Abstract

Joint work with Oded Goldreich.

We prove that random n-by-n Toeplitz matrices over GF(2) have rigidity $\Omega(n^{3/(r^2 \log n)})$ for rank $r > \sqrt{n}$, with high probability. This improves, for $r = o(n / \log n \log \log n)$, over the $\Omega( (n^{2}/r) \log (n/r) )$ bound that is known for many explicit matrices.

Our result implies that an explicit trilinear function $f$ on $n$ variables has complexity $\Omega(n^3/5)$ in the multilinear circuit model suggested by Goldreich and Wigderson (ECCC, 2013), which yields an $\exp(n^{3/5})$ lower bound on the size of the so-called canonical depth-three circuits for $f$. 