



Union Radio-Scientifique Internationale (URSI)

Activity Report - Year 2020

Prof. Carlo Carobbi

1. Introduction

The URSI (www.ursi.org) mission statement is as follows: “Radio science encompasses the knowledge and study of all aspects of electromagnetic fields and waves. The International Union of Radio Science (Union Radio-Scientifique Internationale), a non-governmental and non-profit organization under the International Council for Science, is responsible for stimulating and coordinating, on an international basis, studies, research, applications, scientific exchange, and communication in the fields of radio science.” Included within the objectives are the following:

- To encourage and promote international activity in radio science and its applications, for the benefit of humanity;
- To encourage the adoption of common methods of measurement, and the intercomparison and standardization of the measuring instruments used in scientific work;
- To stimulate and co-ordinate studies of:
 - o the scientific aspects of telecommunications using electromagnetic waves, guided and unguided;
 - o the generation, emission, radiation, propagation, reception, and detection of fields and waves, and the processing of the signals embedded in them.
- To represent radio science to the general public, and to public and private organizations.

The first General Assembly of URSI was held in July 1922 in Brussels. At that time, only four National Committees had been formed officially: Belgium, France, United Kingdom and the USA. However, the following new Committees adhered to the Union during the same year: Australia, Spain, Italy, Japan and the Netherlands. The Italian URSI Committee operates under the umbrella of the National Research Council (CNR) which pays the fee for Italian participation in URSI.

The range of scientific activities covered by URSI is reflected by the scope of its scientific commissions, namely

- Commission A: Electromagnetic Metrology
- Commission B: Fields and waves
- Commission C: Radiocommunication systems and signal processing
- Commission D: Electronics and photonics
- Commission E: Electromagnetic environment and interference
- Commission F: Wave propagation and remote sensing
- Commission G: Ionospheric radio and propagation
- Commission H: Waves in plasmas
- Commission J: Radio astronomy
- Commission K: Electromagnetics in biology and medicine

The CNR-URSI Committee has ten mirror commissions fully reflecting the scopes of the international URSI scientific commissions. Officers and their substitutes of the CNR-URSI scientific commissions can be found [here](#).

URSI organizes three flagship international conferences where all the scientific commissions are involved:

- The “General Assembly of the International Union of Radio Science” (URSI GASS)
- The “Atlantic Radio Science Conference” (URSI AT-RASC)
- The “Asia-Pacific Radio Science Conference” (URSI AP-RASC)

The three flagship conferences take place on a three-year basis (2017 URSI GASS, 2018 URSI AP-RASC, 2019 URSI AT-RASC, 2020 URSI GASS and so on).

2. Main activities carried out by URSI during 2020 relevant for Italy and for CNR

During the URSI GASS 2017 Italy won the selection for the 2020 URSI GASS location. The conference was postponed to 2021 due to COVID 19 pandemic. The International URSI Board decided to only organize the URSI GASS 2020 Student Paper Competition, which was held virtually. The 2021 URSI GASS conference will take place in Rome, within the premises of the faculty of engineering of “La Sapienza” University from 28 August to 4 September 2021. A large effort for the organization of this important event was undertaken both in 2019 and 2020. The conference is expected to attract more than 1500 radioscientists from all over the world¹. Several meetings between the Local Organizing Committee members and the board of URSI took place in 2020 both for managing the postponement and the reorganization of the conference.

3. Activities carried out by Prof. Carobbi within URSI during 2020 and the impact on the Italian scientific community

The past President of the CNR URSI Committee, Prof. Roberto Sorrentino, passed away on March 3, 2020. The new President, elected by the CNR-URSI Committee, is Prof. Carlo Carobbi, from the Università degli Studi di Firenze. The Secretary is Prof. Giuliano Manara from the Università di Pisa. Prof. Carobbi is also the Italian representative in the URSI Council, nominated by the President of CNR.

Prof. Carobbi and Prof. Manara organized the URSI Italy Annual Meeting, virtually held in Rome on September 27, 2020, in conjunction with the “Riunione Nazionale di Elettromagnetismo (RiNEm)”. This latter is the conference organized every two years by the Società Italiana di Elettromagnetismo (SIEM). A contribution to the URSI Radio Science Bulletin devoted to the 2020 URSI Italy Annual Meeting is going to be published, reporting a comprehensive description of the event. Some essential information is provided here below.

The URSI Italy Annual Meeting, held on September 27, was jointly attended by URSI and RiNEm participants (more than one hundred researchers working in Italian universities and research institutes). An URSI Young Scientist Best Paper Award Session was specifically organized as the final of the 2020 Young Scientist Best Paper Award, delivered by the URSI Italian National Committee and named after Prof. Roberto Sorrentino. The final was centered on the presentations of the selected three best papers submitted to the Italian URSI National Committee 2020 Young Scientist Best Paper Award (18 contributions were submitted by URSI Young Scientists to the competition).

The “Roberto Sorrentino” Award Session was chaired by Prof. Manara. In this context, the three finalists presented their papers. The judging committee was composed by Prof. Matteo Pastorino (Commission B), Dr. Pietro Bolli (Commission J), and Dr. Lorenzo Crocco (Commission K).

The Award was assigned to Dr. Jorge A. Tobon Vasquez, for the paper “A 3-D Microwave Imaging System for Brain Stroke Follow-up: Experimental Testing.” The other two finalists were: Dr. Nicola Curreli, with the paper “Quadratic gain of optical parametric amplification in artificial crystals of WS₂,” and Dr. Andrea Michel, with the paper “On the Use of Power Transfer Efficiency to Analyze the Performance of a 3D-Printed Wearable UHF RFID Antenna for Smart Gloves.”

The URSI Special Session, composed by three tutorials contributed by specific URSI Commissions, was chaired by Prof. Carlo Carobbi, who shortly illustrated URSI activities in Italy and worldwide as an introduction to the session. The first tutorial was presented by Giulia Sacco (Università di Roma “La Sapienza”), winner of the URSI GASS 2020 Student Paper Competition. It was entitled “An FMCW Radar for Localization and Vital Signs Measurement for Different Chest Orientations.” The second presentation was contributed by Commission E and titled “The threat of radiated Intentional Electromagnetic Interference (IEMI): deterministic and statistical prediction models for field coupling to cables and systems.” It was presented by Prof. Giordano Spadacini (Politecnico di Milano). The third presentation was related to topics relevant to Commission D and titled “Thermal effects on supermodes in Yb-doped multicore fibers for high-power lasers.” It was given by Federica Poli (Università di Parma). The fourth and last presentation was contributed by Commission H, given by Lorenzo Figini (Istituto per la Scienza e Tecnologia dei Plasmi, Consiglio Nazionale delle Ricerche) and titled “RF heating and diagnostic systems in magnetic confinement plasma devices for fusion power.”

4. Evaluation of the participation in terms of benefits and membership cost

Participation in URSI has, up to now, permitted to provide visibility to Italian radioscientists. The organization of the 2021 URSI GASS conference in Rome is a great opportunity to strengthen existing international relationships as well as to establish new ones. Several Italian radioscientists are expected to be charged with

¹ About 1700 contributions were submitted at the time of writing of this report.

important roles in URSI during URSI GASS 2021 in Rome. In particular, Prof. Giuliano Manara (vice-representative of Commission B of Italy and Secretary of the URSI-CNR Committee) applied for the Vice-President position of URSI. The four positions of Vice-President of URSI are renewed every three years during the General Assembly. Prof. Francesca Apollonio (representative of Commission K of Italy), Dr. Luca Baldini (Istituto di Scienze dell'Atmosfera e del Clima, CNR-ISAC, Roma) and Prof. Carlo Carobbi (representative of Commission E of Italy and President of the URSI-CNR Committee) applied for the Vice-Chair positions of the International Commissions K, F and E, respectively. Finally, four Italian Young Scientists applied for Early Career Representatives (ECR) of Commissions A, D, E and G.

5. Evaluation of Italian attendance and how to improve interest and involvement

The participation of Italian radioscientists in international events is always strong but, at the same time, we have to note that Italian radio-scientists do not reach a proportional number of apical positions within URSI. The involvement of young Italian radioscientists should also be increased. Actions have been undertaken to promote URSI in Italy through information about the advantages deriving from individual membership. Indeed, the Young Scientist competition that took place during the URSI Italy Annual Meeting stimulated some of the Italian Young Scientists to apply as Early Career Representatives (ECRs) of URSI International during the next URSI GASS 2021 in Rome.

6. Italian experts with important roles within the Union or within related Commissions and Programs (if known)

In the triennium from 2017 to 2020, Italy has no international Commission Chairs, but has:

- Commission G Vice Chair: Giorgiana De Franceschi (INGV)
- Commission B Early Career Representative (ECR): Andrea Michel (University of Pisa)

Due to the coronavirus pandemic De Franceschi and Michel are still in office until the next GASS 2021. In particular, Giorgiana De Franceschi will serve as Commission G Chair till 2023 (the 2023 GASS will be held in Sapporo, Japan), while Andrea Michel will continue to serve as ECR for Commission B.

7. Short summary of the 2020 CNR Commission activities

The CNR-URSI Committee met on May 29, and November 17. The minutes of these meetings are available on the website of the CNR-URSI Committee <http://www.ursi.cnr.it>. According to the tradition of the latest years, the CNR-URSI Committee organized an annual meeting within a larger national event. As mentioned above the 2020 URSI Italy Annual Meeting took place during the RiNEm conference, virtually held in Rome, on September 27, 2020. A Young Scientists Award was also granted by the Italian URSI Member Committee in the name of the past President of the URSI-CNR Committee, Prof. Roberto Sorrentino. The invited presentations given by the Italian radio-scientists are available through the CNR-URSI Committee website (<http://www.ursi.cnr.it/News.html>).

8. Conclusions

The CNR-URSI Committee is active in promoting scientific activities within URSI. A great achievement and opportunity, obtained in 2017, is the responsibility for the organization of the next 2021 URSI GASS conference in Rome. The CNR-URSI Committee should strengthen international relationships with other national URSI committees, in particular European committees. This is important for the success of the 2021 URSI GASS conference and for improving visibility of Italian radioscientists. Networking is also essential in order to increase the number of apical positions within URSI held by Italian radioscientists.

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Prof. Carlo Carobbi



(in cooperation with Prof. Giuliano Manara)