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Continuous combinatorics and natural quasirandomness

The theory of graph quasirandomness studies graphs that "look like" samples of the Erdős–Rényi random graph $G_{n,p}$. More formally, a sequence $(G_n)_n$ is said to be quasirandom if for every finite graph F, the densities of F in G_n and in $G_{n,p}$, respectively, converge to the same number (with probability 1). This notion of similarity naturally gives rise to a topology, called density topology, on the space of graphs and is the starting point of the theory of graph limits, graphons.

In turn, the theory of graphons is the starting point of continuous combinatorics, which studies limits of arbitrary combinatorial objects (formally, models of some universal first-order theory in a finite relational language) in the analogous density topology. Thus, it is natural to ask if a theory of quasirandomness can be developed in the same level of generality.

In this talk, I will introduce the theory of natural quasirandomness, which provides such generalization. Although the theory heavily uses the language of continuous combinatorics, no familiarity with the topic is required as I will also briefly introduce its basic concepts.

This talk is based on joint work with Alexander A. Razborov.