

Syndrome decoding of Reed-Muller codes and tensor decomposition over finite fields

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Abstract

In this talk, we will look at decoding Reed-Muller codes beyond their minimum distance when the errors are random (i.e., in the binary symmetric channel). A recent beautiful result of Saptharishi, Shpilka and Volk showed that for binary Reed-Muller codes of length n and degree $n - O(1)$, one can correct $\text{polylog}(n)$ random errors in $\text{poly}(n)$ time (which is well beyond the worst-case error tolerance of $O(1)$). We will see two efficient algorithms as well as a different proof of the same result, where the decoding is done given the $\text{polylog}(n)$ -bit long syndrome vector of the corrupted codeword:

Examination Committee: Prof. Swastik Kopparty (Chair), Prof. Shubhangi Saraf, Prof. Jeff Kahn, Prof. Yongfeng Zhang