

Anti-concentration inequalities for linear combinations

The classical Littlewood-Offord problem asks for the maximum probability that a weighted sum of independent random signs hits a point or a ball of a given radius. A sharp result when dealing with real weights was famously provided by Erdős who used Sperner's Theorem. In this talk we shall consider the same problem for arbitrary distributions in \mathbb{R}^d . It turns out that, perhaps surprisingly, there is a unique choice of optimal weights, regardless of the distribution under consideration. Our result applied to Bernoulli distributions answers a recent question of Fox, Kwan and Sauermann (2019). An important feature of our approach is that we do not use Harmonic Analysis or Extremal Combinatorics, which are the prevailing tools in the area. Finally, I will discuss the applications of the methods developed to obtain optimal anti-concentration bounds in a more general setting.

The talk is based on joint work with Valentas Kurauskas (Vilnius University).