



DIPARTIMENTO DI INGEGNERIA DELL'ENERGIA ELETTRICA
E DELL'INFORMAZIONE "GUGLIELMO MARCONI"

IEEE DISTINGUISHED LECTURE:
Dr. Mauro ETTORRE, Michigan State University (USA)

**EXPLORING THE FUTURE OF WIRELESS CONNECTIVITY: KEY
INNOVATIONS IN RADIATING SYSTEMS FOR NEAR AND FAR-
FIELD COMMUNICATIONS**

**May 23, 2025, h. 11:30 - 13:00, Scuola d'Ingegneria
AULA III Piano Terra, Viale del Risorgimento 4 – Bologna,**



Title: Exploring the Future of Wireless Connectivity: Key Innovations in Radiating Systems for Near and Far Field Communications.

Dr. Mauro Ettore

Professor,
Fellow IEEE,
Electrical and Computer Engineering,
Michigan State University, East Lansing, MI 48824

Abstract:

In the near future, high-speed wireless networks will take advantage of the vast amount of available bandwidth in the sub- and millimeter frequency ranges of XG systems and New Space technologies. These future networks will facilitate communication between users and objects located both in the far-field and near-field regions of radiating devices. Innovations in antenna technology are crucial for fully utilizing these broad bandwidths and providing efficient data links for mobile users. I recently proposed the use of quasi-optical planar systems as efficient beamformers for multi-beam, wide-scanning antennas. This approach minimizes losses and costs associated with beamforming networks for arrays operating at higher frequencies while maintaining the flexibility of the radiating unit. I will discuss the implementation of this concept across various technologies specifically at millimeter and sub-millimeter frequency bands. For satellite communications, I will demonstrate how quasi-optical planar systems can drive wideband terminal antennas based on connected long slot arrays. I will also present the advantages of these arrays in terms of bandwidth and scanning capabilities and discuss their physical implementation. Regarding near-field communications, I will highlight the benefits of non-diffractive beams. In particular, I will show how non-diffractive beams can be generated with planar radiating structures by exciting cylindrical leaky waves. I will explain how non-diffractive beams can overcome path loss and obstructions, demonstrating this experimentally at millimeter-wave frequencies. These results pave the way for a novel paradigm for near-field wireless links.

Biography:

Mauro Ettore received a Laurea degree "summa cum laude" in Electrical Engineering and a Ph.D. degree in Electromagnetics from the University of Siena, Italy, in 2004 and 2008, respectively. Part of his Ph.D. work was developed at the TNO, the Netherlands. Since 2023, he has been a Professor at Michigan State University, East Lansing, USA. Previously, he was a Research Scientist at CNRS, IETR laboratory, France. From 2014 until 2020, he co-led the multi-beam antenna activity for satellite applications in the joint laboratory between IETR and Thales Alenia Space, France. From 2016 until 2021, he was a member of the French National Committee for Scientific Research, CNRS, France. From 2016 until 2021, he led the mm and sub-mm waves team at IETR, and co-chaired from 2021 until 2023 the department ADH (Antennas and Microwave Devices Department) at IETR. Dr. Ettore's research interests include the analysis and design of quasi-optical systems, periodic structures, wideband arrays, millimeter-wave antennas, non-diffractive radiation, and localized waves. He has authored over 90 journal papers and 210 conference communications and holds 14 patents (2 licensed) on millimeter-wave antenna technology. Dr. Ettore is a Fellow of IEEE. Since 2017 and 2023, he has served as Associate Editor and Track Editor for the IEEE Transaction on Antennas and Propagation, respectively. Dr. Ettore is the 2024 IEEE MTT-S and AP-S Inter-Society Distinguished Lecturer.

The research activities of Dr. Ettore have been recognized with several prizes, including the 2009 French Ministry of Research award for the most innovative project in all natural sciences, the Young Investigator Award from the French National Research Agency in 2014, the Innovation Award at the 2018 ESA Antenna Workshop in the Netherlands, the Best Paper Award in Electromagnetics and Antenna Theory at EuCAP 2018, UK, the Best Antennas Paper Award at EuCAP 2021, Germany and Best Paper Award at the iWAT 2023, Denmark.

Organizer: Prof. Alessandra Costanzo (alessandra.costanzo@unibo.it)

ALMA MATER STUDIORUM - UNIVERSITÀ DI BOLOGNA

DIREZIONE E AMMINISTRAZIONE: VIALE DEL RISORGIMENTO 2 - 40136 BOLOGNA - ITALIA - TEL. +39 051 2093001 - FAX +39 051 2093073
ALTRE SEDI: VIA VENEZIA 52 - 47521 CESENA - TEL. +39 0547 339200 - VILLA GRIFFONE - 40044 PONTECCHIO MARCONI - TEL. +39 051 846333