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High-dimensional structures are ubiquitous in modern science and its real-world applications. They are used for modelling physical and biological phenomena as well as computer networks. Due to their size and complexity, they are difficult to describe, analyze, and control. For this reason, new methods had to be developed, many of them probabilistic in nature. Fields as various as natural language processing, statistics, genetics, quantum physics, and machine learning, tasks as diversified as finding an almost shperical section of a polytope, big data analytics, and statistical testing whether an integer number is a prime number (which is of importance in cryptography) - all use the language of randomness, even if, in some cases, the object of study happens to be purely deterministic.

The basic tools for describing random variables are probabilistic inequalities, which have been systematically studied since the nineteenth century. However, most classical estimates are not sufficient for handling multidimensional objects, such as random vectors, random matrices, or paths of stochastic processes. Therefore, in the last decades a large number of new ideas have been introduced, and the old techniques have been improved upon and extended, drawing from many branches of analysis and geometry. Members of our team have already made some contributions to this development. Now we will take on new, challenging problems.