

Institut für Diskrete Mathematik

## Combinatorics Seminar

Friday 21st April 12:30

Online meeting (Webex)

# On the evolution of triangle-free graphs in the ordered regime

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Erdos, Kleitman and Rothschild proved that the number of triangle-free graphs on  $n$  vertices is asymptotic to the number of bipartite graphs; or in other words, a typical triangle-free graph is bipartite. Osthus, Promel and Taraz proved a sparse analogue of this result: if  $m > (\sqrt{3}/4 + \epsilon)n^{3/2}\sqrt{\log n}$ , a typical triangle-free graph with  $m$  edges is bipartite (and this no longer holds below this threshold).

What do typical triangle-free graphs at sparser densities look like and how many of them are there? We consider what we call the ordered regime, where typical triangle-free graphs are not bipartite but have a dense max-cut. In this regime we prove asymptotic formulas for the number of triangle-free graphs and give a precise probabilistic description of their structure. This leads to further results such as determining the threshold at which typical triangle-free graphs are  $q$ -colourable for  $q \geq 3$ , determining the threshold for the emergence of a giant component in the complement of a max-cut, and many others.

This is joint work with Will Perkins and Aditya Potukuchi.

Meeting link:

<https://tugraz.webex.com/tugraz/j.php?MTID=m3162bb7e6bef850e659f657a18095a1c>

Meeting number: 2733 453 3442

Password: bSDVGJDp976

Joshua Erde, Mihyun Kang