IEEE AP/ED/MTT North Italy Chapter

Chapter Seminar

XL MIMO Wireless Systems: The prominent role of programmable metasurfaces

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Date: 26 October 2025

Time: 11:00

Location: **onsite** in Room 2R, Dipartimento di Ingegneria Civile, Ambientale e Meccanica, Via Mesiano 77, Trento; and **online** at

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The seminar will cover the latest advances in eXtremely Large (XL) Multiple-Input Multiple-Output (MIMO) wireless systems as well as their emerging applications, giving emphasis on a generic multi-hybrid transceiver hardware architecture comprising programmable metasurfaces, which offers signal processing capabilities both in the digital and analog domains as well as over-the-air via the direct manipulation of the electromagnetic waves. System models and signal processing schemes enabling energy- and cost-efficient multi-user wireless communications and sensing, as well as their integrated realization will be discussed. In addition, emerging XL MIMO systems leveraging nonlinear signal processing components and performing over-the-air inference tasks will be presented. The seminar will be concluded with a list of novel perspectives and future directions for XL-MIMO-based computing in future wireless networks.

George C. Alexandropoulos received the Engineering Diploma (Integrated M.S.c), M.A.Sc., and Ph.D. degrees in Computer Engineering and Informatics from the University of Patras, Greece in 2003, 2005, and 2010, respectively. He has held senior and principal research positions at various universities and research centers, including the Mathematical and Algorithmic Sciences Lab of Huawei Technologies France and the Technology Innovation Institute, United Arab Emirates. He is currently an Associate Professor with the Department of Informatics and Telecommunications, School of Sciences, National and Kapodistrian University of Athens (NKUA), Greece and an Adjunct Professor with the Department of Electrical and Computer Engineering, University of Illinois Chicago, USA. His research interests span the general areas of algorithmic design and performance analysis for wireless networks with emphasis on multi-antenna transceiver hardware architectures, full duplex MIMO, active and passive RISs, ISAC, millimeter wave and THz communications, as well as distributed machine learning algorithms. He currently serves as an Editor for IEEE Transactions on Communications, IEEE Transactions on Green Communications and Networking, IEEE Transactions on Mobile Computing, and IEEE Wireless Communications Letters. He has participated and/or technically managed more than 15 European Union, international, and Greek research, innovation, and development projects, including the H2020 RISE-6G, SNS JU TERRAMETA, SNS JU 6G-DISAC, and ESA PRISM projects dealing with RIS-empowered smart wireless environments, THz RISs, distributed ISAC, and RIS demonstration for localization and mapping, respectively. He was the recipient of the best Ph.D. thesis award 2010, IEEE Communications Society Best Young Professional in Industry Award 2018, EURASIP Best Paper Award of the Journal on Wireless Communications and Networking 2021, IEEE Marconi Prize Paper Award in Wireless Communications 2021, Best Paper Awards from the IEEE GLOBECOM 2021 and IEEE VTC-Spring 2025, Best Paper and Honorable Mention Awards 2025 from the Intelligent and Converged Networks Journal, IEEE Communications Society Fred Ellersick Prizes 2023 and 2024, IEEE Communications Society Leonard G. Abraham Prize 2024, and NKUA's Research Excellence Award for the academic year 2023-2024. More information is available at www.alexandropoulos.info.

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