Symmetry in Algebra, Topology, and Physics
La symétrie en algèbre, en topologie et en physique

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NICOLÁS ANDRUSKIEWITSCH, Universidad Nacional de Córdoba, Argentina

Finite-dimensional Lie algebras arising from Nichols algebras of diagonal type

Let B be a finite-dimensional Nichols algebra of diagonal type over an algebraically closed field of characteristic 0. The distinguished pre-Nichols algebra of B, introduced and studied in [4], has several nice properties including finite GK-dimension and action of the Weyl groupoid. Its graded dual, called the Lusztig algebra of B, was subsequently introduced and studied in [1]. We will outline these constructions. Then we will present the Lusztig algebra as an extension (as braided Hopf algebras) of B by the universal enveloping algebra of a graded nilpotent Lie algebra, that is the positive part of a semisimple Lie algebra, that is determined in all cases.

References: [1] N. Andruskiewitsch, I. Angiono and F. Rossi Bertone. The divided powers algebra of a finite-dimensional Nichols algebra of diagonal type. Math. Res. Lett., to appear.

[2] N. Andruskiewitsch, I. Angiono and F. Rossi Bertone. A finite-dimensional Lie algebra arising from a Nichols algebra of diagonal type (rank 2). Bull. Belg. Math. Soc. Simon Stevin 24 (1) (2017), 15-34.

[3] N. Andruskiewitsch, I. Angiono and F. Rossi Bertone. Lie algebras arising from Nichols algebras of diagonal type.

[4] I. Angiono. Distinguished Pre-Nichols algebras. Transf. Groups 21 (2016), 1-33.

VYJAYANTHI CHARI, UC Riverside

SEAN CLARK, Northeastern University

Canonical bases for quantized general linear and orthosymplectic Lie superalgebras

One of the most remarkable features of quantized enveloping algebras is the Kashiwara-Lusztig basis, which has fundamental connections to combinatorics, geometry, and categorified representation theory. In recent years, some progress has been made in constructing analogues of these bases in quantized enveloping superalgebras. However, this setting has significant complications over the non-super case, which have so far prevented a general approach to constructing such bases.

In this talk, I will discuss an ad-hoc strategy, using braid isomorphisms lifting the Weyl groupoid, for the construction of canonical bases in the half-quantum groups associated basic type Lie superalgebras, in the case of positive root systems whose simple roots satisfy $(\alpha_i, \alpha_j) \leq 0$ for $i \neq j$ (a condition which does not hold for all choices of simple roots of Lie superalgebras). I will discuss how this strategy works for types A and D, and is conjectured to work for such root systems in all types. Time permitting, I will discuss the obstructions to generalizing this strategy.

BEN COOPER, University of Iowa

The Hall algebras of surfaces

This is a continuation of Peter Samuelson's talk. A rigorous framework for the study of the Hall algebras of Fukaya categories of surfaces will be discussed. We show that the HOMFLY-PT skein relation arises naturally in this context. Extensions and ramifications will be discussed. (joint with P. Samuelson)

VYACHESLAV FUTORNY, University of Sao Paulo

Algebras of invariant differential operators and their representations

We will discuss algebras of G-invariant differential operators on affine space and on a torus for a complex reflection group G. In particular, we address the Noncommutative Noether's Problem for the invariants of Weyl algebras and their representations. The talk is based on recent joint results with F.Eshmatov and J.Schwartz.

EUGENE GORSKY, University of California, Davis

Khovanov-Rozansky homology and the flag Hilbert scheme

Jucys-Murphy elements are known to generate a maximal commutative subalgebra in the Hecke algebra. They can be categorified to a family of commuting complexes of Soergel bimodules. I will describe a relation between a category generated by these complexes and the category of sheaves on the flag Hilbert scheme of points on the plane, using the recent work of Elias and Hogancamp on categorical diagonalization. As an application, I will give an explicit conjectural description of the Khovanov-Rozansky homology of torus links. The talk is based on a joint work with Andrei Negut and Jacob Rasmussen.

REIMUNDO HELUANI, IMPA

Chiral homology and rationality of vertex algebras

I will discuss a question of Beilinson and Drinfeld regarding the vanishing of the higher chiral homology of V (the integrable quotient of the affine Kac-Moody vertex algebra at positive integral level). In particular I will describe an approach (joint with J. Van Ekeren) that relates this question in the particular case of Elliptic curves to classical homological constructions on the Zhu algebra of V.

MATT HOGANCAMP, University of Southern California

Categorical Diagonalization

I will discuss recent joint work with Ben Elias in which we develop a theory of diagonalization of functors. We apply our theory to the diagonalization of the full-twist Rouquier complex acting on Soergel bimodules in type A, resulting in categorifications of Young idempotents, both primitive and central. I will also discuss the relevance of this construction to the higher representation theory of Hecke algebras.

JOEL KAMNITZER, University of Toronto

Crystals and monodromy of Bethe vectors

The Gaudin algebra acts on invariant vectors in tensor products of representations of semisimple Lie algebras; its eigenvectors are called Bethe vectors. The Gaudin algebra depends on a parameter z which lives in the moduli space M_n of genus 0 curves. We study the monodromy of these Bethe vectors as z varies inside the real locus $M_n(\mathbb{R})$. We show that their monodromy is given by the action of the cactus group on the corresponding tensor product of crystals.

MIKHAIL KHOVANOV, Columbia University

How to categorify the ring of integers localized at two

In the talk we will describe a triangulated monoidal Karoubi closed category with the Grothendieck ring isomorphic to the ring of integers with 2 inverted. This is a joint work with Yin Tian.

JON KUJAWA, University of Oklahoma

Webs of Type Q

In recent years there is interest in describing categories diagrammatically. In an early example of this philosophy, twenty years ago Kuperberg described representations of rank 2 Lie algebras via diagrams he called "webs". Recently webs have been generalized to various settings. In this talk we describe the analogue of webs for type Q Lie superalgebras. This is joint work with Gordon Brown.

DAVID PLAZA, Universidad de Talca
Homomorphisms between cell modules of the endomorphisms ring of a Bott-Samelson bimodule.

In this talk we explain how the endomorphisms ring of a Bott-Samelson bimodule fits into the framework of graded cellular algebras. Then, we show how to construct certain injective homomorphisms between cell modules. This allows us to provide a proof of the monotonicity conjecture for Kazhdan-Lusztig polynomials.

RITA JIMÉNEZ ROLLAND, Universidad Nacional Autónoma de México
Representation stability and convergence of point-counting

In this talk I will consider some families of varieties with actions of certain finite reflection groups – varieties such as the hyperplane complements or complex flag manifolds associated to these groups. The cohomology groups of these families stabilize in a precise representation-theoretic sense. I will explain these stability patterns and how to combine them with results of Grothendieck and Lehrer to establish asymptotic stability of certain point-counts over finite fields. This is joint work with Jennifer Wilson.

DAVID ROSE, University of North Carolina
Traces and link homology

Given an endomorphism T of a vector space V, we will describe a general procedure which uses categorical traces to produce homology theories for closures of braids β, viewed as links in the solid torus. For special choices of (V, T), the homology gives an invariant of the associated link $\mathcal{L}_\beta \subseteq S^3$. Specific values of (V, T) recover known link homology theories (e.g. Khovanov-Rozansky homology and its annular relatives), while others produce new invariants. This is joint work with Queffelec and Sartori.

PETER SAMUELSON, University of Edinburgh
Hall algebras and skein theory

The Hall algebra of an abelian category is spanned by isomorphism classes of objects, with the multiplication defined by "counting extensions." Skein algebras of surfaces are spanned by links in a thickened surface, with multiplication defined by stacking. We discuss a result that the skein algebra of the torus is isomorphic to the Hall algebra of an elliptic curve. In light of homological mirror symmetry, this work motivates the study of the Hall algebras of Fukaya categories of surfaces, which will be discussed further in Ben Cooper's talk. (joint with H. Morton and B. Cooper)

MONICA VAZIRANI, UC Davis
The "Springer" representation of the DAHA

Building on the work of Calaque-Enriquez-Etingof, Lyubashenko-Majid, and Arakawa-Suzuki, Jordan constructed a functor from quantum D-modules on the special linear group to representations of the double affine Hecke algebra (DAHA) in type A.

In work in progress, our preliminary findings show when we input the so-called quantum Springer sheaf at parameter kN the output is roughly a k-thickened version of the regular representation of S_N. Part of this work is defining what the quantum Springer sheaf is, and through Jordan's functor we gain a greater understanding of its structure. This is joint work with David Jordan.