



Italian National
Committee

Centro Congressi "Le Benedettine"
University of Pisa
Piazza S. Paolo a Ripa d'Arno, 16, Pisa
September 26, 2019



UNIVERSITÀ DI PISA

2019 Italian URSI Annual Meeting

The annual Meeting of the Italian URSI Committee will be held in **Pisa** on **September 26, 2019** jointly with the 2019 IEEE RFID – TA Conference. Information at <http://2019.ieee-rfid-ta.org/>

Venue: Centro Congressi "Le Benedettine", University of Pisa
Piazza San Paolo a Ripa d'Arno, 16, Pisa
Date: Thursday, September 26, 2019
Organizer: Roberto Sorrentino, University of Perugia

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). The meeting offers an URSI Special Session with 3 tutorials exemplifying its scientific activities, and the presentations of the 3 finalists of the 2019 Best Paper Young Scientist Award delivered by the URSI Italian National Committee.

All IEEE RFID – TA delegates are warmly invited to attend!

The first tutorial will be presented in a plenary session jointly organized by the Italian URSI National Committee and the IEEE RFID Conference Organizing Committee.

- 12:30 **Welcome Lunch**
- 13:50 **Plenary RFID – TA and URSI Session**
Session Chairs: Roberto Sorrentino, URSI Italy, and Paolo Nepa, University of Pisa
- 13:50 **Smail Tedjini** - University of Grenoble Alpes
"Advances in RFIDs"
- 14:40 **URSI Special Session**
Session Chairs: Roberto Sorrentino, URSI Italy, and Carlo Carobbi, University of Florence
- 14:40 **Roberto Sorrentino**
Chair of URSI Italian Committee
"The International Union of Radio Science (URSI) and its Italian Activities"
- 14:50 **Angelo De Santis**
(Commission G: Ionospheric Radio and Propagation)
"Pre-earthquake signatures in ionosphere as detected by Swarm satellites"
- 15:20 **Lorenzo Crocco**
(Commission K: Electromagnetics in Biology and Medicine)
"A portable microwave imaging device for brain stroke monitoring"
- 15:50 **Coffee break**
- 16:15 **Young Scientist Award Session**
Session Chairs: Roberto Sorrentino, URSI Italy, and Carlo Carobbi, University of Florence
- 16:15 **Introduction**
- 16:20 **Presentations of the three finalist papers (15 minutes plus 5 minutes questions each)**
- 17:20 **Closing of the meeting**

A **Young Scientist Poster Session** will be organized in parallel to the URSI Special Session, the Young Scientist Award Session, and the Meeting of the URSI Italian Committee (from 14:50 to 18:20).

A **Gala Dinner** will be held at Hotel Principe di Piemonte, P.zza Giacomo Puccini, 1, 55049 Viareggio, Lucca (**ticket required** – for information please contact Giuliano Manara - email: giuliano.manara@unipi.it).

The Young Scientist Best Paper Award will be presented at the Gala Dinner.



Italian National
Committee

Centro Congressi "Le Benedettine"
University of Pisa
Piazza S. Paolo a Ripa d'Arno, 16, Pisa
September 26, 2019



UNIVERSITÀ DI PISA

2019 Italian URSI Annual Meeting

SUMMARY OF THE PLENARY SESSION

Advances in RFIDs

Smail TEDJINI

Abstract: More than 70 years after H. Stockman's publication of his paper on "communications by means of reflected waves", but also by L. Theremin's demonstration of his wireless microphone, RFID continues to attract ever-increasing interest for many applications. These two historical facts are the basis of both RFID families: Conventional RFID with chip and Chipless RFID. These two RFID families, although supported by the same physical phenomenon of the back-scattering exhibit two remarkable and decisive advantages in practice, namely wireless and battery-less. They also, offer different characteristics and advantages/limitations. RFID has long been confined to traceability and identification applications, but with the advent of the Internet of Things (IOT) and the era of Artificial Intelligence (AI), RFID is considered as the TECHNOLOGY that enables the real implementation of IOT and AI. To fulfill such requirements, scientists and engineers are dramatically pushing the limits of both RFIDs exploring many new applications and exploiting new functionalities in particular sensing and transforming the identification RFID tag in an Augmented tag. In this keynote, after an overview of the state of the art for RFID nowadays, we will focus on recent development of both RFIDs. Some methods that allow RFID tags to acquire new capabilities, in particular sensing, will be discussed. Conventional RFID tags based on IC will be considered and examples of transforming these tags in sensors will be discussed. On the other hand, chipless technologies which represent an alternative identification solution continue to progress and offer real time and full passive solution. Despite their modest performance in term of coding capacity, the transformation of chipless tag into passive wireless sensor is a topic of great interest and many research projects worldwide and under development. Finally, the last part will be dedicated to standardization issues and review the impact of RF regulations on RFID.

Short Biography : Smail TEDJINI, IEEE Senior Member, URSI Fellow, Doctor Physics Grenoble University 1985. 1981-1986 Assistant Professor at Grenoble Institute of Technology, Senior Researcher of CNRS (Research French National Center) 1986 to 1993. He became University Full Professor 1993. Since 1996 he is Professor at esisar: Dpt. of Grenoble-inp. His main teaching topics concern Electromagnetism, RadioFrequency, Wireless Systems and Optoelectronics. He served as coordinator/member in numerous academic programs both for education and research. He was coordinator for Ph.D., Master and Bachelor Programs for Grenoble University, some programs are under international collaboration from Europe, USA, Canada, Brazil, Vietnam, Egypt, Maghreb. He founded the LCIS lab and served as its Director. He also served as the Director of esisar. He has more than 35 year experience in Education, Research and management of university affairs. Now, he is project manager at the ORSYS group of the LCIS that he founded 18 years ago and leaded until 2014. He supervised more than 40 Ph.Ds, and participated as Ph.D jury examiner/opponent for tens of defenses. He has more than 300 publications and patents. He organized several conferences/workshops. Senior Member IEEE, Past-President and founder of the IEEE-CPMT French Chapter, Vice-President of IEEE Section France (2008-2014) and Vice-Chair of URSI Commission D "Electronics & Photonics" in 2008. He served as the Chair of URSI Commission "D" for the triennium 2011-2014. In 2015 he was elected President of URSI-France. Since 2018 he is the Vice-chair of the MTT-TC24 on RFID.



Italian National
Committee

Centro Congressi "Le Benedettine"
University of Pisa
Piazza S. Paolo a Ripa d'Arno, 16, Pisa
September 26, 2019



UNIVERSITÀ DI PISA

SUMMARY OF THE TUTORIALS

Pre-earthquake signatures in ionosphere as detected by Swarm satellites

Angelo De Santis (on the behalf of SAFE Team*)

Abstract - We analyse Swarm three-satellite electron density and magnetic data for almost 5 years after the launch, to look for possible earthquake related ionospheric anomalies. We define these anomalies statistically and undertake their search in the whole space-time interval of interest, avoiding high magnetic latitudes ($|\text{geomagnetic latitude}| \leq 50^\circ$) and geospatial disturbed periods. Then, a worldwide statistical correlation analysis with earthquakes by means of a superposed epoch approach is performed, finding a few clear concentrations of satellite data anomalies some days before the earthquake occurrences. In order to assess the robustness of the results obtained from observations, the latter results are compared with those obtained from other analyses with random anomalies. In general, our results point to a significant statistical correlation of both the electron density and the magnetic field signal with earthquakes, much above random chance, supporting a lithosphere-atmosphere-ionosphere coupling during the preparation phase of earthquakes. Performing the analysis for different ranges of magnitude, we confirm the Rikitake empirical law between ionospheric anomaly precursor time and earthquake magnitude. Finally, we explain this relationship in terms of a diffusion process in the lithosphere.

*SAFE Team:

Angelo De Santis¹, Rita Di Giovambattista¹, Loredana Perrone¹, Giorgia De Franceschi¹, Cristoforo Abbattista², Leonardo Amoruso², Saioa Arquero-Campuzano¹, Marianna Carbone², Claudio Cesaroni¹, Gianfranco Cianchini¹, Dedalo Marchetti^{1,4}, Alessandro Piscini¹, Dario Sabbagh¹, Francesca Santoro², Luca Spogli^{1,3}

- 1) Istituto Nazionale di Geofisica e Vulcanologia, Via di Vigna Murata 605, Rome 00143, Italy
- 2) Planetek Italia srl, via Massaua 12, Bari
- 3) SpacEarth Technology, Via di Vigna Murata 605, 00143, Rome, Italy
- 4) Now at School of Remote Sensing and Geomatics Engineering NUIST - Nanjing University of Information Science and Technology, Nanjing, China

A portable microwave imaging device for brain stroke monitoring

Lorenzo Crocco

Consiglio Nazionale delle Ricerche,
Istituto per il Rilevamento Elettromagnetico dell'Ambiente, CNR-IREA,
via Diocleziano 328, 80124 Napoli
crocco.l@irea.cnr.it

Abstract - Brain stroke is one of the most common cerebrovascular diseases, with an incidence of about 15 millions of cases every year worldwide, causing death or permanent injuries. A brain stroke can be either ischemic or hemorrhagic and the required treatment is completely different depending on the kind of disease. As such, diagnostic imaging methodologies are necessary to support to clinicians and monitor the effectiveness of the therapy. Currently adopted modalities are magnetic resonance imaging (MRI) and X-ray computerized tomography (CT). They have greatly contributed to the mitigation of brain stroke effects and social impact. Nevertheless, there is still an interest in developing new modalities, as MRI and CT are not viable to address emerging clinical requirements such as early diagnosis (possibly in the ambulance) and continuous bedside monitoring in the post-acute stage. In such a framework, microwave imaging (MWI) may represent an interesting alternative, due to low-cost, not harmful nature and portability. This presentation reviews the recent efforts carried out by the author and his colleagues in the development of an innovative MWI device properly designed for brain stroke monitoring with the requirement of making the system architecture as simple as possible. The talk will describe the overall development, from the design stage to the realization of the systems components and the prototype, as well as the initial controlled experiments demonstrating the device capabilities.