

# FIM Kolloquium

Am Dienstag, den 24. Juni 2025, hält

**Daniel Král'**

(Universität Leipzig und MPI MiS)

einen Vortrag über das Thema

## **Analytic approach to extremal combinatorics**

Ort: HS 11 IM, Zeit: 17 c.t.

**Abstract:** Analytic tools to represent and study large discrete structures provided by the theory of combinatorial limits led to new views on a wide range of topics in mathematics and computer science. In this talk, we will briefly introduce the theory of combinatorial limits and showcase its methods on specific problems from Ramsey theory, which studies the existence of ordered substructures.

Ramsey theory got its name because of the following classical statement proven by Ramsey in 1930: if  $N$  is sufficiently large, then for any partition of  $k$ -tuples of  $N$  points into finitely many classes, there exist  $n$  points such that all  $k$ -tuples formed by these  $n$  points belong to the same class. We will study quantitative versions of Ramsey type statements and present a solution of a 30-year-old problem on the existence of high chromatic graphs with small Ramsey multiplicity. In relation to general questions on the interplay of combinatorial limits and extremal combinatorics, we will present, among others, a counterexample to a conjecture of Lovász on finitely forcible optima of extremal problems.

**Bio:** Daniel Král' is Alexander von Humboldt Professor for Discrete Mathematics at Leipzig University and an affiliated member of the Max Planck Institute for Mathematics in the Sciences. Before moving to Leipzig, he was the inaugural holder of the Donald Ervin Knuth Professorship at Masaryk University in Brno. He is also an honorary professor at the University of Warwick. In 2011, Král' won the European Prize in Combinatorics, and in 2014, he won a Philip Leverhulme Prize in Mathematics and Statistics. He is an elected Fellow of the AMS.