SAMI ASSAF
MIT

Affine dual equivalence

We will describe an equivalence relation on starred strong tableaux that generalizes Haiman's dual equivalence on standard Young tableaux and show how this gives a formula for the Schur expansion of the k-Schur functions introduced by Lapointe, Lascoux and Morse. This is joint work with Sara Billey.

JASON BANDLOW
University of Pennsylvania

The Murnaghan-Nakayama rule for k-Schur functions

I will present a Murnaghan–Nakayama rule for the k-Schur functions of Lascoux, Lapointe, and Morse. This is an explicit formula for the expansion of the product of a power sum symmetric function and a k-Schur function in terms of k-Schur functions. It generalizes the usual Murnaghan–Nakayama which gives the Schur expansion of the product of a power sum symmetric function and a Schur function as an alternating sum computed by adding ribbons to a partition diagram. Our work will be stated and proved in terms of the noncommutative k-Schur functions introduced by Lam, and the combinatorics of k-tableaux, introduced by Lapointe and Morse. This is joint work with Anne Schilling and Mike Zabrocki.

ELIZABETH BEAZLEY
University of Michigan

Quantum Schubert Calculus and Maximal Newton Polygons

Fulton and Woodward described minimal monomials in the quantum parameters occurring in the quantum product of two Schubert classes in QH(G/P). In the case of G/B, Postnikov interpreted the unique minimal monomial occurring in such a quantum product in terms of directed paths in the quantum Bruhat graph. The primary goal of this talk will be to explain how these minimal monomials in QH(G/B) arise in solving another combinatorial problem of computing the maximal Newton polygon associated to a given affine Weyl group element. More specifically, we can associate a two-dimensional Newton polygon to an element in GL(n) over certain fields of formal Laurent series. If we restrict to the set of Newton polygons which come from group elements in a fixed stratum of the affine Bruhat decomposition, there will be a unique maximal associated Newton polygon. The combinatorial formula for computing these maximal Newton polygons coincides with that for determining the unique minimal monomial in the product of two quantum schubert classes.

CHRIS BERG
York University, Fields Institute

A bijection on core partitions

I will introduce a bijection on core partitions. The bijection can be simply described on Young diagrams and can be viewed in terms of the Lapointe-Morse bijection between k+1-cores and k-bounded partitions. I will describe some other settings in which the bijection arises and some applications.

JONAH BLASIAK
University of Chicago

Canonical bases for k-atoms

It is classically known that the ring of coinvariants $\mathbb{C}[y_1, \ldots, y_n]/(e_1, \ldots, e_n)$, thought of as an $\mathcal{S}_n$-module with $\mathcal{S}_n$ acting by permuting the variables, is a graded version of the regular representation of $\mathcal{S}_n$. However, how a decomposition of the coinvariants into irreducibles is compatible with its ring structure remains a mystery. In particular, Li-Chung Chen conjectures that the k-atoms of Lascoux, Lapointe, and Morse are the graded characters of certain subquotients of this ring. We describe a promising approach to understanding such subquotients using the canonical basis of the extended affine Hecke algebra. We show that a subalgebra of this Hecke algebra has a cellular subquotient which is a q-analog of the ring of coinvariants and, further, that this subquotient has cellular quotients which are q-analogs of Garsia-Procesi modules. We conjecture that Chen's subquotients for k-atoms arise as cellular submodules of these Garsia-Procesi modules. This cellular picture gives a clear explanation of the appearance of cyclage and catabolism in the combinatorial description of Garsia-Procesi modules and may shed light on the combinatorics of k-atoms as well.

MICHAEL EHRIG
Mathematisches Institut der Universität zu Köln

Categorification of quantum sl(n) tensor products and KR-crystals

GHISLAIN FOURIER
Mathematisches Institut der Universität zu Köln

Another basis and pattern for irreducible A_n-Modules

We have a natural filtration on the universal envelopping algebra of a simple Lie algebra, the degree filtration. This induces the PBW filtration on an irreducible module of this Lie algebra. In this talk, we will give generators and relation for the associated graded module of an irreducible A_n -module. As a byproduct we obtain a new class of pattern and basis for irreducible A_n module, conjectured by Vinberg.

STEVEN GRIFFETH
University of Edinburgh

Representation theory and Hilbert schemes of points on surfaces

The first part the talk is an introduction to the work of many mathematicians linking representation theory of Cherednik algebras to the geometry of Hilbert schemes of points on A_n resolutions of singularities. The second part is about my joint work with Charles Dunkl, which uses vector-valued analogs of Jack polynomials to tighten this connection.

JOEL KAMNIZTER
University of Toronto

Mirkovic-Vilonen cycles and MV basis

Mirkovic-Vilonen cycles are a family of subvarieties of the affine Grassmannian, which under the geometric Satake correspondence give a basis for representations of reductive groups. In my talk, I will begin with older work giving a description of MV cycles using MV polytopes. Then I will explain more recent results, joint with Pierre Baumann, on properties of the resulting MV basis. In particular, I will explain how to compute the action of E_i on this basis using intersection theory on the affine Grassmannian.

THOMAS LAM
University of Michigan

From k-Schur functions to quantum Schubert polynomials via the Toda lattice

CHANGZHENG LI
Korea Institute for Advanced Study

Relationships between quantum cohomology of complete and partial flag varieties.

There is a deep relationship between homology of based loop groups and quantum cohomology of complete flag varieties, which was discovered by Peterson and proved by Lam-Shimozono. In this talk, I will show a natural filtration on quantum cohomology of a complete flag variety G/B, which respects the quantum product structure and specializes to the classical filtration on the cohomology of G/B. It will be interesting to study similar phenomenon for based loop groups.

REIHO SAKAMOTO
University of Tokyo

Combinatorics of a tropical integrable model

Box-Ball System (BBS) is a typical example of the tropical (or ultradiscrete) integrable systems. The model possesses connections with many other branches of mathematics, including crystal bases of the quantum affine algebras and tropical algebraic geometry. In this talk, I will survey some combinatorial aspects of the BBS. In particular, (1) connection with the rigged configurations, (2) tropical tau functions (generalization of the energy statistics) and their piecewise linear formula, (3) a possible connection with the Macdonald polynomials.

LUIS SERRANO
University of Michigan

Noncommutative Schur functions

Fomin and Greene have introduced noncommutative Schur functions as a tool to find Schur expansions for several known Schur positive functions, such as Stanley symmetric functions, stable Grothendieck polynomials, etc. In this talk we will discuss their approach, and show some results aimed at developing a similar theory for other types.

HUGH THOMAS
University of New Brunswick

A Littlewood-Richardson rule for the equivariant cohomology of Grassmannians

I will discuss recent joint work with Alex Yong, in which we give a Littlewood-Richardson rule for the equivariant cohomology of Grassmannians, in terms of (a modified version of) jeu de taquin. There are other Littlewood-Richardson rules known (Knutson-Tao puzzles, for example) but our approach lends itself to extensions to equivariant K-theory (where we have a conjecture) and potentially also to other types.

PETER TINGLEY
MIT

Affine sl(n) crystals and fusion rules

We will discuss some combinatorial realizations of integrable affine sl(n) crystals. This has applications to the fusion ring of integrable highest weight representations at a fixed level k. In particular we see a very simple explanation of level-rank duality.