Title: Gaussian Channels: I-MMSE at Every SNR

Speaker: Ronit Bustin

Time & Location: Monday, June 29 2015 at 11:00 a.m. ECE Room 202

Abstract:

Multi-user information theory presents many open problems, even in the simple
Gaussian regime. One such prominent problem is the two-user Gaussian
interference channel which has been a long standing open problem for over 30 years.
We distinguish between two families of multi-user scalar Gaussian settings;
a single transmitter (one dimension) and two transmitters (two dimensions),
not restricting the number and nature of the receivers. Our first goal is to fully
depict the behavior of "good", capacity achieving, codes in one dimensional settings
for every SNR. Such an understanding provides important insight to capacity
achieving schemes and also gives an exact measure of the disturbance such codes
have on unintended receivers. We first discuss the Gaussian point-to-point channel
and enhance some known results. We then consider the Gaussian wiretap channel and Gaussian
Broadcast channel and reveal MMSE properties that confirm "rules of thumb" used in the achievability
proofs of the capacity region of these channels and provide insights to the design of such codes.
Our second goal is to employ these observations to the analysis of the two dimensional setting.
Specifically, we analyze the two-user Gaussian interference channel, where simultaneous
transmissions from two users interfere with each other. We employ our understanding of
"good" point-to-point code sequences to the analysis of this channel.
Our results resolve the "Costa Conjecture" for bounded variance inputs
(a.k.a the "missing corner points" conjecture).

* Joint works with H. V. Poor , R. F. Schaefer and S. Shamai.

Bio:

Ronit Bustin received a B.Sc. degree in electrical engineering and computer science and a M.Sc. degree
in electrical engineering in 2004 and 2006, respectively, from Tel-Aviv university, Israel. She received a
Ph.D. in electrical engineering in 2013 from the Technion - Israel Institute of Technology, Haifa. She is
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University. Her research interests include multi-user information theory, secrecy constraints, Gaussian
MIMO channels, estimation theory and channel coding. Ronit Bustin received the Irwin and Joan Jacobs
scholarship for excellence in graduate studies and research, in January 2010. She is a recipient of the
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