Two approaches to Sidorenko's conjecture

Date Tuesday, February 25

Time 3 pm

Location 303 Mudd

Abstract: Sidorenko's conjecture states that the number of homomorphisms from a bipartite graph H to a graph G is at least the expected number of homomorphisms from H to the binomial random graph with the same expected edge density as G. In this talk, I will present two approaches to the conjecture. First, I will introduce the notion of tree-arrangeability, where a bipartite graph H with bipartition $A \cup B$ is tree-arrangeable if neighborhoods of vertices in A have a certain tree-like structure, and show that Sidorenko's conjecture holds for all tree-arrangeable bipartite graphs. In particular, this implies that Sidorenko's conjecture holds if there are two vertices a_1, a_2 in A such that each vertex $a \in A$ satisfies $N(a) \subseteq N(a_1)$ or $N(a) \subseteq N(a_2)$. Second, I will prove that if T is a tree and H is a bipartite graph satisfying Sidorenko's conjecture, then the Cartesian product of T and H also satisfies idorenko's conjecture. This result implies that, for all $d \geq 2$, the d-dimensional grid with arbitrary side lengths satisfies Sidorenko's conjecture.

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