

1007-05-250

Guy Kindler*, Mathematics Department, Institute for Advanced Study, 1 Olden Ln., Princeton, NJ 08540, and **Boaz Barak, Benny Sudakov, Ronen Shaltiel** and **Avi Wigderson**. *From sum-product estimates to explicit Bipartite Ramsey Graphs.*

We present the following theorem.

Theorem. For every fixed $\delta > 0$ there is an efficiently computable function $f : [N] \times [N] \rightarrow \{0, 1\}$ (running in polylogarithmic time in N), for which the following holds. For every two subsets A, B of $[N]$, each of size at least $K = N^\delta$, we have $f(A \times B) = \{0, 1\}$.

If one thinks of f as a 2-coloring of the edges of the complete $N \times N$ bipartite graph, then the edges of no $K \times K$ subgraph are monochromatic (indeed we can guarantee that each color will be represented in a constant fraction of all edges). No explicit construction was known for $\delta < 1/2$.

Several other new explicit constructions, interesting in their own right, are needed on the way to construct f itself, and we will discuss them too. These include a deterministic 3-source extractor, a somewhere condenser, and a somewhere 2-source extractor, among others.

An essential ingredient in all constructions is the recent "multiple source" extractor of Barak, Impagliazzo and Wigderson, which in turn is based on sum-product estimates for finite fields of Bourgain, Katz and Tao.

The talk will be self contained. Joint work with Boaz Barak, Benny Sudakov, Ronen Shaltiel and Avi Wigderson. (Received February 23, 2005)