

Plenary Session

KEYNOTE LECTURE:

„Interference-limited communications: Models, Inherent Limits, and Insights“

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Abstract: In this talk, we study the capacity of interference-limited channels with memory. These channels model non-orthogonal communications scenarios, such as the non-orthogonal multiple access (NOMA) scenario, and underlay cognitive communications, in which the interference from other communications signals is much stronger than the thermal noise. As communications signals are inherently cyclostationary in continuous time (CT), then, after sampling at the receiver, the discrete-time (DT) received signal model contains the sampled desired information signal with additive sampled CT cyclostationary noise. We first explain why the sampled noise can be modeled either as a DT cyclostationary process with memory or a DT almost-cyclostationary process with memory, where the latter case results in a channel that is not information-stable. Thus, analyzing this model requires the development of a new approach for channels with additive non-stationary noise that has memory. Our results show, for the first time, the relationship between memory, sampling frequency synchronization, and capacity, for interference-limited communications. The insights from our work provide a link between the analog and digital time domains, which has been missing in most previous works on capacity analysis. We also discuss related the design of DNN-aided network clock synchronization motivated by these results, and subsequent work on source coding for such processes.

Short Bio:



Prof. Rona Dabora received his B.Sc. and M.Sc. degrees in 1994 and 2000, respectively, from Tel-Aviv University, Israel, and his Ph.D. degree in 2007 from Cornell University, USA; all in Electrical Engineering. From 1994 to 2000 he worked as an R&D engineer at the Communications Research Institute, and from 2000 to 2003, he was with the Algorithms Group at Millimetrix Broadband Networks, Israel, where he worked on the design of high-speed backbone networks. From July 2007 till January 2009, he was a postdoctoral researcher at the Wireless Systems Lab, Stanford University, USA, and since 2009 he is a faculty member at the School of Electrical and Computer Engineering, Ben-Gurion University, Israel. In the academic years 2022-2024, he was a Visiting Fellow at Princeton University, USA, where he is currently a Visiting Research Collaborator. Dr. Dabora serve(d) as a TPC member for several major international conferences, including, among others, the 5G World Forum, WCNC, ICC, GlobeCom, ISPLC, and PIMRC. In 2020 he was the keynote speaker at the IEEE ISPLC conference. During 2012-2019 he served as an associate editor and as a senior area editor for the IEEE Signal Processing Letters.