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Advancing the next generation of photonic systems using machine learning

Prof. Darko Zibar

Professor at the Department of Electrical and Photonics Engineering
Technical University of Denmark, Lyngby, Denmark

Thursday February 27th - 10:00 am
Sala Shannon (meeting room in front of Classroom 12)

The 2024 Nobel Prize in Physics underscores the growing influence of machine learning in diverse areas of physical science. In the field of photonics, machine learning is proving invaluable for tasks such as optimizing and designing fiber-optical communication systems, optical amplifiers, noise characterization of frequency combs, inverse design of photonic components, and quantum-noise-limited signal detection. In this talk, I will review notable applications of machine learning in photonics and explore future directions in this emerging field. Specifically, I will highlight its role in phase noise characterization of optical frequency combs, end-to-end learning for fiber-optic communication, and realization of programmable ultra-wideband Raman amplifiers. Lastly, I will introduce an exciting new application of machine learning: controlling nonlinear interactions in highly nonlinear waveguides

Darko Zibar is currently Professor at the Department of Electrical and Photonics Engineering, Technical University of Denmark and the group leader of Machine Learning in Photonics Systems (MLiPS) group. He received M.Sc. degree in telecommunication and the Ph.D. degree in optical communications from the Technical University of Denmark, in 2004 and 2007, respectively. He has been a Visiting Professor at Politecnico di Torino, Friedreich Alexander University of Erlangen, University of California Santa Barbara and University of Colorado, Boulder. His research efforts are currently focused on the application of digital signal processing and machine learning techniques to advance classical and quantum optical communication and measurement systems. Some of his major scientific contributions include record capacity hybrid optical-wireless link (2011), record sensitive optical phase noise measurement technique that approaches the quantum limit (2021) and record-bandwidth (S+C+L band) programmable gain Raman amplifier (2019). He is the recipient of Young Researcher Award by University of Erlangen-Nurnberg (2016), European Research Council (ERC) Consolidator Grant (2017), Alexander von Humboldt Foundation Bessel Research Award, (2021), and Villum Investigator Award (2023). Finally, he was a part of the team that won the HORIZON 2020 prize for breaking the optical transmission barriers (2016).

For further information: info.photonext@polito.it