Manhattan Algebra Day

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Boolean matrices with prescribed row and column sums, associated partition functions and hyperbolic polynomials

Friday, December 6, 2013
CUNY Graduate Center, Room 4102
2:20pm

Abstract:
Hyperbolic(and their generalizations) polynomials were recently used to improve several lower bounds in combinatorics and geometry. These new lower bounds can be used to obtain poly-time algorithms to approximate many #P-HARD interesting quantities, notably the mixed volume, within simply exponential multiplicative error. The talk will describe one refinement of the lower bounds and its application to the approximation of partition functions associated with Boolean matrices with prescribed row and column sums. Such boolean matrices is one of the classical and intensely studied topics in analytic combinatorics. In a way, we will describe a natural non-trivial class of $n \times n$ nonnegative matrices which allows a poly-time deterministic algorithm to approximate the permanent within the multiplicative factor const with exponent the square root of n.

Besides, we will explain how the celebrated Gale-Ryser Theorem follows immediately from the hyperbolic polynomials framework.