THE WEIZMANN INSTITUTE OF SCIENCE
FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Faculty Seminar

Room 155 ,Ziskind Building
on Sunday, Dec 26, 2021at 11:00

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Derandomization of elementary random codes

Abstract:

An error correcting code should ideally be 1) of large rate, 2) noise tolerant and 3) efficiently decodable. Elementary probabilistic constructions, such as random linear codes, achieve an excellent trade-off between the first two objectives, but unfortunately, decoding them is believed to be algorithmically hard. This motivates us to derandomize these constructions in a way that preserves noise tolerance, while adding structure that can be used for algorithmic purposes. In many settings, such as the ubiquitous list-decoding model, noise-tolerance can be seen to be a "local property of codes" - a new concept analogous to the classical notion of a local property of graphs. This observation turns out to yield a highly effective framework for the analysis and derandomization of elementary random codes. In this talk I will discuss the line of research that originates in the analogy between codes and graphs, and culminates, so far, in the recent proof that many Reed-Solomon codes achieve list-decoding capacity. Based on joint works with Venkatesan Guruswami, Ray Li, Nati Linial, Peter Manohar, Nicolas Resch, Noga Ron-Zewi, Shashwat Silas and Mary Wootters.