

HOPF ALGEBRAS AND RELATED TOPICS
FEBRUARY 14-16, 2009
ABSTRACTS

Nicholas Andruskiewitsch (Universidad Nacional de Cordoba)

Pointed Hopf algebras over non-abelian groups

I will report on recent work in collaboration with F. Fantino, M. Grana, L. Vendramin and S. Zhang where we show that there are very few finite-dimensional pointed Hopf algebras with group isomorphic either to the symmetric, alternating or (some) sporadic groups.

Yuri Bahturin (Memorial University of Newfoundland)

Group gradings on simple Lie and Jordan algebras

I will report on some new results in the entitled area obtained using Hopf algebras, Affine group schemes and Functional identities.

Georgia Benkart (UW - Madison)

Travels to hyperbolic space starting from an $\mathfrak{sl}(2)$ base

This talk will feature various bases for $\mathfrak{sl}(2)$ and connections with braid group representations and hyperbolic Weyl groups

Miriam Cohen (Ben Gurion University)

Symmetric Hopf algebras and a Verlinde-type formula.

We use results about symmetric algebras to study certain characters of symmetric Hopf algebras. One consequence is a Verlinde-type formula.

Shlomo Gelaki (Technion - Israel Institute of Technology)

Fusion categories applied to Hopf algebras

I will review some recent developments in the theory of fusion categories which, in particular, lead to new results on semisimple Hopf and quasi-Hopf algebras.

Jane Kashina (DePaul University)

Frobenius-Schur indicators for Hopf algebras

In 2000 Susan Montgomery and her student Vitaly Linchenko generalized the notion of Frobenius-Schur indicators from groups to semisimple Hopf algebras. In this talk we will discuss the history and developments of this topic as well as some recent applications.

Martin Lorenz (Temple University)

Prime ideals and group actions

Given a rational action of an algebraic group G on an associative algebra R , one obtains the so-called G -stratification of the spectrum of all prime ideals of R . This stratification has recently been analyzed in detail for various quantized coordinate rings R with suitable torus actions.

In this talk, I will discuss the G -stratification for arbitrary G and R . It turns out that the fibres can always be described by commutative spectra. Particular attention will be given to the role of “rational” ideals. The results presented give a positive answer, for arbitrary algebras, to an old problem of Dixmier’s that was originally stated for enveloping algebras of finite-dimensional Lie algebras.

Geoff Mason (UC - Santa Cruz)

Remarks on the McKay Conjecture

The McKay Conjecture is a well-known open problem about the representations of a finite group. We discuss a broader setting in which it can be considered.

Sonia Natale (Universidad Nacional de Cordoba)

Hopf algebra extensions of group algebras and Tambara-Yamagami categories

An important problem related to the classification of semisimple Hopf algebras was the question of deciding the existence of examples which were not group-theoretical. Recently, this question has been answered by Nikshych, who constructed a family of semisimple Hopf algebras which are not group-theoretical as an extension of the algebra of functions on the group \mathbb{Z}_2 by a twisted group algebra $(kG)^J$. In this talk we shall consider Hopf algebra extensions of a triangular semisimple Hopf algebra A by the group \mathbb{Z}_2 , which are in a sense dual to those mentioned before. We describe the (co-)representation theory of such Hopf algebras, which generalizes at the Hopf algebra level, the so-called Tambara-Yamagami categories. We relate the construction to the notion of G -equivariantization of fusion categories. Finally, we show how the structure of such Hopf algebra is determined by certain group-theoretical data.

Don Passman (UW - Madison)

Invariant ideals in group algebras of commutative groups

When studying the ideal structure of certain group algebras, the following problem arises. Let $K[A]$ be the group algebra of an abelian group A , and let G be a group of automorphisms of A . Then G acts on $K[A]$, and the goal is to find the G -stable ideals of $K[A]$. Of particular interest is the case where G is a locally finite simple group or perhaps just close to being simple. In this talk, I will discuss some known results and mention some open problems.

David Radford (University of Illinois - Chicago)

Representations of Certain Classes of Hopf Algebras

Let k be an algebraically closed field of characteristic 0. Recent classification results for certain large classes of pointed Hopf algebras by Andruskiewitsch and Schneider show that generalizations of quantized enveloping algebras and the small quantum groups of Lusztig cover quite a bit of ground.

We discuss a generalization of the complete reducibility theorem for the quantized enveloping algebras and other complete reducibility theorems for them. In some cases arguments follow those in Lusztig's book very closely. This is nearly completed work of Andruskiewitsch, Radford, and Schneider.

We will also describe a basic class of modules which is at the heart of the theory of simple modules for our Hopf algebras of interest. This is based on joint work of Radford and Schneider.

Hans-Jurgen Schneider (Universität München)

Hopf algebras and root systems

In 1995 Susan Montgomery showed that any pointed Hopf algebra is a crossed product of a link indecomposable Hopf algebra and a group algebra. Thus the structure of pointed Hopf algebras can be reduced to the link indecomposable case. She pointed out the question as to which finite groups occur as groups of link indecomposable pointed Hopf algebras. Very few such groups are known. The question can be reformulated as a question on finite-dimensionality of Nichols algebras over finite groups. I will talk on recent work with Istvan Heckenberger giving a new method to contribute to this question. We associate a generalized root system to the Nichols algebra of a finite direct sum V of irreducible Yetter-Drinfeld modules. In recent joint work with N. Andruskiewitsch we define reflections of a Weyl groupoid of the Nichols algebra of V . Using the theory of root systems we show that the Nichols algebra is finite-dimensional if and only if the Weyl groupoid is finite and the Nichols algebras of the irreducible components of Yetter-Drinfeld modules obtained by iterated reflections from V are finite-dimensional. As an application we construct new examples of finite-dimensional Nichols algebras. Since 10 years these are the first new such examples.

Peter Schauenburg (Universität München)

Generalized Frobenius-Schur indicators for fusion categories

I will report on joint work with Siu-Hung Ng on the latest stage in a long series of generalizations of the classical Frobenius-Schur indicators. Sommerhäuser and Zhu have defined equivariant (under the modular group) indicators for modules over a semisimple Hopf algebra and used them to prove that the kernel of the action of the modular group afforded by the modular category of modules over the Drinfeld double is a congruence subgroup. We can generalize this to the setting of spherical fusion categories by giving a categorical version of generalized indicators and investigating their properties.

Lance Small (UC - San Diego)

Centralizers in Affine Domains

We will discuss some recent results of Bell on centralizers in affine domains of low GK dimension as well as some general results on the transcendence degrees of maximal subfields of the quotient division rings of affine domains.

Efim Zelmanov (UC - San Diego)

On classification of quantum groups over polynomials

Let \mathfrak{g} be a simple finite dimensional Lie algebra over \mathbb{C} . We will discuss

- (1) a complete classification of formal solutions of the Classical Yang-Baxter equation over $\mathfrak{g}[[x]]$,
- (2) classification of quantum groups over the polynomial algebra $\mathfrak{g}[x]$.

This is joint work with F.Montaner and A.Stolin.