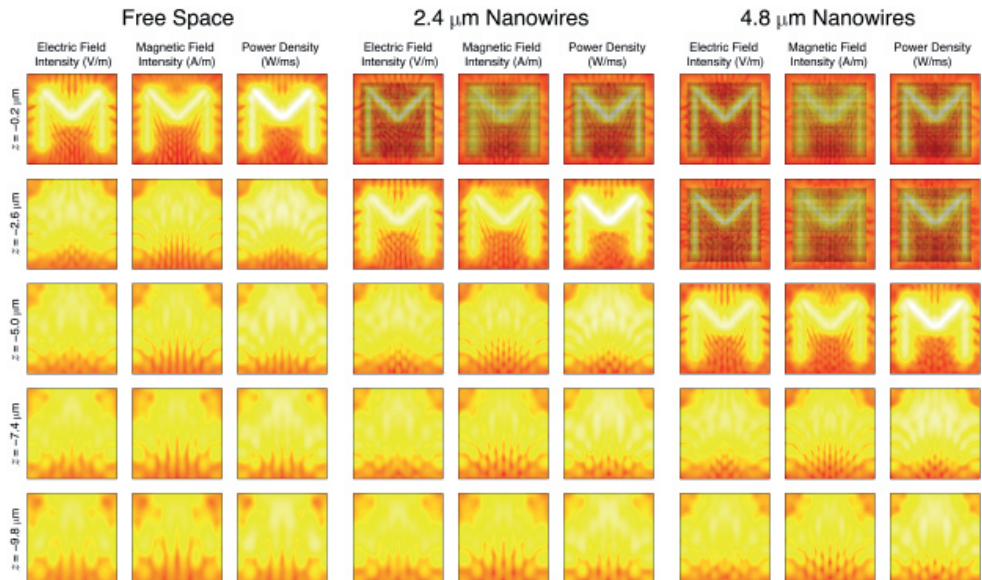
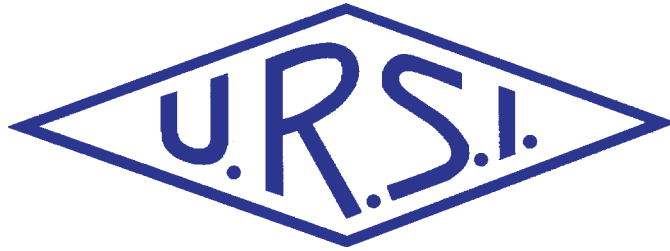


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Workshop on “Metrology for Aerospace” and “URSI in Italy”

On the wings of success of the first two editions of the IEEE International Workshop on Metrology for Aerospace (MetroAeroSpace), a third edition was proposed for the purpose of strengthening the collaboration among researchers working in the field of instrumentation and measurement methods for aerospace. The third edition of MetroAeroSpace was held in Firenze, Italy, June 21-23, 2016. The cradle of the Renaissance and appreciated by millions of tourists, Firenze has been a UNESCO World Heritage Site since 1982. Museums, palaces, and churches house some of the greatest artistic treasures in the world.

As in the previous editions, the focus was kept on the state of art and practice of metrology for aerospace. In particular, the focus was on (but not limited to) new technologies for metrology-assisted production in the aerospace industry; aircraft-component measurements, sensors, and associated signal conditioning for aerospace; and calibration methods for electronic test and measurement for aerospace. The program was designed to raise the interests of a wide group of researchers, operators, and decision-makers from the metrology and aerospace fields, by presenting the most innovative solutions both from the scientific and technological point of views.

The keynote speeches were given by experts in the field of metrology for aerospace:

- Dr. William H. Prosser from the NASA Engineering and Safety Center (Langley Research Center, USA) gave a talk about “Applications of Advanced Nondestructive Measurement Techniques to Address Safety Issues of Flight on NASA Spacecraft”
- Dr. Alessandro Cozzani, from the European Space Research and Technology Centre, described the “Trends and Research on Contactless Measurements for Environmental Testing of Space Systems”

The preparation of the technical program of the Third IEEE International Workshop on Metrology for AeroSpace was particularly challenging, since 155 abstracts were received from all over the world. The final program hosted 26 oral and poster sessions, scheduled over two days. Due to the time constraints of the conference, only 129 papers were selected based upon the review activity of the program committee and additional reviewers. Authors from 23 countries attended MetroAeroSpace. All the submitted papers were peer reviewed, and those accepted were made globally accessible via IEEE Xplore.

This edition of the workshop was improved with respect to previous ones by adding a significant number of special sessions. This was done for two reasons:

- There are so many fields of application of metrology for aerospace that a single track would have been much too dispersive
- In contrast to a unified definition of research in the field of metrology for aerospace, a spontaneous aggregation of well-focused themes was promoted, with the specific aim of providing a forum of debate relevant to each prominent research field.

In more detail, the technical program included several events and activities. This edition of MetroAeroSpace included for the second time:

- “Military Metrology for AeroSpace,” a session organized in cooperation with the AFCEA Chapter of Naples, which took place at the Institute of Military Aeronautical Sciences in Firenze on June 21
- Three half-day tutorials on the following subjects:
 - “Precise Time Scales and Navigation Systems,” Patrizia Tavella (INRIM and Vice Chair of URSI Commission A)
 - “RADAR Role: From the Underground to the Outer Space,” Alfonso Farina, LFIEEE, BoG AESS
 - “Measurement for Planetary Exploration: Mars and Exomars,” Stefano Debei, Center of Studies and Activities for Space, Padua, Italy

For the first time, MetroAeroSpace included demonstration sessions, providing an interactive and tangible form of presentation quite different from the usual oral and poster sessions. Static exhibitions of two military systems were offered:

- Unmanned SHADOW 200 - RQ-7B V2 by AAI/Textron Systems (organized by the Italian Army and Rigel srl - AAI/Textron Systems)
- SARAD - Automatic Data Analysis and Recording (organized by the Italian Navy)

During MetroAeroSpace, some sessions were organized for the purpose of providing attendees with the

opportunity to contact institutions and experts operating in different fields of metrology for aerospace. In particular, the following sessions and meetings were held:

- “The Italian Strong Contribution to Epochal Rosetta Mission”
- The “Opus Suite” User Group meeting
- The “URSI Italian Committee meeting”

The URSI Italian National Committee meeting was attended by some twenty researchers working in universities and research institutes. Three presentations were given after that the session chair, Roberto Sorrentino, President of the URSI Italian Member Committee, introduced URSI activities in Italy.

The first presentation was a contribution from Commission J: “The Clock-Like Nature of the Radio Pulsars,” from Andrea Possenti (INAF, Osservatorio Astronomico di Cagliari, Italy). Radio pulsars are highly magnetized and rapidly rotating neutron stars. Their radio beams can be detected as radio pulses when they sweep the line of sight to the observer, at the pace of the neutron star’s spinning. Since some of the underlying neutron stars are ultra-stable rotators, the pulsed emission from the associated radio pulsar behaves as the tick of a natural clock. This property can be exploited for performing a variety of experiments of fundamental physics, as well as for establishing a terrestrial time scale entirely based on cosmic sources. The contribution reviewed methodologies and perspectives in this field.

The second presentation was a contribution from Commission F: “Use of Millimeter and Optical Wavelengths for Next-Generation Aerospace Communication Systems,” from Carlo Capsoni (Dipartimento di Elettronica, Informazione e Bioingegneria, Politecnico di Milano, Italy). High-throughput satellite communication systems (HTS), providing multimedia service as well as space science missions, can greatly benefit from the use of very high frequency carriers (in the millimeter or even infrared bands), in order to take advantage of the larger bandwidths made available. Aeronautical applications aimed at distributing service information among air traffic control centers and aircraft for increasing flight security as well as providing global access to passengers to the Internet during travel also share the interest in these bands. The drawback of using very short wavelengths is the definite impact of the impairments caused by the troposphere. This contribution reviewed the advantages and disadvantages of these future systems, and the strategies required to move towards the operational phase.

The third and last presentation was a contribution from Commission E: “Proficiency Testing in EMC,” from Carlo Carobbi (Dipartimento di Ingegneria dell’Informazione, Università degli Studi di Firenze, Italy). Achieving

electromagnetic compatibility (EMC) for modern electrical and electronic equipment is not an easy task. This is mainly due the increasing need for efficient power conversion (high-frequency switching power supply), connectivity (ubiquitous radiofrequency communication modules), and fast processing of a relatively large amount of data (high-speed digital circuits) within the same equipment. EMC is an even more critical issue in military, avionic, and space applications, where pieces of electrical and electronic equipment are subject to high power and broadband interference, must operate in close proximity, and must share the same ground and power supply. Furthermore, in these contexts, consideration of the safety and economic consequences of a possible failure due to electromagnetic interference during a military or space mission or a regular flight is mandatory. Due to these reasons, not only EMC-compliant design but also EMC testing requires a high degree of specialization and competence, especially in high-frequency measurement techniques.

At the same time, EMC testing is going through a process of continuous improvement. Such a process involves aspects such as traceability of measurement results, calculation of measurement uncertainty, and evaluation of measurement repeatability. The competence of EMC testing laboratories is formally recognized through assessment by a third party against the requirements of the ISO IEC 17025 standard, which mandates the implementation of a systematic approach to the above-mentioned aspects. In particular, assurance of the quality of test results requires some form of verification, which has to be experimental, i.e., complementary to documentation, and representative of the testing process carried out by the EMC laboratory. This is achieved through participation in proficiency tests, as clearly pointed out in terms of a specific requirement in clause 5.9.1, item b) of ISO IEC 17025. Proficiency tests are inter-laboratory comparisons specifically designed to evaluate participants’ performance against pre-established criteria.

All the participants appreciated the variety of topics and applications covered by the URSI special session in MetroAeroSpace, a distinctive feature of URSI and its organization into ten scientific Commissions.

The next, fourth edition of MetroAeroSpace will be held in Padua, Italy, on June 21-23, 2017 (<http://www.metroaerospace.org/>). We are sure that this edition of MetroAeroSpace will also provide attendees with a unique opportunity for spreading their research results, gathering and connecting experts in metrology for aerospace from all over the world.

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