Abstracts

Noriyuki Abe (University of Tokyo)

Title: A Hecke action on $G_1T$-modules

Abstract: Let $G$ be a connected reductive group over a field of characteristic $p$ and we assume that $p$ is greater than the Coxeter number. It is known that the wall-crossing functors defines a structure of a representation of the affine Weyl group on the Grothendieck group of the principal block of the category of algebraic representations of $G$. Riche-Williamson conjectured an existence of a categorification of this representation, namely an existence of an action of the Hecke category. We give an analogue of this categorification for $G_1T$-modules where $T$ is a maximal torus of $G$ and $G_1$ is the Frobenius kernel.

Pramod Achar (Louisiana State University)

Title: Tensor ideals of tilting modules

Abstract: The category of tilting modules of a reductive group is closed under tensor product, so it makes sense to ask for a classification of the tensor ideals in this category. I will explain a (partly conjectural) approach to this problem in terms of support varieties and cells in affine Weyl groups. I will focus in particular on $GL(n)$, where the conjectures imply a very explicit combinatorial solution to the problem. This is based on joint work with W. Hardesty and S. Riche.

Roman Bezrukavnikov (MIT)

Title: A new topological realization of the small quantum groups

Abstract: I will describe a work in progress (with Michael McBreen) where we identify a regular block in the category of small quantum group modules with a category that can be described as the category of microlocal sheaves on a certain affine Springer fiber. Here the specific technical incarnation of the "microlocal sheaves" concept is based on presenting the affine Springer fiber as a Hamiltonian reduction of a cotangent bundle. This is heuristically (though at present not technically) related to a conjecture of Shan-Vasserot and myself where this Springer fiber is used to describe the center of the small quantum group. Time permitting, I will also describe some ideas from a joint project with Pablo Boixeda Alvarez aimed at proving that conjecture.

Cédric Bonnafé (University of Montpellier)

Title: Drinfeld double of the braid group and unipotent characters II

Abstract: This is a common work with M. Broué, O. Dudas, J. Michel and R. Rouquier. This talk follows the talk given by O. Dudas, where he describes an action of the centralizer of an element in the braid group on the cohomology of the corresponding Deligne-Lusztig variety, and conjectures that this action fulfils some $SL(2,Z)$-equivariance property. In this second part, we propose to reverse the logic and show in several small examples how one can recover the unipotent characters as well as Lusztig Fourier transform just by using the conjectural $SL(2,Z)$-equivariance of this braid
group action. This context allows easily to replace the Weyl group by any Coxeter group or even any complex reflection group: again, in small examples, one recovers "unipotent characters" of complex reflection groups as defined by Broué-Malle-Michel, as well as the Fourier transform.

**Ana Caraiani** (Imperial College London)

Title: On the cohomology of locally symmetric spaces

Abstract: I will discuss some aspects of the cohomology of locally symmetric spaces for GL_n/F, where F is a CM field. I will focus on the relationship to the extension of the Taylor-Wiles method recently proposed by Calegari and Geraghty.

**Joe Chuang** (City University London)

Title: Dual realisation of blocks of symmetric groups

**Olivier Dudas** (University Paris 7)

Title: Drinfeld double of the braid group and unipotent characters I

Abstract: If G is a finite reductive groups with Weyl group W, and B is a finite Borel subgroup in G, then the Hecke algebra of W acts on the permutation module associated to G/B. In this talk I will explain Broué's idea for generalising this picture to Deligne-Lusztig varieties and how this fits into a vast program of understanding the modular representation theory of finite reductive groups up to derived equivalences.

This will be achieved by constructing braid group action on Deligne-Lusztig varieties fulfilling some SL(2,Z)-equivariance properties.

This is part of a joint work with Bonnafé, Broué, Michel and Rouquier.

**Jens Eberhardt** (University of California, Los Angeles)

Title: Motives in (Modular) Representation Theory

Abstract: Categories of mixed l-adic sheaves and mixed Hodge modules are indispensable tools in geometric representation theory. Recently, Soergel and Wendt proposed to replace those categories by motivic sheaves, which have a number of advantages. In this talk, I will give an overview of the state of this idea. I will explain how motivic sheaves can be used to construct an analogue of mixed l-adic sheaves and mixed Hodge modules both with rational coefficients (Soergel-Wendt, Soergel-Virk-Wendt) and modular coefficients (joint work with Shane Kelly). I will then explain how one can realise categories of representations of many "convolution" algebras (graded affine Hecke, KLR and Quiver Schur algebras) in terms of certain equivariant motivic sheaves. If time permits, I will present "exotic" categories of motivic sheaves, which may be of interest in representation theory, and state some open problems and conjectures.

**Amit Hazi** (City University London)

Title: Indecomposable tilting modules for the blob algebra

Abstract: The blob algebra is a quasi-hereditary quotient of the Hecke algebra of type $BS$, and one of the oldest examples of a diagram algebra. In this talk I will give a description of its
indecomposable tilting modules, a new result. I will also explain the connection between this result and KLR algebras, (diagrammatic) Soergel bimodules, and modular representation theory. This is based on joint work with Paul Martin and Alison Parker.

**Bao Viet Le Hung** (Northwestern University)

Title: Weights of automorphic forms, Galois representations, and modular representation theory, Part I

**Brandon Levin** (University of Arizona)

Title: Weights of automorphic forms, Galois representations, and modular representation theory, Part II

Abstract: Since the 70s, it has been observed that there is an abundance of congruences between modular forms of different weights. The weight part of Serre's conjecture seeks to classify all possible such congruences. Understanding this phenomenon (especially for higher rank groups) turns out to be naturally connected to the modular representation theory of finite groups of Lie type and the deformation theory of representations of Galois groups of p-adic fields. In these talks, we will discuss how one can study Galois deformation spaces via certain algebraic varieties that are closely linked to traditional objects in geometric representation theory (such as flag varieties and affine Springer fibers), and how the geometry and combinatorics of these varieties provide a bridge between modular representation theory and the above congruence phenomena.

**Carl Mautner** (University of California, Riverside)

Title: Modular representation theory of matroids

Abstract: In joint work with Tom Braden we defined for any matroid (e.g., for any graph) an analogue of the Schur algebra. Like the usual Schur algebra, our matroidal Schur algebras have interesting behavior over fields of small characteristic. In this talk I will describe the basic structure of these matroidal Schur algebras, our motivation for defining them and joint work in progress with Jens Eberhardt to categorify them.

**Gil Moss** (University of Utah)

Title: The Whittaker model of Serre's universal unramified module

Abstract: Let $F$ be a $p$-adic field, and let $I$ be a prime different from $p$. For certain primes $I$, the mod-$l$ representation theory of the $F$-points of reductive groups can exhibit very different behavior than the complex theory. By studying Serre's universal unramified module, we reveal the interplay between Whittaker models and systems of spherical Hecke eigenvalues for representations of $GL_n(F)$. The results can be applied toward the Ihara conjecture in the theory of mod-$l$ automorphic forms.

**Gabriel Navarro** (University of Valencia)

Title: Global/Local Conjectures in Finite Group Representation Theory

Abstract: The representation theory of finite groups is essentially centered on several fascinating conjectures due to Alperin, Brauer, Broué, Dade, and McKay. After many years, the only way that
we can see to prove these conjectures is to reduce them to (complicated) problems on simple groups, and then use the Classification (and a case by case analysis). While this approach continues to have great success, some still believe that there should be an "explanation" for all these conjectures. In this talk, we survey these problems hoping to inspire researchers from other areas to become interested in them.

**Simon Riche** (University of Clermont Auvergne)

Title: Characters and support varieties for tilting modules

Abstract: Tilting modules are an important class of representations of reductive algebraic groups over fields of positive characteristic. In this talk I will review recent progress on the description of various "invariants" one can attach to these modules, in particular their characters and support varieties, and outline some directions of future research.

**Raphael Rouquier** (University of California, Los Angeles)

Title: Finite groups as quantized loop groups

Abstract: I will give some evidence relating representations of finite groups of Lie type with loop groups and their geometry. A particular feature is the appearance of (q,t)-decomposition matrices, Hilbert schemes of points and toroidal Lie algebras.

**Peng Shan** (Tsinghua University)

Title: Center of \(G_1T\)-modules and cohomology of affine Springer fibres

Abstract: I will explain an isomorphism between the deformed center of \(G_1T\)-modules and the equivariant cohomology of an affine Springer fibre (joint work with Eric Vasserot).

**Jack Thorne** (University of Cambridge)

Title: Congruences between automorphic forms

Abstract: Congruences form the foundation of applications of the theory of automorphic forms to number theory. They are closely linked with the mod l representation theory of p-adic groups. I will discuss some of the open questions in this area.