

Global/Local Conjectures in Representation Theory of Finite Groups

March 13–18, 2011

MEALS

*Breakfast (Buffet): 7:00–9:30 am, Sally Borden Building, Monday–Friday

*Lunch (Buffet): 11:30 am–1:30 pm, Sally Borden Building, Monday–Friday

*Dinner (Buffet): 5:30–7:30 pm, Sally Borden Building, Sunday–Thursday

Coffee Breaks: As per daily schedule, 2nd floor lounge, Corbett Hall

***Please remember to scan your meal card at the host/hostess station in the dining room for each meal.**

MEETING ROOMS

All lectures will be held in Max Bell 158 (Max Bell Building accessible by walkway on 2nd floor of Corbett Hall). LCD projector, overhead projectors and blackboards are available for presentations. Note that the meeting space designated for BIRS is the lower level of Max Bell, Rooms 155–159. Please respect that all other space has been contracted to other Banff Centre guests, including any Food and Beverage in those areas.

SCHEDULE

Sunday

16:00 Check-in begins (Front Desk - Professional Development Centre - open 24 hours)

17:30–19:30 Buffet Dinner, Sally Borden Building
Beverages and a small assortment of snacks are available on a cash honor system.

Monday

7:00–8:45 Breakfast

8:45–9:00 Introduction and Welcome by BIRS Station Manager, Max Bell 158

9:00–9:50 **M. Geck:** On the number of Brauer characters in the ℓ -blocks of finite groups of Lie type

10:00–10:30 Coffee Break, 2nd floor lounge, Corbett Hall

10:30–11:20 **O. Brunat:** On semisimple characters in finite reductive groups

11:30–13:00 Lunch

13:00–14:00 Guided Tour of The Banff Centre; meet in the 2nd floor lounge, Corbett Hall

14:00 Group Photo; meet on the front steps of Corbett Hall

14:10–15:00 **B. Späth:** A reduction theorem for the Alperin-McKay conjecture

15:00–15:30 Coffee Break, 2nd floor lounge, Corbett Hall

15:30–16:00 **G. Navarro:** Rational groups

16:00–17:30 Informal Discussion

17:30–19:30 Dinner

Tuesday

- 7:00–9:00 Breakfast
9:00–9:50 **M. Cabanes:** McKay conjecture, some steps within the last step
10:00–10:30 Coffee Break, 2nd floor lounge, Corbett Hall
10:30–11:20 **G. Malle:** Quasi-isolated blocks of exceptional groups
11:30–13:30 Lunch
14:00–14:50 **P. Tiep:** Gluck-Wolf theorem for odd primes
15:00–15:30 Coffee Break, 2nd floor lounge, Corbett Hall
15:30–17:30 Informal Discussion
17:30–19:30 Dinner

Wednesday

- 7:00–9:00 Breakfast
9:00–9:50 **B. Srinivasan:** On $GL(n, q)$ and the Heisenberg algebra
10:00–10:30 Coffee Break, 2nd floor lounge, Corbett Hall
10:30–11:20 **M. Broué:** TBA
11:30–13:30 Lunch
13:30–17:30 Free Afternoon
17:30–19:30 Dinner

Thursday

- 7:00–9:00 Breakfast
9:00–9:50 **D. Gluck:** Rational defect groups and 2-rational characters
10:00–10:30 Coffee Break, 2nd floor lounge, Corbett Hall
10:30–11:00 **N. Kunugi:** Scott modules and Morita equivalences for principal blocks of finite groups
11:30–13:30 Lunch
14:00–14:50 **A. Evseev:** A refinement of the McKay and Broué conjectures
15:00–15:30 Coffee Break, 2nd floor lounge, Corbett Hall
15:30–16:20 **G. Hiss:** On the socle of an endomorphism algebra
16:30–17:30 Informal Discussion
17:00–19:30 Dinner

Friday

- 7:00–9:00 Breakfast
9:00–9:50 **S. Koshitani:** Blocks of finite groups with small defect
10:00–10:50 **C. Eaton:** Groups of perfect isometries
11:30–13:30 Lunch
Checkout by 12 noon.

** 5-day workshops are welcome to use BIRS facilities (2nd Floor Lounge, Max Bell Meeting Rooms, Reading Room) until 3 pm on Friday, although participants are still required to checkout of the guest rooms by 12 noon. **

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ABSTRACTS (in alphabetic order by speaker surname)

Speaker: **M. Broué** (Université Paris 7 Paris-Diderot)

Title: *TBA*

Abstract: TBA

Speaker: **O. Brunat** (Université Paris 7 Paris-Diderot)

Title: *On semisimple characters in finite reductive groups*

Abstract: Except for a few cases, the semisimple characters of a finite reductive group G are the irreducible characters with degree prime to the defining characteristic. In this talk, we will present some properties of these characters including the operation of the full automorphism group of G on them. This is a crucial step in the reduction theorem of the McKay conjecture to finite simple groups.

Speaker: **M. Cabanes** (Université Paris 7 Paris-Diderot)

Title: *McKay conjecture, some steps within the last step*

Abstract: The inductive McKay conjecture is a condition on non-abelian simple groups of which Isaacs-Malle-Navarro (2007) showed that it implies the McKay conjecture on p' character degrees. In this talk we will comment on some joint work with B. Spaeth about the checking of the inductive McKay conjecture for the tamest of the last simple groups of Lie type to be checked. The talk will revolve around the possible equivariance of the many correspondences of characters involved : Lusztig's Jordan decomposition, Broué-Malle-Michel's d -Harish Chandra theory for unipotent characters and Späth's maximal extensibility results. Possibly we will give hints at what kind of question the still unsolved cases could lead.

Speaker: **C. Eaton** (University of Manchester)

Title: *Groups of perfect isometries*

Abstract: This is work by my student Pornrat Ruengrot. We consider the group formed by taking all perfect isometries of a block with itself under composition, and examine properties of this block invariant.

Speaker: **A. Evseev** (Queen Mary, University of London)

Title: *A refinement of the McKay and Broué conjectures*

Abstract: The talk will present a possible new refinement of the McKay conjecture. Let P is a Sylow p -subgroup of a finite group G , and denote by $\text{Irr}_{p'}(G)$ the set of irreducible characters of G of degree not divisible by p . The refinement asserts that one may choose a one-to-one correspondence between $\text{Irr}_{p'}(G)$ and $\text{Irr}_{p'}(N_G(P))$ to be compatible with induction and restriction in a certain sense. I will also state a corresponding refinement of the Broué abelian defect group conjecture and will discuss the proposed refinements in some special cases.

Speaker: **M. Geck** (University of Aberdeen)

Title: *On the number of Brauer characters in the ℓ -blocks of finite groups of Lie type*

Abstract: TBA

Speaker: **D. Gluck** (Wayne State University)

Title: *Rational defect groups and 2-rational characters*

Abstract: Let D be a defect group of a 2-block B of a finite group G . We conjecture that if D is a rational group and $D' \leq Z(D)$, then the values of all irreducible characters in B lie in a cyclotomic field \mathbb{Q}_m , for

some odd integer m . We prove the conjecture when G is solvable or $|D| \leq 8$. Examples show that the condition $D' \leq Z(D)$ cannot be relaxed. In work in progress, we hope to prove the conjecture when B has maximal defect.

Speaker: **G. Hiss** (RWTH Aachen)

Title: *On the socle of an endomorphism algebra*

Abstract: TBA

Speaker: **S. Koshitani** (Chiba University)

Title: *Blocks of finite groups with small defect*

Abstract: We will be discussing one of the most interesting and essential problems in representation theory of finite groups, which goes back to R. Brauer. Namely the problem we are interested in is that, if a defect group P of a p -block A of a finite group G is given (here p is a prime), then what kind of information on A can we get? We will be looking at the problem for a specific relatively small P . This is really one of Global/Local Conjectures. This is joint work with R. Kessar and M. Linckelmann.

Speaker: **N. Kunugi** (Tokyo University of Science)

Title: *Scott modules and Morita equivalences for principal blocks of finite groups*

Abstract: I would like to give a talk on Morita equivalences for principal blocks induced by Scott modules. In particular, we consider equivalences for principal blocks of general linear groups in non-defining characteristic.

Speaker: **G. Malle** (Universität Kaiserslautern)

Title: *Quasi-isolated blocks of exceptional groups*

Abstract: I will speak on work in progress with Radha Kessar on the determination of quasi-isolated blocks of finite exceptional groups of Lie type for bad primes. Our work relies on the recent proof of the Mackey-formula for Lusztig induction by Bonnafé and Michel which allows to explicitly compute the decomposition of Lusztig induction in the cases of interest. Together with previous work of various authors, this completes the determination of all blocks of all finite quasi-simple groups. I will also explain two applications of these results to conjectures in representation theory.

Speaker: **G. Navarro** (University of Valencia)

Title: *Rational groups*

Abstract: TBA

Speaker: **B. Späth** (Université Paris 7 Paris-Diderot)

Title: *A reduction theorem of the Isaacs-Navarro-refinement of the McKay conjecture*

Abstract: In this talk I would like to introduce a new reduction theorem in the style of Isaacs-Malle-Navarro: assuming a slightly more complex condition on simple groups one can show that the Isaacs-Navarro-refinement of the McKay conjecture holds. Especially the conjecture holds for every prime and every group having an abelian Sylow 2-subgroup. Furthermore I want to sketch how this condition on the simple group can be verified for the simple groups of Lie type and the defining characteristic.

Speaker: **B. Srinivasan** (University of Illinois at Chicago)

Title: *On $GL(n, q)$ and the Heisenberg algebra*

Abstract: Recent developments in the modular representation theory of symmetric groups and Hecke algebras have led to connections with Lie theory. A main idea here is, for example, the action of an affine Kac-Moody algebra \widehat{sl}_e on the sum of the Grothendieck groups $\bigoplus_{n \geq 0} K_0(\text{mod-}FH_n)$, H_n the Hecke algebra of type A_{n-1} , F a field of characteristic 0. We consider an analogous situation for the representation theory of the finite general linear groups $GL(n, q)$. Let ℓ be a prime not dividing q and e the order of $q \bmod \ell$. Let \mathcal{C}_n be the category of unipotent representations of $GL(n, q)$ over $\overline{\mathbb{Q}}_\ell$ and let $\mathcal{C} = (\bigoplus_{n \geq 0} K_0(\mathcal{C}_n)) \otimes_{\mathbb{Z}} \overline{\mathbb{Q}}_\ell(v)$

be the sum of the Grothendieck groups of the categories \mathcal{C}_n for all n . Then $\mathcal{U}_v(\widehat{gl}_e)$ acts on this space. In particular the Heisenberg algebra acts on this space by certain operators v_k which are shown to be related to Deligne-Lusztig operators. Thus we have a connection between affine gl and finite GL .

Speaker: **P. H. Tiep** (University of Arizona)

Title: *Gluck-Wolf theorem for odd primes*

Abstract: TBA