High rate locally-correctable and locally-testable codes with sub-polynomial query complexity

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Locally decodable codes (and the closely related locally correctable codes) are error-correcting codes that admit efficient decoding algorithms: They give a method to encode k bit messages into n bit codewords such that even after a constant fraction of the bits of the codeword get corrupted, any bit of the original message (or original codeword for locally correctable codes) can be recovered by only looking at only a sub linear or even just constant number of bits of the corrupted codeword.
Locally testable codes are codes that admit efficient testing algorithms: They give a method to encode k bit messages into n bit codewords such that there is an effect tester that can query an n-bit string in only a sub linear or even just constant number of bits of the corrupted codeword and decide if the string is near or far from a true codeword.

The tradeoff between the rate of a code and the locality/efficiency of its decoding and testing algorithms has been studied extensively in the past decade, with numerous applications to complexity theory and pseudorandomness.

In this talk I will discuss some recent results giving efficient sub-polynomial query decoding and testing algorithms for high rate error correcting codes. I will also highlight some of the most interesting challenges that remain.

This is a joint work with Swastik Kopparty, Or Meir and Noga Ron-Zewi.