“La Sapienza” SEMINARS

Italy Section Joint Chapter,AP03/MTT17 C&S

Tuesday June 3rd 2025 at 3PM

IEEE fellow

MHz to THz Technologies and Our Place in the Universe

Goutam Chattopadhyay (IEEE – MTT President)

NASA-Jet Propulsion Laboratory, California Institute of Technology

Energy sustainable IoT SWIPT and LEO satellite integration

Nuno Borges Carvalho (IEEE – MTT Past-President)

Universidade de Aveiro

IEEE fellow

RF Design for Sustainability

Jasmin Grosinger (IEEE – MTT DML Emeritus)

University of Graz, Austria

Sala Lettura DIET

2nd floor, building RM032

“La Sapienza” University, Faculty of Engineering

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Virtual Zoom meeting:

https://uniroma1.zoom.us/j/86469361243

Talk Abstracts

MHz to THz Technologies and Our Place in the Universe (Goutam Chattopadhyay)

Space exploration captivates us because it speaks to one of humanity's deepest instincts—the desire to understand our origins and our place in the cosmos. By venturing beyond Earth, we uncover the mysteries of distant planets, stars, and galaxies, gaining profound insights into our own world. Whether searching for signs of life, studying the birth of stars, or tracing the evolution of galaxies, each discovery reshapes our understanding of the universe—and ourselves. Space exploration inspires innovation, demands global collaboration, and pushes us to dream beyond the limits of the possible. Ultimately, it reminds us that while we occupy a tiny corner of the cosmos, we are a curious and resilient species capable of reaching for the stars.

The rapid advancement of technologies championed by the MHz-to-THz community of the IEEE MTT-S has revolutionized space exploration, opening new frontiers for scientific discovery. These technologies enable more efficient communication systems, high-resolution imaging, and enhanced remote sensing—tools that are critical for probing distant worlds and cosmic phenomena. As space agencies and private ventures continue to harness these capabilities, they deepen our understanding of planetary environments, astrophysical processes, and the very fabric of space-time. In doing so, MTT-S technologies not only transform Nuno how we explore the cosmos but also challenge our perspective on humanity's place within it, inviting us to revisit fundamental questions about our existence, the possibility of life beyond Earth, and our role in the universe.

This lecture will explore these questions and the ways we, as a global community, strive to answer them.

Energy sustainable IoT SWIPT and LEO satellite integration (Borges Carvalho)

RF Design for Sustainability (Jasmin Grosinger)

In the talk, we will discuss radio frequency design solutions for wireless sensor and communication nodes, aiming to address sustainability issues arising from the digitalization of the economy and society, particularly through the massive deployment of wireless nodes on both environmental and economic levels. Engineers can apply these design solutions to enhance the ultra-low-power operation of wireless nodes, mitigate the environmental toxicity of batteries, and reduce maintenance costs associated with battery replacement. The discussed solutions offer high integration levels based system-on-chip and system-in-package concepts in low-cost complementary metal-oxide-semiconductor(CMOS) technologies, aiming to limit the costs and carbon footprints of these nodes. We will discuss, in particular, solutions for ultra-low-power wireless communication systems based onhigh-frequency and ultra-high frequency radio frequency identification (RFID) technologies.

Speaker Biographies

Goutam Chattopadhyay is the 2025 President of the IEEE Microwave Theory and Technology Society (MTT-S). He is a Senior Scientist at NASA's Jet Propulsion Laboratory (JPL) at the California Institute of Technology (Caltech) and a Visiting Professor at Caltech in Pasadena, USA. Dr. Chattopadhyay earned his Ph.D. in Electrical Engineering from Caltech in 2000. He is a Fellow of both IEEE (USA) and IETE (India), serves as a Track Editor for the *IEEE Transactions on Antennas and Propagation*, and is an IEEE Distinguished Lecturer. His research interests include microwave, millimeter-wave, and terahertz receiver systems and radars, as well as the development of space instruments for the search for life beyond Earth.

Dr. Chattopadhyay has published over 400 papers in international journals and conferences and holds more than 20 patents. He has received over 35 NASA Technical Achievement and New Technology Invention Awards. In 2024, he was honored with the Armstrong Medal from the Radio Club of America (RCA) for his outstanding contributions for radio science. He also received the NASA-JPL People Leadership Award in 2023. He was named IEEE Region-6 Engineer of the Year in 2018 and received the Distinguished Alumni Award from the Indian Institute of Engineering Science and Technology (IIEST), India, in 2017. Additionally, he has won the Best Journal Paper Award from *IEEE Transactions on Terahertz Science and Technology* in both 2020 and 2013, the Best Paper Award for Antenna Design and Applications at the European Antennas and Propagation Conference (EuCAP) in 2017, the IETE Prof. S. N. Mitra Memorial Award in 2014, and the IETE Biman Bihari Sen Memorial Award in 2022.

Nuno Borges Carvalho (S'97–M'00–SM'05-F'15) was born in Luanda, Angola, in 1972. He received his Diploma and Doctoral degrees in electronics and telecommunications engineering from the University of Aveiro, Aveiro, Portugal, in 1995 and 2000, respectively.

He is currently a Full Professor and a Senior Research Scientist with the Institute of Telecommunications, University of Aveiro, the director of the Department of Electronics, Telecommunications and Informatics at UA, and an IEEE Fellow. He coauthored Intermodulation in Microwave and Wireless Circuits (Artech House, 2003), Microwave and Wireless Measurement Techniques (Cambridge University Press, 2013), White Space Communication Technologies (Cambridge University Press, 2014), Wireless Power Transmission for Sustainable Electronics (Wiley, 2020), Theory and Technology of Wireless Power Transfer Inductive, Radio, Optical, and Supersonic Power Transfer, (CRC-Taylor & Francis 2024) and Radio Frequency Identification Engineering How to Engineer an RFID Reader, Cambridge University Press, 2025). He has been a reviewer and author of over 400 papers in magazines and conferences. He is the Editor in Chief of the Cambridge Wireless Power Transfer Journal, an associate editor of the IEEE Microwave Magazine, and former associate editor of the IEEE Transactions on Microwave Theory and Techniques and IET Microwaves Antennas and Propagation Journal.

He is the co-inventor of six patents. His main research interests include software-defined radio front-ends, backscatter communications, wireless power transmission, nonlinear distortion analysis, and measurements

in microwave/wireless circuits and systems. He has been involved in the design of dedicated radios and systems for newly emerging wireless technologies.

Dr. Borges Carvalho is a member of the IEEE MTT ADCOM, the past chair of the IEEE Portuguese Section, TC-20 and TC-11, and also belongs to the technical committees, TC-25 and TC-26. He is also the Chair of the URSI Commission A (Metrology Group). He was the recipient of the 1995 University of Aveiro and the Portuguese Engineering Association Prize for the best 1995 student at the University of Aveiro, the 1998 Student Paper Competition (Third Place) of the IEEE Microwave Theory and Techniques Society (IEEE MTT-S) International Microwave Symposium (IMS), and the 2000 IEE Measurement Prize.

Since 2024 he is a member of the IEEE Future Directions Committee, a member of IEEE TCOES, and in 2025 the IEEE Tab representative for MGA.

He is a Distinguished Lecturer for the RFID Council and was a previous Distinguished Microwave Lecturer for the IEEE Microwave Theory and Techniques Society. In 2023 he was the IEEE-MTT President.

Jasmin Grosinger is an Associate Professor at the Institute of Microwave and Photonic Engineering at Graz University of Technology in Austria, where her research focuses on sustainable wireless electronics and radio-frequency systems. From 2023 to 2025, she served as a Visiting Associate Professor at the Graduate School of Engineering, Tohoku University, Japan. As a senior member of IEEE, Jasmin has co-authored numerous peer-reviewed publications, book chapters, and invention disclosures. For her PhD work, she received the first prize from the Jubilee Foundation of the Industrial Union of the Austrian Automotive Industry. In 2021, she was honored with the Mind the Gap—Diversity Award from the Graz University of Technology. From 2019 to 2024, she served as Associate Editor for IEEE Microwave and Wireless Technology Letters and is currently the inaugural Editor-in-Chief of the IEEE Journal on Wireless Power Technologies. Jasmin is an active member of the IEEE Microwave Theory and Technology Society (MTT-S), where she contributes to Technical Committees 25 (Wireless Power Transfer and Energy Conversion) and 26 (RFID, Wireless Sensors, and IoT). Recognized as a Distinguished Microwave Lecturer by MTT-S, she is also an Elected Voting Member of its Administrative Committee, chairing the Meetings and Symposia Committee since 2024.