A U S H A N G

FREIE UNIVERSITÄT BERLIN

Fachbereich Mathematik und Informatik

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D I S P U T A T I O N

Montag, 11. Oktober 2021, 17:00 Uhr

WebEx

Disputation über die Doktorarbeit von

Herrn Patrick Wyndham Morris

Thema der Dissertation:

Clique Factors: Extremal and Probabilistic Perspectives

Thema der Disputation:

Rainbow matchings and the probabilistic method

Die Arbeit wurde unter der Betreuung von **Prof. Dr. T. Szabó** durchgeführt.

Abstract: A K_r-factor in a graph G is a collection of vertex-disjoint copies of K_r covering the vertex set of G. In this talk, we investigate these fundamental objects in three settings that lie at the intersection of extremal and probabilistic combinatorics. We explore conditions that guarantee clique factors in pseudorandom graphs and in randomly perturbed graphs and also address robustness for K_3-factors. In each setting, we are able to provide the complete picture in certain regimes of parameters, in particular for K_3-factors, by giving tight results.

A rainbow matching in an edge coloured (multi-)graph is a collection of vertex disjoint edges, each having a unique colour. The study of rainbow matchings dates back to Euler's research on Latin squares and is now a vibrant area of modern combinatorics, rich in tantalising open conjectures. Motivated by various areas of mathematics, principally design theory, problems in the area posit that certain edge-coloured graphs have very large rainbow matchings, using (almost) all the available colours. Few exact results are known but in recent years there have been several breakthrough results proving asymptotic relaxations of key conjectures.

In this talk, we will present very recent work of Munh\'a Correia, Pokrovskiy and Sudakov which introduces a new approach to these problems and can be used to obtain strong asymptotic results from weaker versions. The method is surprisingly simple and leads to short asymptotic proofs in several settings. Some results are new and solve open conjectures whilst others provide alternative proofs of results that previously required much more involved arguments. The key idea is a sampling trick and this work is testament to the power of the probabilistic method to provide elegant proofs and insight in combinatorics.

Die Disputation besteht aus dem o. g. Vortrag, danach der Vorstellung der Dissertation einschließlich jeweils anschließenden Aussprachen.

Interessierte werden hiermit herzlich eingeladen

Der Vorsitzende der Promotionskommission
Prof. Dr. T. Szabó