TS1: Thematic Session: Groups 1
Monday 30 June, 14:00–16:00 • Room 103

Marina Anagnostopoulou-Merkouri (University of Bristol)

Time: 14:00–14:30

Permutation groups, partition lattices and block structures

Let $G \leq Sym(\Omega)$ be a finite transitive permutation group. We say that G is primitive if it preserves no nontrivial partition of Ω, and imprimitive otherwise. Primitive groups have been heavily studied by group theorists over the years. Not as much is known on the other hand about imprimitive groups and there is generally no sensible way to describe their structure in detail. However, those groups are very interesting to study from a combinatorial angle. In particular, it can be very fruitful to explore the lattice of their invariant partitions. In this talk we will present some recent work on imprimitive groups whose lattices of partitions form special combinatorial structures called orthogonal and poset block structures, which are widely used by statisticians in the design of experiments.

This is joint work with Rosemary Bailey and Peter Cameron.

Dimitri Leemans (Université Libre de Bruxelles)

Time: 14:30–15:00

Gluing methods for string C-group representations

The study of string C-group representations of rank at least $n/2$ for the symmetric group S_n has gained a lot of attention in the last fifteen years. In a recent paper, Cameron et al. gave a list of permutation representation graphs of rank $r \geq n/2$ for S_n, having a fracture graph and a non-perfect split. They conjecture that these graphs are permutation representation graphs of string C-groups. In trying to prove this conjecture, we discovered two new techniques to glue two CPR graphs for symmetric groups together. We discuss the cases in which they yield new CPR graphs. By doing so, we invalidate the conjecture of Cameron et al. We believe our gluing techniques will be useful in the study of string C-group representations of high ranks for the symmetric groups. This is joint work with Jessica Mulpas.

Daniele Nemmi (University of Padova)

Time: 15:00–15:30

Graphs encoding generating properties of finite groups

We are going to explore some graphs related to the generation of finite groups, with a particular attention to their connection with almost simple groups.

Robert Bailey (Memorial University of Newfoundland)

Time: 15:30–16:00

On distance-regular graphs with primitive automorphism groups

A graph is distance-regular if, for each vertex v and each vertex w at distance i from v, the number of neighbours of w at distances $i-1$, i or $i+1$ from v depends only on i, and not on the choice of v or w. These are highly-structured graphs with interesting structural and algebraic properties. Many of the well-known examples have large automorphism groups, and many fascinating groups (including several sporadic simple groups) arise as automorphism groups of such graphs.

An ongoing project is to classify (as far as possible) "small" distance-regular graphs with primitive automorphism groups by making use of the GAP libraries of primitive permutation groups. This in turn has led to some more theoretical questions about graphs arising from certain primitive group actions. In this talk, I will discuss the status of this work, a few surprises which came up along the way, and some (theoretical and computational) questions which remain open.