Gaussian mixtures with applications to entropy inequalities and convex geometry

Abstract:
We say that a symmetric random variable $X$ is a Gaussian mixture if $X$ has the same distribution as $YG$, where $G$ is a standard Gaussian random variable, and $Y$ is a positive random variable independent of $G$. In the first part of the talk we use this simple notion to study the Shannon entropy of sums of independent random variables. In the second part we investigate, using Gaussian mixtures, certain topics related to the geometry of $B_{p^n}$ balls, including optimal Khinchine-type inequalities and Schur-type comparison for volumes of section and projections of these sets. In the third part we discuss extensions of Gaussian correlation inequality to the case of $p$-stable laws and uniform measure on the Euclidean sphere. Based on a joint work with Alexandros Eskenazis and Tomasz Tkocz.