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*Random embeddings and approximation and other high-dimensional geometric phenomena*

This talk will illustrate a geometric and probabilistic approach of Asymptotic Geometric Analysis to several high-dimensional phenomena described by a large class of random matrices. Those include Gaussian and  $\pm 1$  matrices, more generally, subgaussian matrices, and also matrices determined by subsets of bounded orthogonal systems. We shall consider random embeddings of normed spaces (notably, of the Euclidean space), random approximation and random projections, used for example in compressed sensing, and some properties of combinatorial flavor of random 0/1 polytopes. These phenomena are intimately connected to probabilistic inequalities for singular numbers of a wide class of random matrices.