Graz University of Technology

Institut für Diskrete Mathematik

Combinatorics Seminar

19.06.2026, 12:30

AE06, Steyrergasse 30

Non-existence probabilities via belief propagation

Will Perkins

(Georgia Tech)

Consider the probability that the random graph $G(n,p)$ avoids a clique K_r. When p is small enough, the asymptotics of the logarithm of this probability are given by Janson's Inequality, while for p large enough the asymptotics match that of being $(r-1)$-partite, and this can be proved using hypergraph containers. What happens in the critical regime in between? In this talk I will give some answers, including an asymptotic formula for the log probability in a portion of the critical regime and show that a phase transition occurs in the problem. The problem is naturally formulated as a problem about independent sets in hypergraphs, and the answers can be written in terms of fixed points of the message-passing algorithm Belief Propagation. Based on joint work with Matthew Jenssen, Aditya Potukuchi, and Michael Simkin.

Fabian Burghart, Mihyun Kang, Ronen Wdowinski