

Institut für Diskrete Mathematik

## Combinatorics Seminar

Friday 5th November 14:15

Seminarraum AE06, Steyrergasse 30, Erdgeschoss / Webex

# Quasirandom combinatorial structures and extremal combinatorics

DANIEL KRÁĚ

(Masaryk University)

A combinatorial structure is said to be quasirandom if it resembles a random structure in a certain robust sense. The notion of quasirandom graphs, developed in the work of Rödl, Thomason, Chung, Graham and Wilson in 1980s, is particularly robust as several different properties of truly random graphs, e.g., subgraph density, uniform edge distribution and spectral properties, are satisfied by a large graph if and only if one of them is.

In the first part of the talk, we will discuss quasirandom properties of several other combinatorial structures, in particular, tournaments, permutations and Latin squares, and present recent results obtained using analytic tools of the theory of combinatorial limits. In the second part of the talk, we will discuss several questions from extremal combinatorics related to quasirandom graphs and hypergraphs, in particular, the uniform Turán density of hypergraphs, which was introduced by Erdős and Sós in the early 1980s; we establish the existence of a hypergraph with uniform Turán density equal to  $1/27$ , which answers a question of Reiher, Rödl and Schacht [J. London Math. Soc. 97 (2018), 77–97], and determine the uniform Turán density of odd tight cycles.

The talk contains results obtained with different groups of collaborators, including Matija Bucić, Timothy F. N. Chan, Jacob W. Cooper, Frederik Garbe, Robert Hancock, Adam Kabela, Ander Lamaison, Taísa Martins, David Munhá Correia, Roberto Parente, Samuel Mohr, Jonathan A. Noel, Yanitsa Pehova, Oleg Pikhurko, Maryam Sharifzadeh, Fiona Skerman and Jan Volec.

Meeting link:

<https://tugraz.webex.com/tugraz/j.php?MTID=ma70275cd258e7748417214793956c7bf>

Joshua Erde, Mihyun Kang