



2015 Colloquia in Combinatorics

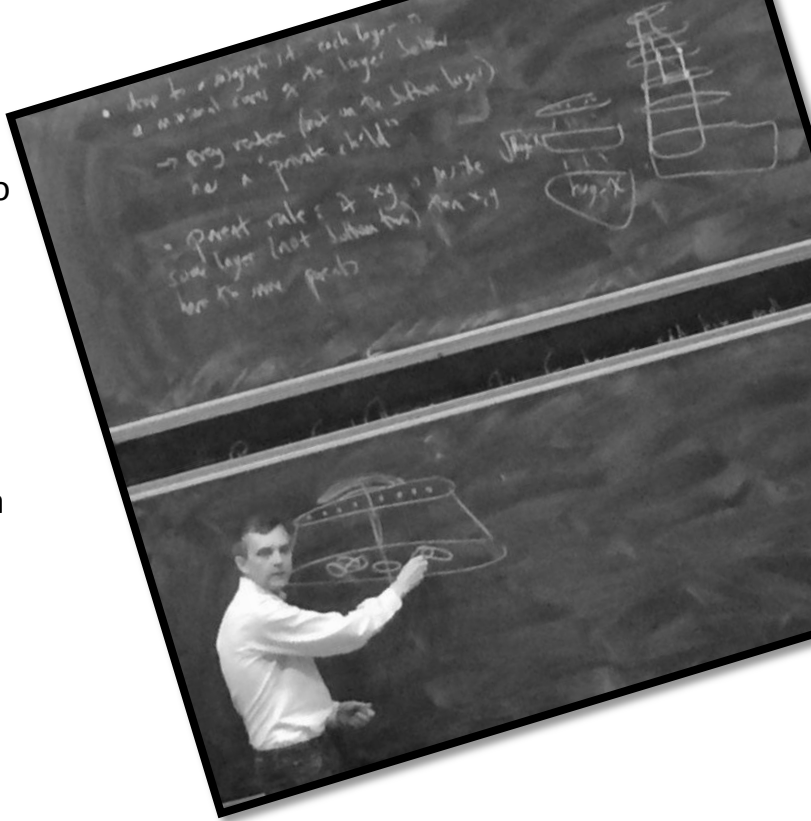
The 2014/15 Colloquia followed the successful format established in the past: six invited talks were delivered on each of the two days. The meeting went according to plan, and our expectations were fully met. Most participants attended both days. The conference attracts both excellent speakers and a large audience, with participants coming not only from the UK but also from continental Europe.



The Queen Mary day started with an engaging talk by Stéphan Thomassé about Barát-Thomassen conjecture. In the following talk, Alex Scott talked about resolution to a beautiful conjecture of Gyarfás from 1985 that a graph without an induced odd cycle longer than three has chromatic number bounded by a function of its clique number. The programme continued with three talks by promising young mathematicians: Olof Sissak discussed recent progress for some central questions (such as how large a set of integers can be if it contains no solutions to a given linear equation) in additive combinatorics, Anita Liebenau talked about the structure of Ramsey-minimal graphs, and Ron Peled

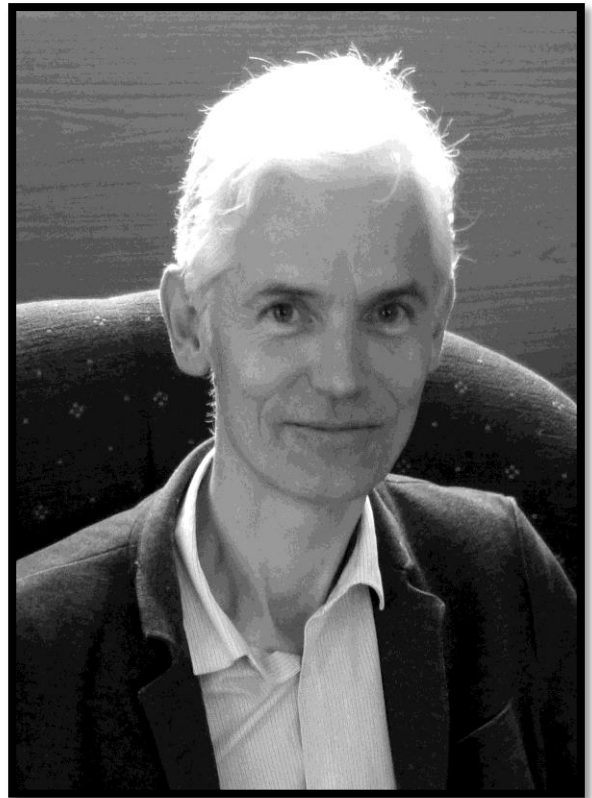
showed how to use the probabilistic method to show the existence of regular combinatorial objects (such as orthogonal arrays, t -designs, and t -wise permutations) which previously were not known to exist. The day's programme ended with a lecture by Gregory Sorkin in which he discussed Vickrey-Clarke-Groves auctions (a type of sealed-bid auction of multiple items that assigns the items in a socially optimal manner) for general combinatorial structures.

Will Perkins opened the LSE day, talking about a new method for bounding the partition function in two models from statistical physics and also showed some of its applications in combinatorics. Afterwards, Alexander Schrijver discussed how partition functions and their duals can describe certain graph invariants, and how to use Lie algebras to describe these invariants. Then, Frank Vallentin gave a beautiful talk about one of the oldest problems in mathematics: 'How much of space can be filled with pairwise non-overlapping copies of a given solid?'. The talk started with historical perspective, continued with modern applications of geometric packing problems, and ended with new methodology developed to find new upper bounds for the maximum density of translative packings of superspheres in three dimensions. In the afternoon, Christina Goldschmidt surveyed the newly developed theory of scaling limits of Galton-Watson trees. This was followed by Alexey Pokrovskiy who presented his solutions to two conjectures of Kühn, Lapinskas, Osthus, and Patel about highly connected tournaments. The meeting culminated in the traditional Norman Biggs lecture, given by Tim Gowers. Tim delivered an engaging and stimulating lecture in which he discussed how an interesting question in communication complexity quickly transforms to a seemingly unrelated problem in algebra, and then solves it.





PROFESSOR NORMAN BIGGS



PROFESSOR TIM GOWERS

NORMAN BIGGS SPEAKER: PROFESSOR TIM GOWERS

