Hopf Algebras and Monoidal Categories

Book of Abstracts

Ferrara, September 3 to 6, 2024

Contents

1 Marcelo Aguiar

Cornell University

The Eckmann–Hilton argument in duoidal categories

Abstract. We will go over the basics of duoidal categories, illustrating with a number of examples. As monoidal categories provide a context for monoids, duoidal categories provide one for duoids and bimonoids. Our main goal is to discuss a number of versions of the classical Eckmann–Hilton argument which may be formulated in this setting. As an application we will obtain the commutativity of the cup product on the cohomology of a bimonoid with coefficients in a duoid, an extension of a familiar result for group and bialgebra cohomology.
The talk borrows on earlier work in collaboration with Swapneel Mahajan on the foundations of duoidal categories (2010). The main results are from ongoing work with Javier Coppola. We also rely on work of Richard Garner and Ignacio López-Franco (2016). □

2 Nicolás Andruskiewitsch

National University of Córdoba

Noetherian enveloping algebras of simple graded Lie algebras

Abstract. We will show that the universal enveloping algebra of an infinite-dimensional simple $\mathbb{Z}^n$-graded Lie algebra is not Noetherian, a partial answer to a well-known conjecture that is unavoidable for the classification of Noetherian Hopf algebras. This is joint work with Olivier Mathieu. □

3 Andrea Appel

University of Parma

The R-matrix of affine Yangians

Abstract. The theory of Yangians was introduced by Drinfeld in the 1980s as a systematic approach to solving the Yang–Baxter equation: every irreducible finite-dimensional representation is equipped with a rational R-matrix obtained by normalising the action of the universal R-matrix. Drinfeld's proof of the existence of the universal R-matrix for Yangians of finite type was non-constructive and cohomological in nature. In this talk, I will present an alternative, explicit, and more general construction, which extends to the case of Yangians of affine type and their representations in category O. This is based on a joint work with S. Gautam and C. Wendlandt. □

4 Paolo Aschieri

University of Eastern Piedmont

Metric compatibility and Levi-Civita connections on quantum groups

Abstract. We consider the problem of Levi-Civita connections of arbitrary metrics on noncommutative spaces. After reviewing the triangular quantum group and the associated quantum (homogeneous) algebras cases we study the case of arbitrary Hopf algebras. In the context of Woronowicz bicovariant differential calculi we show how connections on one forms or vector fields extend to the braided symmetric tensor product of forms or vector fields. This allows to define a metric compatibility condition between an arbitrary connection (not necessarily a bimodule connection) and an arbitrary braided symmetric metric. The metric compatibility condition and the torsion free condition are solved for metrics conformal to central and equivariant metrics provided the braiding given by the differential calculus is diagonalizable (and an associated map invertible). Thus, existence and uniqueness of the Levi-Civita connection on a quantum group for this class of metrics that are neither central nor equivariant is proven. This includes the $SL_q(2)$ example. □

5 Ken Brown

University of Glasgow

Twisted unipotent groups

Abstract. I will explain recent results of Shlomo Gelaki and myself on the structure and representation theory of the Hopf algebras obtained by deforming the coordinate ring of a unipotent group using a Hopf 2-cocycle. □

6 Tomasz Brzeziński

Swansea University & University of Białystok

Lie algebra fibred affine spaces

Abstract. Vector space valued Lie brackets on affine spaces or Lie affgebras were introduced by Grabowska, Grabowski and Ubrański in early 2000s. With the recent developments of heaps and heaps of modules, it has become clear how to extend this definition to affine space valued Lie brackets on affine spaces. In this talk I will present basic elements of the Lie affgebra theory, focusing on the two-way relationship between Lie affgebras and Lie algebras which allows one to view Lie affgebras as Lie algebra fibered affine spaces. The results presented in this talk have been obtained in collaboration with Ryszard Andruszkiewicz, James Papworth and Krzysztof Radziszewski. □

7 Daniel Bulacu

University of Bucharest

Double biproduct quasi-quantum groups

Abstract. We characterize double byproducts as ordinary byproducts, and show that their deformations by 2-cocycles are double wreath quasi-quantum groups. Also, we present examples of 2-cocycles from almost skew pairings in categories of Yetter–Drinfeld modules and show that various types of quasi-quantum groups known in the literature are of this type (joint work with Daniel Popescu and Blas Torrecillas). □

8 Stefaan Caenepeel

Vrije Universiteit Brussel

Multi monads in 2-categories

Abstract. We introduce multi monads (or monads with several objects) in a 2-category (or bicategory). These are given by a one-cells $A_{ab} : b \to a$, where a and b run over a subclass of the class of objects of the 2-category, with appropriate (multiplication and unit) structure maps. A monad with one object turns out to be a monad in the classical sense. Enriched categories appear as examples, and also Morita contexts are examples. Modules over multi monads can be introduced. Dually, one can introduce multi comonads and comodules. Multi Frobenius monads are at the same time multi monads and comonads, with appropriate compatibility conditions. We generalise some classical properties: modules over a Frobenius multi monad are equivalent to comodules; multi Frobenius monads have a self dual property. □

9 Juan Cuadra

University of Almería

Constructing integral Hopf orders in twists of certain group algebras

Abstract. In [1] and [2], we found an arithmetic difference between group algebras and semisimple Hopf algebras in connection with Kaplansky's sixth conjecture. Namely, *there are complex semisimple Hopf algebras that do not admit an integral Hopf order*. We provided more instances of this phenomenon in [3]. All the examples studied are twists of group algebras in Movshev's way.

In this talk, we will bring a new perspective on this topic. We will present a group-theoretical condition under which a twist of a group algebra admits an integral Hopf order.

The results we will expound are part of the work [4] in collaboration with Ehud Meir (University of Aberdeen, United Kingdom).

References

[1] J. Cuadra and E. Meir, *On the existence of orders in semisimple Hopf algebras*. Trans. Amer. Math. Soc. 368 (2016), 2547-2562.

[2] _____, *Non-existence of Hopf orders for a twist of the alternating and symmetric groups*. J. London Math. Soc. (2) 100 (2019), 137-158.

[3] G. Carnovale, J. Cuadra, and E. Masut, *Non-existence of integral Hopf orders for twists of several simple groups of Lie type*. Publ. Mat.68 (2024), 73-101.

[4] J. Cuadra and E. Meir, *Existence of integral Hopf orders in twists of group algebras*. ArXiv:2211.00097.

□

10 Walter Ferrer Santos

Universidad de la Repùblica, Uruguay

Hopf sheaves and representation of non affine schemes

Abstract. We introduce the notion of *Hopf sheaf on an abelian variety* and prove the existence of a contravariant equivalence between the category of *faithful commutative Hopf sheaves* on a given abelian variety A, and the category of affine extensions of A, generalizing in this manner the well-known *op*–equivalence between commutative Hopf algebras and affine group schemes. We develop a representation theory for the Hopf sheaves and prove that if $q_{\mathcal{H}} : G_{\mathcal{H}} \to A$ is the affine extension associated to $\mathcal{H}$ (a Hopf sheaf on A), then the category of q-coherent $\mathcal{H}$–comodules is equivalent to the category of representations of $q_{\mathcal{H}}$. Our exposition will center in the algebraic aspects of the theory with special emphasis in the monoidality of the constructions. □

11 William Hautekiet

Université Libre de Bruxelles

Partial Yetter–Drinfel'd modules

Abstract. Partial modules over a Hopf algebra are a generalization of usual modules: the action should no longer be associative, but only *partially* associative. These were introduced in [1] and can be thought of as a linearization and generalization of partial actions of groups.
The category of partial modules is a *biactegory* over the category of global modules over H: the tensor product of a partial module and a global module is again a partial module. Looking at the relative center of this biactegory, we obtain a category of *partial Yetter–Drinfel'd modules* ${}_{H_{par}}\mathcal{YD}^H$, which is monoidal, but not braided. We prove a partial module version of a theorem of T. Brzeziński and G. Militaru [2]: if A is a "commutative" algebra in ${}_{H_{par}}\mathcal{YD}^H$, then the partial smash product $A\underline{\#}H$ has the structure of a Hopf algebroid. Joint work with Eliezer Batista (Universidade Federal de Santa Catarina) and Joost Vercruysse (Université Libre de Bruxelles).

[1] M. M. S. Alves, E. Batista, J. Vercruysse, *Partial representations of Hopf algebras*, J. Algebra 426 (2015), 137–187.

[2] T. Brzeziński, G. Militaru, *Bialgebroids, $\times_A$-bialgebroids and duality*, J. Algebra 251 (2022), 279–294.

□

12 Malgorzata Hryniewicka

University of Białystok, Poland

Hopf braces, Hopf trusses and Hopf heaps

Abstract. Here C denotes a coalgebra with counit (C, Δ, ε). A left Hopf truss consists of:

$(*)$ a coalgebra C with two algebra structures such that one makes C into a Hopf algebra $(C, \cdot, 1, \Delta, \varepsilon, S)$ and the other into a nonunital bialgebra $(C, \circ, \Delta, \varepsilon)$,

$(**)$ connected by a coalgebra endomorphism $\sigma\colon C \to C$ such that $x \circ (y \cdot z) = \sum (x_1 \circ y) \cdot S\sigma(x_2) \cdot (x_3 \circ z)$ holds for all $x, y, z \in C$.

An equivalent formulation of the statement $(**)$ is:

$(***)$ define a ternary operation $[-,-,-]\colon C \otimes C^{\mathrm{cop}} \otimes C \to C$ by $[x, y, z] = x \cdot S(y) \cdot z$ for all $x, y, z \in C$. Then $x \circ [y, z, t] = \sum [x_1 \circ y, x_2 \circ z, x_3 \circ t]$ holds for all $x, y, z, t \in C$.

A ternary operation defined in the statement $(***)$ makes C into a Hopf heap $(C, \Delta, \varepsilon, [-,-,-])$. A Hopf heap consists of a coalgebra C with a coalgebra homomorphism $\chi\colon C \otimes C^{\mathrm{cop}} \otimes C \to C$, $x \otimes y \otimes z \mapsto [x, y, z]$ such that $[[x, y, z], t, u] = [x, y, [z, t, u]]$ and $\sum [x_1, x_2, y] = \sum [y, x_1, x_2] = \varepsilon(x) y$ hold for all $x, y, z, t, u \in C$.

This talk is intended as a discussion of Hopf trusses and Hopf heaps. □

13 Yevgenia Kashina

DePaul University

Yetter–Drinfel'd Hopf Algebras, Biproducts, and Extensions

Abstract. In previous work, together with Yorck Sommerhäuser, we have constructed a certain family of eight-dimensional semisimple Yetter–Drinfel'd Hopf algebras over the Klein four-group. As every Yetter–Drinfel'd Hopf algebra, these algebras also give rise to ordinary Hopf algebras via the Radford biproduct construction. The arising semisimple Hopf algebra has dimension 32 and therefore can, as every semisimple Hopf algebra of prime power dimension, alternatively be constructed as a Hopf algebra extension. We determine all possible ways in which this can be done. In particular, we show that it cannot be constructed as a cocentral abelian extension of prime index. We also observe that the set of all possible extensions carries certain symmetries that suggest that the Hopf algebra might be self-dual. The talk is based on joint work with Yorck Sommerhäuser, who will give the subsequent talk and will in particular settle the self-duality question. □

14 Christian Kassel

University of Strasbourg & CNRS

A problem of Noether extended to Hopf algebras

Abstract. Let G be a finite group and k a field. Consider the purely transcendental extension K of k generated by variables $t(g)$ indexed by the elements of the group; the group G acts on K by $h \cdot t(g) = t(hg)$. In an article published in 1917 Emmy Noether asked whether the subfield of G-invariant elements of K is also a purely transcendental extension of k. It is known that the answer depends on the group G and the base field k. In my lecture I'll show how to extend Noether's problem to all finite-dimensional Hopf algebras and present a theorem which asserts that the answer to the generalized Noether problem is positive for all finite-dimensional pointed Hopf algebras. This is joint work with Akira Masuoka (University of Tsukuba). □

15 Vladislav Kharchenko

National Autonomous University of Mexico

Quantizations as quadratic-linear Koszul algebras

Abstract. The Koszul algebras arise in many areas of the modern mathematics: algebraic geometry, representation theory, noncommutative geometry, topology, number theory, theory of pseudoroots of noncommutative polynomials. We prove that in q-Weyl generators the multi-parameter Drinfeld–Jimbo quantizations of type A_n^+ and B_n^+ are quadratic-linear Koszul algebras. At the same time, the quantization of type G_2^+ is a quadratic-linear algebra but not a quadratic-linear Koszul algebra. □

16 Christian Lomp

University of Porto

Locally finite dimensional representations over some Noetherian Hopf algebras

Abstract. In 1960, Eben Matlis showed that the injective hull of a simple module over a commutative Noetherian ring is Artinian. Matlis' result does not extend to arbitrary non-commutative Noetherian rings. However, there are some interesting classes of Noetherian K-algebras for which the injective hull of finite-dimensional simple modules still satisfies some finiteness conditions, such as being locally finite-dimensional. Our study was motivated by various results in the literature: let G be a polycyclic-by-finite group and $K[G]$ its group ring over a field K. In 1982, Stephen Donkin showed that any injective hull of a finite-dimensional $K[G]$-module is locally finite-dimensional (Donkin attributes this result to Ken Brown). Interest in this question actually dates back to works by Philip Hall and J. E. Roseblade from the 1960s and 1970s on finitely generated soluble groups. In this talk, based on a joint paper with Can Hatipoglu, we provide necessary and sufficient conditions for the category of locally finite-dimensional representations over a Noetherian algebra to be closed under taking injective hulls. We also extend results known for group rings and enveloping algebras to Ore extensions, Hopf crossed products, and affine Hopf algebras of low Gelfand–Kirillov dimension. □

17 Fosco Loregian

Tallinn University of Technology

On the Fibration of Algebras

Abstract. We study fibrations arising from indexed categories of the following form: fix two categories A, X and a functor $F : A \times X \to X$, so that to each $F_a = F(a, \_)$ one can associate a category of algebras $Alg_X(F_a)$ (or an Eilenberg–Moore, or a Kleisli category if each F_a is a monad). We call the functor $A \ltimes \mathrm{Alg} \to A$, whose typical fibre over A is the category $Alg_X(F_a)$, the <<fibration of algebras>> obtained from F.

Examples of such constructions arise in disparate areas of mathematics, and are unified by the intuition that $A \ltimes \mathrm{Alg}$ is a form of <<semidirect product>> of the category A, acting on X, via the 'representation' given by the functor $F : A \times X \to X$.

A motivating example lies in the theory of Hopf algebras: there is an action of the category of groups, via the group algebra functor, on Lie algebras, and the semidirect product recognizes the category of cocommutative Hopf algebras on a char 0 field. □

18 Abdenacer Makhlouf

🏠 University of Upper Alsace

An overview of Twisted bialgebras and Hopf algebras

Abstract. In this talk we deal with Hom-type and BiHom-type algebras, bialgebras and Hopf algebras. The first instances come from quantum deformations of algebras of vector fields. The relevant examples are obtained for Witt and Virasoro algebra, where usual derivation is replaced by a Jackson derivation, the Leibniz identity being twisted by an algebra map. The description of the new structure gave rise to a structure generalizing Lie algebras, called Hom-Lie algebras or quasi-Lie algebras introduced by Larsson and Silvestrov. A pending Hom-associative algebras and some other Hom-type generalizations of non-associative algebras were introduced by Makhlouf and Silvestrov. A study from the point of view of monoidal categories were considered by Caenepeel and Goyvaerts for Hom-algebras, then generalized by Graziani, Makhlouf, Menini and Panaite to introduce BiHom-type algebras.
The purpose of my talk is to give an overview of recent developments and provide some key constructions. □

19 Laura Năstăsescu

Institute of Mathematics of the Romanian Academy

A question on Frobenius strongly graded algebras

Abstract. Our initial aim was to answer the question: does the Frobenius (symmetric) property transfer from a strongly graded algebra to its homogenous component of trivial degree? Related to it, we investigate invertible bimodules and the Picard group of a finite dimensional quasi-Frobenius algebra R. We compute the Picard group, the automorphism group and the group of outer automorphisms of a 9-dimensional quasi-Frobenius algebra, which is not Frobenius, constructed by Nakayama. Using these results and a semitrivial extension construction, we give an example of a symmetric strongly graded algebra whose trivial homogenous component is not even Frobenius. This is joint work with Sorin Dăscălescu and Constantin Năstăsescu. □

20 Thi Hoa Nguyen

Clermont Auvergne University

Cohomological dimensions of braided Hopf algebras

Abstract. The global dimension is an important homological invariant of an algebra, often serving as a good analogue of the dimension of a smooth affine algebraic variety. However, there are examples where the global dimension does not align with geometric intuition. This often leads to consider the Hochschild cohomological dimension rather than the global dimension. It is thus a natural question to determine classes of algebras for which the global dimension and the Hochschild cohomological dimension coincide, and this is a well-known fact when our algebra is graded connected or is a Hopf algebra.
In this talk, I will discuss some properties of braided Hopf algebras and explain a result which states that equality between global and Hochshild dimensions still holds for a braided Hopf algebra in the category of comodules over a cosemisimple coquasitriangular Hopf algebra. The presentation will cover results from a recent paper with my supervisor Julien Bichon. □

21 Chiara Pagani

Federico II University of Naples

Atiyah sequences of Hopf–Galois extensions

Abstract. In noncommutative geometry, Hopf–Galois extensions are seen as principal bundles. We study gauge transformations of K-equivariant H-Galois extensions, for K a triangular Hopf algebra. Each such noncommutative principal bundle can be associated a sequence of braided Lie algebras (Lie algebras in the symmetric monoidal category of K-modules), a noncommutative analogue of the Atiyah sequence of a principal bundle. Connections are then given by splittings of the sequence. Examples for bundles over noncommutative spheres are presented.
Based on joint works with Paolo Aschieri and Giovanni Landi. □

22 Francesco Sala

University of Pisa

Cohomological Hall algebras, quantum groups, and their categorification

Abstract. The present talk serves as a gentle introduction to the theory of cohomological Hall algebras and its connection to quantum groups. If time allows, it will also discuss an approach to the categorification of quantum groups through categorified Hall algebras. □

23 Paolo Saracco

Université Libre de Bruxelles

Everybody knows what a normal gabi-algebra is

Abstract. A classical result in Tannaka–Kreĭn reconstruction theory states that there is a bijective correspondence between (a) Hopf algebra structures on an algebra A over a commutative ring $\Bbbk$ and (b) closed monoidal structures on the category of left A-modules such that the forgetful functor to the category of $\Bbbk$-modules is closed monoidal. One would usually split this result into two steps: the lifting of the monoidal structure corresponds to the bialgebra structure, and then the lifting of the closed structure (as adjoint to the monoidal one) corresponds to the existence of an antipode.
It is less known, however, that closed structures on a category can be defined independently of monoidal ones and this led us to explore a new perspective on Tannaka–Kreĭn reconstruction: what kind of structure on A would correspond to lifting the closed structure of $\Bbbk$-modules alone?
In this talk we will see how lifting the closed structure corresponds to the existence of a *gabi-algebra* structure on A, i.e. a pair of algebra maps $\delta\colon A \to A \otimes A^{\mathrm{op}}$ and $\varepsilon\colon A \to \Bbbk$ satisfying appropriate conditions. Additionally, we will see that the lifted closed structure on the category of A-modules is normal if and only if A is a Hopf algebra, thus supporting our claim that *everybody knows what a normal gabi-algebra is.* □

24 Taiki Shibata

Okayama University of Science

Semisimple Hopf superalgebras of low dimension

Abstract. In this talk, we introduce a method for constructing semisimple Hopf superalgebras whose (Radford–Majid) bosonization becomes isomorphic to an abelian extension by appropriate groups. We will see how these semisimple Hopf superalgebras and twists of suitable group algebras can be used to classify finite-dimensional semisimple Hopf superalgebras. As a result, we have achieved a complete classification of semisimple Hopf superalgebras of dimension up to 10. This is joint work with Kenichi Shimizu (Shibaura Institute of Technology) and Ryota Wakao (Okayama University of Science). □

25 Kenichi Shimizu

Shibaura Institute of Technology

Quasi-Frobenius algebras in finite tensor categories

Abstract. Given an algebra A in a finite tensor category $\mathcal{C}$, the category $\mathcal{C}_A$ of right A-modules in $\mathcal{C}$ is defined. Since $\mathcal{C}_A$ is a left $\mathcal{C}$-module category, one can define $\mathcal{C}$-injective objects in $\mathcal{C}_A$ in terms of the internal Hom functor of $\mathcal{C}_A$. An algebra A in $\mathcal{C}$ is said to be quasi-Frobenius (QF) if $A \in \mathcal{C}_A$ is $\mathcal{C}$-injective. It turns out that Frobenius algebras in $\mathcal{C}$, exact algebras in $\mathcal{C}$, and Hopf algebras in $\mathcal{C}$ (when $\mathcal{C}$ is braided) are QF. In this talk, I will give several criteria for an algebra to be QF. One of important characterizations is that, as one might expect, an algebra in $\mathcal{C}$ is QF if and only if it is Morita equivalent to a Frobenius algebra in $\mathcal{C}$ (here, two algebras A and B in $\mathcal{C}$ are Morita equivalent if $\mathcal{C}_A \approx \mathcal{C}_B$ as module categories over $\mathcal{C}$). The techniques for proving this also allow us to show that the class of symmetric Frobenius algebras in $\mathcal{C}$ is closed under Morita equivalence, provided that $\mathcal{C}$ is pivotal so that symmetricity of an algebra in $\mathcal{C}$ makes sense. □

26 Sergei Silvestrov

Mälardalen University of Västerås

Hom-algebras, Hopf algebras and monoidal categories

Abstract. Hom-algebra structures and their interplay with Hopf algebras and monoidal categories will be presented. □

27 Yorck Sommerhäuser

Memorial University of Newfoundland

Self-Duality of Yetter–Drinfel'd Hopf Algebras and Their Biproducts

Abstract. The dual of a left Yetter–Drinfel'd Hopf algebra is a right Yetter–Drinfel'd Hopf algebra. By transporting these new structures from the right to the left via an antipode or an inverse antipode, this dual can be turned into a left Yetter–Drinfel'd Hopf algebra, which is the left or right dual in the sense of category theory. For the Yetter–Drinfel'd Hopf algebras constructed by Yevgenia Kashina and the speaker, we show that the arising duals are isomorphic to the original Yetter–Drinfel'd Hopf algebra. As a consequence, we show that the arising Radford biproducts are also self-dual. Furthermore, we give an explicit description of the irreducible representations of these biproducts. The talk is based on so far unpublished joint work with Yevgenia Kashina. □

28 Dragoș Ștefan

University of Bucharest

On deformations of associative algebras

Abstract. The deformations of associative algebras were introduced and studied by M. Gerstenhaber. In our talk, we shall show how this concept can be interpreted and extended using the theory of coalgebras as the primary tool. In this broader context, we shall see that deformations are governed by a cohomology theory closely related to Hochschild cohomology, as in the classical case (joint work with A. Makhlouf). □

29 Matti Stroiński

Uppsala Universitet

Lax module profunctors, reconstruction, and tensor categories

Abstract. Let $\mathcal{C}$ be a monoidal category and $\mathcal{M}$ a $\mathcal{C}$-module category. There are many results specifying finiteness, exactness, and rigidity/closedness conditions on $\mathcal{C}$ and $\mathcal{M}$ so that $\mathcal{M}$ can be realized as the category of modules for an algebra object A. Here, A can be an object of $\mathcal{C}$, or of a larger monoidal category, such as $\mathrm{Ind}(\mathcal{C})$. We show that the category $\mathrm{Tamb}(\mathcal{C})$ of Tambara modules on $\mathcal{C}$ is the universal category for this purpose: algebra objects in $\mathrm{Tamb}(\mathcal{C})$ describe all $\mathcal{C}$-module categories, with no assumptions on $\mathcal{C}$ or $\mathcal{M}$. Using the structure of the category $\mathrm{Tamb}(\mathcal{D}\text{-proj})$ for a finite tensor category $\mathcal{D}$, we verify a conjecture of Etingof–Ostrik on a generalization of a theorem of Skryabin: the category of modules for an algebra object A in $\mathcal{D}$ is an exact module category if and only if A is semisimple. Additionally, we obtain an analogue of the Jacobson radical for algebra objects in $\mathcal{D}$. This is joint work in progress with Tony Zorman. □

30 Blas Torrecillas

University of Almería

A quasi-Hopf analogue of the Drinfeld–Jimbo quantum groups

Abstract. Let H be a quasi-Hopf algebra. To a set I and a given family of characters of H indexed by I, we associate a braided Hopf algebra within the category of Yetter–Drinfeld modules over H. This kind of free braided Hopf algebra can be, moreover, factorized through some Serre relations, leading thus to the construction of the Drinfeld–Jimbo quantum groups in the quasi-Hopf setting. Our construction is an extremely general one (even in the Hopf case, the Drinfeld–Jimbo quantum groups $U_q(g)$ are obtained as a particular case of our construction) and allows us not only to introduce the quasi-Hopf analog of the $U_q(g)$'s, but also to define new classes of quasi-quantum groups (joint work with Daniel Bulacu). □

31 Thomas Weber

Charles University in Prague

Infinitesimal braidings and pre-Cartier bialgebras

Abstract. We propose an approach to infinitesimal braidings which applies to arbitrary braided monoidal categories. The motivating idea is to understand an infinitesimal braiding as a first order deformation of a given braiding. We call braided monoidal categories endowed with an infinitesimal braiding 'pre-Cartier', because they generalize previously studied Cartier categories. It is the main goal of this talk to present the algebraic structure on coquasitriangular bialgebras which characterizes infinitesimal braidings on their categories of comodules. It turns out that this pre-Cartier bialgebra structure corresponds to Hochschild 2-cocycles which satisfy a deformed version of the quantum Yang–Baxter equation, while it gives rise to Hochschild 2-coboundaries in the Cartier cotriangular Hopf algebra framework. We discuss explicit examples on q-deformed $GL(2)$ and Sweedler's Hopf algebra. As main results we provide an infinitesimal FRT construction and a Tannaka–Krein reconstruction theorem for pre-Cartier coquasitriangular bialgebras. The former admits canonical non-trivial solutions and thus induces non-trivial infinitesimal R-forms on all FRT bialgebras. The talk is based on a collaboration with A. Ardizzoni, L. Bottegoni and A. Sciandra. □