



Italian National  
Committee



# 2023 Italian URSI Annual Meeting

The annual Meeting of the Italian URSI Committee will be held in Genova on **November 17, 2023** jointly with the 2023 IEEE Conference on Antenna Measurements and Applications (<https://2023ieeecama.org/>).

**Venue:** The conference venue is the “NH Collection Genova Marina Hotel”, Molo Ponte Calvi, 5, 16124 Genova – Italy (<https://www.nh-hotels.com/en/hotel/nh-collection-genova-marina>).

**Date:** Friday 17, November 2023

**Organizers:** Carlo Carobbi (University of Florence), Giuliano Manara (University of Pisa)

## PROGRAMME

The URSI Italian National Meeting is intended to disseminate and promote the activities of the International Radio Science Union, one of the oldest and largest scientific Unions supporting education and research in all Radio Science fields ([www.ursi.org](http://www.ursi.org)). The meeting offers an URSI Special Session with tutorials exemplifying the activities of three URSI Scientific Commissions, and the presentations of the three finalist papers of the 2023 Best Paper Young Scientist Award delivered by the URSI Italian National Committee and named after Prof. Roberto Sorrentino.

**Friday, November 17**

**“Roberto Sorrentino” Award Session**

Session Chair: Carlo Carobbi, President URSI Italy

**11:00-12:15**

**Presentations of the three finalist papers** (20 minutes plus 5 minutes questions each)

**11:00-11:25**

**Finalist 1**

**11:25-11:50**

**Finalist 2**

**11:50-12:15**

**Finalist 3**

**National and International URSI Activities**

Session Chair: Giuliano Manara, Secretary URSI Italy

**12:15-12:45**

**Carlo Carobbi – President URSI Italy**

*“The International Union of Radio Science (URSI): national and international activities”*

**12:45-13:00**

**Micaela Liberti – Chair URSI WIRS Italian Chapter**

*“The URSI Women in Radio Science (WIRS) initiative and the URSI WIRS Italian Chapter”*

**13:00 – 14:30 Lunch break**

*the programme continues in the next page*



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## URSI Special Session

Session Chair: Carlo Carobbi, President URSI Italy

**14:30-15:00**

**Andrea Randazzo and Alessandro Fedeli**

Commission B: Fields and waves, Electromagnetic theory and applications

*"Microwave imaging techniques and applications (In memory of Matteo Pastorino)"*

**15:00-15:30**

**Erika Pittella**

Commission A: Electromagnetic Metrology, Electromagnetic measurements and standards

*"Dielectric characterization of materials at microwave frequencies"*

**15:30-16:00**

**Giovanni Nico, Manilo Monaco, Pier Francesco Biagi, Anita Ermini, and Aleksandra Nina**

Commission G: Ionospheric Radio and Propagation

*"Detection of anomalies in time series of VLF signals"*

**16:00**

Coffee break

*end of the programme*



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## SUMMARIES OF THE URSI SPECIAL SESSION PRESENTATIONS

### Microwave imaging techniques and applications (In memory of Matteo Pastorino)

Andrea Randazzo and Alessandro Fedeli  
Università di Genova

**Abstract:** Microwave imaging is a class of nondestructive and noninvasive techniques aimed at inspecting targets starting from measurements of the electromagnetic field they scatter when illuminated by an incident radiation at microwave frequencies. The objective is usually the retrieval of some of the geometrical/physical properties (e.g., the distributions of the dielectric properties) of the targets under test. However, the underlying inverse-scattering problem poses significant theoretical, numerical, and practical issues, which make the development of these techniques quite difficult and challenging. Consequently, engineers and scientists devoted significant efforts in the design of new and innovative solutions, in terms of both effective measurement systems and data processing algorithms. In this presentation, some recent techniques and their application in relevant applicative fields will be discussed. In particular, inversion approaches in non-standard spaces as well as recent AI-based paradigms will be considered. Some specific examples in the civil and biomedical fields will be provided.

### Dielectric characterization of materials at microwave frequencies

Erika Pittella  
Università di Roma 'La Sapienza'

**Abstract:** This presentation provides an overview of systems used to characterize and monitor materials at microwave frequencies. The first topic discussed is Cultural Heritage Monitoring, which compares various methods and probes to noninvasively determine the relationship between water content in stone materials and their reflection properties at microwave frequencies. The second topic is Health Monitoring in Concrete Structures, exploring the use of a network of split-ring resonators to identify cracks in concrete and their location with a single measurement. Lastly, Composites Materials Characterization at microwave frequencies is investigated, including polyamide 6 graphene nanoplatelet composites and 3D printed PLA and PLA/CNT composites.

### Detection of anomalies in time series of VLF signals

Giovanni Nico<sup>1</sup>, Manilo Monaco<sup>2</sup>, Pier Francesco Biagi<sup>3</sup>, Anita Ermini<sup>4</sup>, and Aleksandra Nina<sup>5</sup>

<sup>1</sup>Institute of Applied Mathematics, Italy's National Research Council, Bari, Italy

<sup>2</sup>Italian Space Agency, Matera, Italy

<sup>3</sup>Department of Physics, University of Bari, Bari, Italy

<sup>4</sup>Department of Industrial Engineering, University of Tor Vergata, Rome, Italy

<sup>5</sup>Institute of Physics Belgrade, University of Belgrade, Belgrade, Serbia

**Abstract:** This presentation provides an overview of the techniques for the detection of anomalies in the trend of VLF signals and their potential use to reveal radio precursors of earthquakes. Wavelet and time series analysis techniques are applied to VLF (10-60 kHz) signals acquired by the receivers of the INFREP European radio network installed since 2009. A few case studies are presented referred to recent earthquakes occurred in the Mediterranean region.