Abstract: A basic problem at the intersection of probability and combinatorics is the Littlewood-Offord anti concentration problem: given real numbers $a_1, ..., a_n$, what is the largest possible point probability of the random sum $a_1 X_1 + ... + a_n X_n$ for iid Bernoulli random variables $X_1, ..., X_n$? Several variants of this problem, involving additional arithmetic constraints on the numbers $a_1, ..., a_n$, have proved to both be deep and widely applicable; two notable examples of such variants include the Sarkozy-Szemeredi theorem (resolving the Erdos-Moser problem) and Halasz's theorem. A few years ago, it became evident to me that all of these arithmetic results are in fact specialisations of a more abstract, purely combinatorial phenomenon. In this talk, I will take the scenic route to the recent proof of such an abstract result, regarding the density of “antichain codes” in the Boolean hypercube, surveying the history of these problems and some of the many applications along the way.

Note the unusual time!