Groups 2023 - Northern Group Theory conference in honour of Bernd Fischer

Thursday		**Friday**		**Saturday**	
8.30	Registration				
9.00 – 9.45	Roney-Dougal	9.00 – 9.45	Malle	9.30 – 10.15	van der Kallen
10.00 – 10.45	Camina	10.00 – 10.45	Grazian	10.15 – 10.45	Tea/Coffee
10.45 – 11.15	Tea/Coffee	10.45 – 11.15	Tea/Coffee	10.45 – 11.30	Maglione
11.15 – 12.00	Benson	11.15 – 12.00	Piterman	11.45 – 12.30	Burness
12.00 – 13.30	Lunch	12.00 – 13.00	Lunch	12.30	Lunch
13.30 – 14.30	Poster (Coffee)	13.00 – 14.00	Tea/Coffee		
14.30 – 15.15	Weiss	14.00 – 14.15	Welcome		
15.20 – 16.05	Rees	14.15 – 15.00	Capdeboscq		
16.05 – 16.35	Tea/Coffee	15.05 – 15.50	Cuypers		
16.35 – 17.20	Gobet	15.15 – 16.30	Tea/Coffee		
17.25 – 18.10	Witzel	16.30 – 17.15	Röhrle		
		17.15	Music		
		19.00	Dinner		

Dave Benson
Title: *tba*
Abstract: tba

Tim Burness
Title: *Simple groups, Sylow subgroups and generation*
Abstract: By a theorem of Aschbacher and Guralnick, every finite group can be generated by a pair of conjugate soluble subgroups. The proof uses CFSG and it relies on the fact that every finite simple group can be generated by two Sylow p-subgroups for some prime p. The latter result has been extended in recent work by Breuer and Guralnick, who conjecture that if G is simple and r,s are any prime divisors of |G|, then G is generated by a Sylow r-subgroup and a Sylow s-subgroup. In this talk, I will report on progress towards a proof of this conjecture, which relies on a probabilistic approach. This is joint work with Bob Guralnick.

Rachel Camina
Title: *Coverings of groups*
Abstract: Suppose G is a group, a covering of G is a set of proper subgroups whose union is G. The study of coverings of groups has a long history. In 2017 I was asked a question about coverings of finite p-groups. We now have an answer. I will talk about how we reached this answer and how we were led to the infinite world of pro-p groups. This is joint work with Yiftach Barnea, Mariagrazia Bianchi, Mikhail Ershov, Mark L Lewis and Emanuele Pacifici.

Inna Capdeboscq
Title: *tba*
Abstract: tba

Hans Cuypers
Title: *tba*
Abstract: tba

Thomas Gobet
Title: *tba*
Abstract: tba

Valentina Grazian
Title: *On the lookout for exotic fusion systems*
Abstract: Fusion systems made their first appearance in a 2006 paper by Puig and have since then been investigated by many researchers around the world. A fusion system is a structure that encodes the properties of conjugation between p-subgroups of a group, for p any prime number.
Given a finite group G, it is always possible to define the saturated fusion system realized by G on one of its Sylow p-subgroups S: this is the category where the objects are the subgroups of S and the morphisms are the restrictions of conjugation maps induced by the elements of G.
However, not all saturated fusion systems can be realized in this way:

when this is the case, we say that the fusion system is exotic. An important research direction involves the study of the behavior of exotic fusion systems (in particular at odd primes).

In this talk we will present an overview of recent results concerning the classification of saturated fusion systems on certain families of finite p-groups, highlighting the developments on the understanding of exotic fusion systems at odd primes.

Josh Maglione
Title: *tba*
Abstract: tba

Gunter Malle
Title: *Automorphisms of groups from elliptic curves*
Abstract: We describe a group scheme coming from an elliptic curve over a field K. We characterize when two (abstract) groups arising in this way are isomorphic, and we use this to describe the automorphism group of such groups.
This generalizes work of du Sautoy--Vaughan-Lee and Stanojkovski--Voll.
This is joint work with Mima Stanojkovski.

Kevin Piterman
Title: *Advances on Quillen's conjecture*
Abstract: The study of the p-subgroup complexes began motivated by group cohomology and equivariant cohomology of topological spaces "modulo the prime p". For example, Kenneth Brown proved that the reduced Euler characteristic of this complex is divisible by the size of a Sylow p-subgroup, giving rise to a sort of "Homological Sylow theorem". Later, he showed that the mod-p equivariant cohomology of the p-subgroup complex of a finite group coincides with the mod-p cohomology of the group. Deeper relations with finite group theory, representation theory, and finite geometries were also explored. For instance, uniqueness of certain simple groups, finite geometries for sporadic groups, Lefschetz modules, and, more recently, endotrivial modules.
In 1978, Daniel Quillen conjectured that the poset of non-trivial p-subgroups of a finite group G is contractible if and only if G has non-trivial p-core. Quillen established the conjecture for solvable groups and some families of groups of Lie type. The major step towards the resolution of the conjecture was done by Michael Aschbacher and Stephen D. Smith at the beginning of the nineties. They roughly proved that if p>5 and G is a group of minimal order failing the conjecture, then G contains a simple component PSU(n,q^2) failing a certain homological condition.
In this talk, I will present new advances in the conjecture, with a focus on the prime p=2, which was not covered by the methods developed by Aschbacher-Smith. For example, we will see that sporadic groups cannot appear as components in a minimal counterexample to the conjecture for odd primes p, and state a slightly more restrictive result for p=2. In particular, we can conclude that sporadic and alternating components are (roughly) not an obstruction to establishing Quillen's conjecture for any prime p. This is joint work with S.D. Smith.

Sarah Rees
Title: *Relating Artin groups to their monoids*
Abstract: I'll talk about Artin groups and their monoids.

Artin group are defined by their finite presentations; the class of all Artin groups is very general, containing groups with (apparently) quite a range of properties. Some of these groups (e.g. the braid groups) have quite natural geometric origins, but for most of them, very little geometric information is known. There are a number of problems that are solved for particular classes of Artin groups but not in general. Among these are the word problem and the K(π, 1)-conjecture (of the contractibility of the group's Deligne complex), both of those solved decades ago for braid groups.
The last decade has shown quite significant progress in the study of geodesic words and of the word problem in a variety of Artin groups, and work of Dehornoy suggests that words over the group generators can be effectively studied as *multifractions*, that is, as words over the the Artin monoid. Meanwhile, work of Boyd suggests study of the groups's Deligne complex via the Deligne complex for the monoid.
I shall discuss progress in rewriting in Artin groups (referring to my own work with Holt, work of Blasco, Cumplido and Morris-Wright, and to Dehornoy's work), and explain how this could be used in an investigation of the Deligne complex,in my very recent work with Boyd, Charney and Morris-Wright.

Gerhard Röhrle
Title: *tba*
Abstract: tba

Colva Roney-Dougal
Title: *tba*
Abstract: tba

Wilberd van der Kallen
Title: *tba*
Abstract: tba

Richard Weiss
Title: *Tits polygons*
Abstract: Tits polygons are generalizations of Moufang polygons. Most Moufang polygons arise as the spherical buildings that correspond to absolutely simple algebraic groups of rank 2. All Moufang polygons can be coordinatized by algebraic data that is required, in each case, to be anisotropic in an appropriate sense. There are Tits polygons that can be coordinatized by the same algebraic data, but in the isotropic case. The best known examples are the “projective planes” over the octonions. These are, in fact, Tits triangles coordinatized by split octonion algebras, i.e. octonion algebras whose norm is isotropic. These triangles have a simple description in terms of buildings of type E6. In fact, every irreducible spherical building of rank at least 3 gives rise to Tits polygons—sometimes more than one—in a similar way. In this talk we will describe classification results for Tits polygons and applications of Tits polygons to the study of Moufang sets. (Moufang sets are, roughly speaking, the 2-transitive permutation groups that have a split BN -pair of rank 1.) This is joint work with Bernhard Mühlherr.

Stefan Witzel

Title: *tba*
Abstract: tba