Geometry and Complexity of Binomial Inequalities in Combinatorics

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Polynomial inequalities between counts of substructures are of central interest in combinatorics. For example, we may be interested in inequalities involving the numbers of bases of a matroid of different ranks, or numbers of certain subgraphs of a graph. Verifying validity of such inequalities for all objects (e.g. all graphs) is often a hard (undecidable) problem. Binomial inequalities are also very important in combinatorics, but they are potentially simpler. In particular, their exponents form a convex cone. This convex cone often has a simple structure, which may lead to better complexity. I will mainly give examples of this phenomenon and state some open problems.

Joint work with Annie Raymond (University of Massachusetts, USA).