
THE WEIZMANN INSTITUTE OF SCIENCE
FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Faculty Seminar

Room 1 ,Ziskind Building
on Wednesday, Nov 20, 2019at 10:00

NOTE THE UNUSUAL DAY AND PLACE

Nir ShlezingerWeizmann

Exploiting Tasks, Structures, and AI in Digital Communications Receivers

Abstract:

The broad range of demands which next generation communications systems are required to meet, spanning from increased rates to efficient power consumption, cannot be satisfied by conventional architectures. These requirements give rise to a multitude of new challenges in modern communications and signal processing systems. In this talk we focus on two fundamental aspects of digital communications receivers - signal acquisition and symbol detection - discussing methods to improve their performance and reliability. For signal acquisition, we show how analog-to-digital convertors can be designed in light of the overall system task, achieving optimal-approaching performance while utilizing efficient bit-constrained samplers. Then, we discuss how recent advances in machine learning can be exploited for symbol detection, a task which is typically addressed using channel-model-based methods, such as the Viterbi algorithm and interference cancellation methods. We present a new framework for combining artificial intelligence and model-based algorithms, allowing the latter to be implemented in a data-driven manner. The resulting architectures are capable of approaching the established performance of model-based algorithms, while being invariant of the underlying statistical model, and learning it from a small amount of training samples.