University of Birmingham

Professor Daniela Kühn

Professor in Mathematics (Mason Chair)

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About

Daniela Kühn is the Mason Professor in Mathematics. Her research interests are Extremal and Probabilistic Combinatorics. She has received several research grants from EPSRC and from Europe, including an ERC Starting Grant. She has been awarded the European Prize in Combinatorics in 2003 and the Whitehead Prize by the London Mathematical Society in 2014.

Further recognition for her research includes an invited lecture at the International Congress of Mathematicians in 2014.

School web page: **web.mat.bham.ac.uk/D.Kuehn/ (http://web.mat.bham.ac.uk/D.Kuehn/)**

Qualifications

- Habilitation (Mathematics, Hamburg 2003)
- PhD (Mathematics, Hamburg 2001)

Biography

Daniela Kühn obtained the Certificate of Advanced Studies in Mathematics from the University of Cambridge in 1997 and a Diploma in Mathematics from the Technical University of Chemnitz in 1998. In 2001 she obtained a PhD in Mathematics at the University of Hamburg.

In 2002 she was awarded the Richard Rado prize for her PhD thesis by the German Mathematical Association and in 2003 she was awarded the European Prize in Combinatorics (jointly with D. Osthus).

She worked as a postdoctoral researcher in Hamburg and at the Free University Berlin before she started as a lecturer in Birmingham in 2004. In 2010 she was promoted to Mason Chair of Mathematics.

Teaching

See **web.mat.bham.ac.uk/D.Kuehn/teachdk.html (http://web.mat.bham.ac.uk/D.Kuehn/teachdk.html)** for information on my teaching.

Postgraduate supervision

Daniela Kühn is interested in supervising PhD students in Combinatorics. If you are interested, please email her.

PhD opportunities

Research

RESEARCH THEMES

Combinatorics, especially Extremal and Probabilistic Graph Theory

RESEARCH ACTIVITY

My research interests lie in Graph Theory, Probabilistic Methods and Randomized Algorithms. Recently I have focused on sufficient conditions for Hamilton cycles in directed graphs, i.e. cycles which contain all the vertices of the directed graph. It is unlikely that there is a good characterization of all (directed) graphs containing a Hamilton cycle since the corresponding decision problem is NP-complete. So it is natural to ask for sufficient conditions for the existence of a Hamilton cycle.

The most famous such conditions is Dirac's theorem that every graph in which every vertex is joined by an edge to at least half of the vertices has a Hamilton cycle. An analogue of Dirac's theorem for directed graphs was proved by Ghouila-Houri. Recently we proved an analogue of Dirac's theorem for oriented graphs, i.e. for directed graphs without cycles of length 2. Dirac's theorem was strengthened by Posa and Chvatal who gave conditions on the degree sequence of a graph which still guarantee Hamiltonicity. We have also recently obtained approximate versions of Posa's and of Chvatal's theorem for directed graphs. I have collaborated with D. Christofides, P. Keevash, L. Kelly, D. Osthus and A. Treglown on these questions.

Publications

A complete list of my preprints and publications is available at: **web.mat.bham.ac.uk/D.Kuehn/pubdk.htm (http://web.mat.bham.ac.uk/D.Kuehn/pubdk.html)**

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