

Summer Term 2026

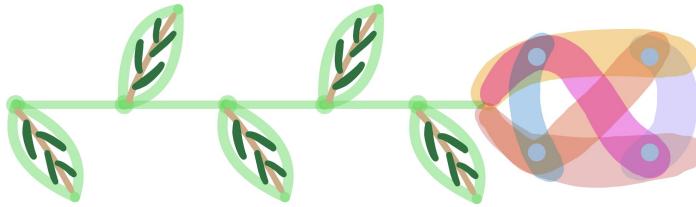
Seminar: Recent developments in extremal combinatorics

Content:

Extremal combinatorics is one of the central areas of modern mathematical research, concerned with extremal problems in graph theory (such as Ramsey- and Turán-type problems), properties of random graphs, and configurations in discrete geometry, among others.

In recent years, there have been significant advances on many classical problems in the field, often achieved through surprisingly short and elegant proofs. In this seminar, we will study a selection of recent papers that either solve or provide the best known results toward several classical extremal problems.

Participants are expected to choose a paper from our selection and present it in a seminar talk. This is a graduate-level seminar, and certain prerequisites are required (see below). Master's students and advanced undergraduate students are warmly encouraged to enroll.



↖ A daisy hypergraph

Timeslot: Fridays 09:45 – 11:15 in SR 2.058, Geb. 20.30.

Prerequisites:

- Knowledge of Linear Algebra, Analysis, and Probability Theory.
- Sound knowledge of Graph Theory.
- Having taken the course Extremal Graph Theory would be appreciated but not necessary.

A few example papers:

- **A short proof of the random Ramsey theorem**
R. Nenadov and A. Steger, *Combinatorics, Probability and Computing* **25** (2016): 130–144.
- **Induced subgraphs of hypercubes and a proof of the sensitivity conjecture**
H. Huang, *Annals of Mathematics* **190** (2019): 949–955.
- **Turán densities for daisies and hypercubes**
D. Ellis, MR. Ivan, and I. Leader, *Bulletin of the LMS* **56** (2024): 3838–3853.
- **Global rigidity of random graphs in \mathbb{R}**
R. Montgomery, R. Nenadov, J. Portier, and T. Szabó, *2023 MATRIX Annals* (2025): 719–726.

The preliminary meeting will take place on 13 February 2026 at 13:00 in SR 0.016 of the Mathematics Building (20.30). Further inquiries can be sent to dingyuan.liu@kit.edu.