International Workshop on
Hopf Algebras and Tensor Categories

（September 9-13, 2019）

Programme

Nanjing University

Nanjing, China (中国．南京)

Organizers

Nicolás Andruskiewitsch (National University of Córdoba, Argentina)

Gongxiang Liu (Nanjing University, China)

Susan Montgomery (University of Southern California, USA)

Yinhuo Zhang (University of Hasselt, Belgium)

Supported by

- Nanjing University
- National Natural Science Foundation of China

Program at A Glance

	Monday	Tuesday	Wednesday	Thursday	Friday
8:30-9:00	Opening +conference photo				
9:00 - 9:45	Andruskiewitsch	Fuchs	Caenepeel	Nikshych	Angiono
9:55-10:40	Lentner	Cuntz	Sommerhäuser	Huang	Shimizu
10:50-11:15	**Break time**	**Break time**	**Break time**	**Break time**	**Break time**
11:15-12:00	Wakui	Bohm	Kashina	Bavula	Montgomery
12:00-14:00	**Lunch**	**Lunch**	**Lunch**	**Lunch**	**Lunch**
14:00-14:45	Natale	Schweigert	**Free time**	Torrecillas	
14:55-15:40	Dong	Hu		Yakimov	
15:45-16:15	**Break time**	**Break time**		**Break time**	
16:15-17:00	Zhou	Shibata		Bao	
17:05-17:50	He	Wang		Giraldi	

All the lectures take place in ZhongDa Hall（中大厅）, International Conference Center.

September 8 , Sunday

10:00-20:00 **Registration** at First Floor, International Conference Center, Nanjing University Xianlin Campus

September 9, Monday

Location: ZhongDa Hall

8:00-8:30 **Registration**

8:30-8:45 **Opening Remarks**

8:45-8:55 **Conference photo**

Chair of the morning session: Susan Montgomery

9:00-9:45 Nicolás Andruskiewitsch

An approach to the classification of pointed Hopf algebras with finite GK-dimension

9:55-10:40 Simon Lentner

Nichols algebra in braided tensor categories and screening operators in conformal field theory

10:50-11:15 Break time

11:15-12:00 Michihisa Wakui

Indecomposability of weak Hopf algebras

12:00-14:00 **Lunch time**

Chair of the afternoon session: Stefaan Caenepeel

14:00-14:45 Sonia Natale

Extension of tensor categories by finite group fusion categories

14:55-15:40 Jingcheng Dong

Examples of crossed product fusion categories

15:45-16:15 **Break time**

16:15-17:00 Guisong Zhou

The structure of connected (graded) Hopf algebras

17:05-17:50 Jiwei He

Singularities of noncommutative quadric hypersurfaces

September 10, Tuesday

Location: ZhongDa Hall

Chair of the morning session: Yinhuo Zhang

9:00-9:45 Jürgen Fuchs

Module categories, relative Serre functors and conformal field theory

9:55-10:40 Michael Cuntz

A bound for finite Weyl groupoids

10:50-11:15 **Break time**

11:15-12:00 Gabriella Böhm

Multimonoidal monads

12:00-14:00 **Lunch time**

Chair of the afternoon session: Jürgen Fuchs

14:00-14:45 Christoph Schweigert

String-net models and invariants for mapping class groups

14:55-15:40 Naihong Hu

Some Hopf algebras from QDO on Manin superspaces and simple Uq(gl(m|n))-modules

15:50-16:15 **Break time**

16:15-17:00 Taiki Shibata

Algebraic supergroups and their representations over a field

17:05-17:50 Zhengfang Wang

B-infinity algebras and Keller's conjecture

September 11, Wednesday

Location: ZhongDa Hall

Chair of the morning session: Gongxiang Liu

9:00-9:45 Stefaan Caenepeel

Galois theory for Hopf categories II: Application to partial actions by groupoids

9:55-10:40 Yorck Sommerhäuser

Cores in Yetter-Drinfel'd Hopf Algebras: Examples

10:50-11:15 **Break time**

11:15-12:00 Yevgenia Kashina

Cores in Yetter-Drinfel'd Hopf Algebras

12:00-14:00 **Lunch time**

14:00-17:00 **Free time**

September 12, Thursday

Location: ZhongDa Hall

Chair of the morning session: Christoph Schweigert

9:00-9:45 Dmitri Nikshych

Classifying braidings on fusion categories

9:55-10:40 Hualin Huang

On nondiagonal finite quasi-quantum groups over abelian groups

10:50-11:15 **Break time**

11:15-12:00 Vladimir Bavula

The Poisson universal enveloping algebra and the Poisson differential operators of a generalized Weyl Poisson algebra

12:00-14:00 **Lunch time**

Chair of the afternoon session: Dmitri Nikshych

14:00-14:45 Blas Torrecillas

On sovereign, balanced and ribbon quasi-Hopf algebras

14:55-15:40 Milen Yakimov

Irreps and Poisson geometry of large quantum groups

15:50-16:15 **Break time**

16:15-17:00 Yanhong Bao

From Weak Bialgebras to Algebraic Operads

17:05-17:50 João Matheus Jury Giraldi

On Nichols algebras over dual Radford algebras

September 13, Friday

Location: ZhongDa Hall

Chair of the morning session: Nicolás Andruskiewitsch

9:00-9:45 Iván Angiono

On Nichols algebras over basic Hopf algebras

9:55-10:40 Kenichi Shimizu

Class functions and the action functor

10:50-11:15 **Break time**

11:15-12:00 Susan Montgomery

Actions of pointed Hopf algebras on matrices

12:00-14:00 **Lunch time**

14:00-17:00 **Free time**

Abstracts

Andruskiewitsch Nicolás (Universidad Nacional de Córdoba, Argentina)
Title: An approach to the classification of pointed Hopf algebras with finite GK-dimension
I will discuss different steps to be considered to attack the question in the title.

Angiono Iván (Universidad Nacional de Córdoba, Argentina)
Title: On Nichols algebras over basic Hopf algebras.
Based in a joint work with Nicol\'as Andruskiewitsch, we show that a finite-dimensional Hopf algebra whose Hopf coradical is basic is a lifting of a Nichols algebra of a semisimple Yetter-Drinfeld module and we explain how to classify Nichols algebras of this kind. We provide along the way new examples of Nichols algebras and Hopf algebras with finite Gelfand-Kirillov dimension.

Bao Yanhong (Anhui University)
Title: From Weak Bialgebras to Algebraic Operads
In this talk, we will provide various constructions of operads from a cocommutative weak bialgebra. This work is joint with Xiao-Wei Xu, Yu Ye, James J. Zhang and Zhi-Bing Zhao.

Bavula Vladimir (University of Sheffield, UK)
Title: The Poisson universal enveloping algebra and the Poisson differential operators of a generalized Weyl Poisson algebra
A new large class of Poisson algebras, the class of generalized Weyl Poisson algebras, is introduced. A Poisson simplicity criterion is given for generalized Weyl Poisson algebras. Many examples are considered. For a generalized Weyl Poisson algebra A, explicit sets of generators and defining relations are found of the Poisson universal enveloping algebra $U (A)$ of A. Asimplicity criterion for the algebra $U (A)$ and regularity criteria for the algebra A are given when the algebra A is of essentially finite type and of pure dimension $d<\infty$. Also the set of minimal primes are described of the algebra A and an equidimensionality criterion is given for A.

Böhm Gabriella (Wigner RCP Budapest, Hungary)
Title: Multimonoidal monads
A bialgebra structure on a given algebra T --- that is, an opmonoidal structure on the induced monad $T\otimes -$ on the category vec of vector spaces is the same, in fact, as a monoidal structure on the category of T-modules such that the forgetful functor to vec is monoidal. The deep explanation of this well-known fact comes from the monoidal Eilenberg-Moore lifting 2-functor \cite{S}. It sends pseudo-monoids i the 2-category of monads to pseudo-monoids the 2-category of categories; in particular, it sends the opmonoidal monad $T\otimes -$ to the monoidal Eilenberg-Moore category of T-modules. A multimonoidal say, n-oidal -category

$\mathsf M$ has not only one, but n compatible monoidal structures \cite{AM}. Generalizing the situation of the previous paragraph, recently in \cite{AHL-F} the additional so-called $(p,n-p)$-oidal structure of a monad t on $\mathsf M$ was described in whose presence the Eilenberg-Moore category $\mathsf M^t$ also has an n-oidal structure such that with respect to p ones of the monoidal structures the forgetful functor $\mathsf M^t \to \mathsf M$ is monoidal, and with respect to the remaining $n-p$ monoidal structures its left adjoint is so. The aim of this talk based on the paper \cite{B} is to give a conceptual explanation of these findings via a suitable monoidal double functor from the double category of monads \cite{FGK} to the category of squares of categories \cite{E}.

Caenepeel Stefaan (Vrij Universiteit Brussels, Belgium)
Title: Galois theory for Hopf categories II: Application to partial actions by groupoids
We define rings and corings over diagonal linear categories, whose underlying class of objects is a set X. To a coring with a fixed grouplike matrix, we associate a pair of adjoint functors, and investigate when this forms a pair of inverse equivalences. A necessary condition is that a certain family of canonical maps consists of isomorphisms; in this case the coring is called a Galois coring. To find sufficient conditions we have to impose some finiteness conditions; a first possible condition is that the set of objects is finite. In this case, we can put the coring in question in packed form, and reduce the question to a similar question about corings over an algebra, that is the case when X is a singleton. For X infinite, we have to assume that the pieces of the diagonal algebra are finitely generated projective over the algebra of coinvariants. We apply our results to groupoids acting partially on algebras (or diagonal linear categories), as introduced by Bagio and Paques. We associate a coring to such a partial action, and study when it is a Galois coring. We relate this to the Galois theory introduced by Bagio and Paques. The two notions are equivalent when the diagonal category involved is commutative. In this situation, we present several equivalent conditions for the Galois property.

Cuntz Michael (Leibniz Universität Hannover, Germany)
Title: A bound for finite Weyl groupoids
Crystallographic arrangements (these are simplicial arrangements in a lattice) correspond to finite Weyl groupoids which are used as invariants of Nichols algebras. They were completely classified in a series of papers by Heckenberger and myself. However, this classification is based on two computer proofs checking millions of cases. In this talk, I want to report on recent progress in finding a shorter proof. In particular, we prove without using a computer that, up to equivalence, there are only finitely many irreducible crystallographic arrangements in each rank greater than two.

Dong Jingcheng (Nanjing University of Information Science and Technology)
Title: Examples of crossed product fusion categories
Galindo introduced the notion of a crossed product tensor category and gave a description of this class of tensor categories, graded monoidal functors, monoidal natural transformations, and braidings in terms of coherent outer G-actions over tensor categories. In this talk, we present three examples of crossed product fusion categories: two of them

arise from extensions of rank 2 fusion categories and the rest arises from extensions of near group categories.

Fuchs Jürgen (Karlstads universitet, Sweden)

Title: Module categories, relative Serre functors and conformal field theory

Module categories over monoidal categories appear in various situations. A particularly rich theory has been developed in the context of finite categories. I present some new results for this case, including the concept of a relative Serre functor. These results lead e.g. to a better understanding of the field content of two-dimensional conformal field theories. Singularities of noncommutative quadric hypersurfaces.

Giraldi João Matheus Jury (Universidade Federal do Rio do Sul, Brazil)

Title: On Nichols algebras over dual Radford algebras

Recently in \cite{GGi}, it were classified the finite-dimensional Nichols algebras over the simple modules of $ {}^{\mathcal{K}}_{\mathcal{K}}\mathcal{YD} $ where $ \mathcal{K} $ is the smallest non-pointed non-cosemisimple Hopf algebra. It turns out to be that $ \mathcal{K} $ belongs to the family of the dual Radford algebras \cite{R, ACE} and the generalized lifting method can be applied to this family. In this talk, we explain how to obtain the finite-dimensional Nichols algebras associated to the simple modules of $ {}^{H}_{H}\mathcal{YD} $ with $ H $ in the family above using a recent result of N. Andruskiewitsch and I. Angiono \cite{AA}. We also give explicit presentations for some of these Nichols algebras. This talk is based in a joint work with D. Bagio, G. Garc\'ia and O. M\'arquez..

He Jiwei (Hangzhou Normal University)

Title: Singularities of noncommutative quadric hypersurfaces

The invariant subalgebra of an Artin-Schelter regular algebra of global dimension 2 under a finite group action (with trivial homological determinants) is a hypersurface obtained from an Artin-Schelter regular algebra of global dimension 3. The study of the representations of singularities of hypersurfaces is important in noncommutative projective geometry. In this talk, we focus on the singularities of noncommutative quadric hypersurfaces. Associated to a noncommutative quadric hypersurface A, there is a finite dimensional algebra *E* which is obtained from a deformation of a Koszul Frobenius algebra. There is an equivalence between the bounded derived category of *E* and the stable category of maximal Cohen-Macaulay modules of A. This equivalence will implies the Knorrer Periodicity Theorem for noncommutative quadric hypersurfaces. This is a joint work with Yu Ye.

Hu Naihong (East China Normal University)

Title: Some Hopf algebras from QDO on Manin superspaces and simple Uq(gl(m|n))-modules

Associated with the quantum general (special) linear algebra $\mathcal U_q(\mathfrak{gl}(m|n))$ ($\mathcal U_q(\mathfrak{sl}(m|n))$), we introduce and define the quantum affine $(m|n)$-superspace $A_q^{m|n}$ and its dual object, the quantum Grassmann superalgebra $\Omega_q(m|n)$. Motivated by Manin's proposal, via defining some

compatible q-differential operators over Ω_q, we can define quantum Weyl superalgebra and obtain some Hopf algebra structures inside it, and we are able to make the quantum (restricted) Grassmann superalgebra Ω_q into the $\mathcal U_q(\mathfrak g)$-module superalgebra structure, where $\Omega_q= \Omega_q(m|n)$ for q generic, or $\Omega_q(m|n, \bold 1)$ for q root of unity, and $\mathfrak g=\mathfrak{gl}(m|n)$ or $\mathfrak {sl}(m|n)$. Finally, we decompose Ω_q into the direct sum of some simple $\mathcal U_q(\mathfrak g)$-modules in both cases q generic and root of unity. In particular, we give the dimension formulae of some simple modules. This is a joint work with G. Feng, M.R. Zhang and X.T. Zhang.

Huang Hualin (HuaQiao University)

Title: On nondiagonal finite quasi-quantum groups over abelian groups

In this talk, we will report some progress on nondiagonal finite quasi-quantum groups over finite abelian groups. We mainly study the Nichols algebras in the twisted Yetter- Drinfeld module category over a finite abelian group with a nonabelian 3-cocycle. A complete clarification is obtained for the Nichols algebra B(V) in case V is a simple twisted Yetter-Drinfeld module of nondiagonal type. This is also applied to provide a complete classification of finite dimensional coradically graded pointed coquasi-Hopf algebras over abelian groups of odd order and to confirm partially the generation conjecture of pointed _nite tensor categories due to Etingof, Gelaki, Nikshych and Ostrik. The talk is based on a joint work with Yuping Yang and Yinhuo Zhang.

Kashina Yevgenia (DePaul University, USA)

Title: Cores in Yetter-Drinfel'd Hopf Algebras

In this talk, we will discuss the biproducts of the Yetter-Drinfel'd Hopf algebras constructed in the previous talk from the point of view of extensions. There are exactly four different ways to write them as extensions, which will be described in the talk. Two of these extensions are abelian, but not cocentral. The other two extensions are not abelian and involve a nontrivial 16-dimensional Hopf algebra. In particular, these Hopf algebras cannot be constructed as extensions of a group of order 2 by a large commutative Hopf algebra. The talk is based on joint work with Yorck Sommerhauser.

Lentner Simon (Hamburg University, Germany)

Title: Nichols algebra in braided tensor categories and screennig operators in conformal field theory

Given a vertex operator algebra and an element, one can define a screening operator. Frequently, in this way we obtain an action of an interesting Lie algebra. More generally, given an element in a vertex algebra module, we can define a non-local screening operator. Here, the non-trivial braiding in contrast to a Lie algebra is due to the non-locality of the intertwining operator. In a previous work I have shown, that certain such screening operators for the Heisenberg algebra give an action of the Borel part of the quantum group (or more general diagonal Nichols algebras). Such actions of screening operators appear prominently in free-field realizations of triplet algebra etc. After explaining this example, I report on work in progress with Y.-Z. Huang on the general picture: Under certain finiteness and smallness-assumptions, the screening operators of any set of

intertwiningoperators on any vertex algebra should give an action of a Nichols algebra, namely those associated to the braiding of the intertwining operators in the HLZ-construction.

Montgomery Susan (University of Southern California)
Title: Actions of pointed Hopf algebras on matrices
In joint work with Yuri Bahturin, we study actions of pointed Hopf algebras on matrices over fields. Crucial ingredients are Masuoka's theorem (1990) that Hopf actions on matrices are "inner", as well as the determination of group gradings on matrices by Bahturin, Sehgal, and Zaicev (2001). A first step is to determine actions of the Taft Hopf algebra, generated by a group element and a single skew-primitive element. We are able then to classify actions of pointed Hopf algebras of dim p^3, using the description of such algebras by Andruskiewitsch and Schneider (1998).

Natale Sonia (Universidad Nacional de Córdoba, Argentina)
Title: Extension of tensor categories by finite group fusion categories
Let G be a finite group. In this talk, we shall discuss exact sequences of finite tensor categories related to the group G. First, we shall show that under suitable assumptions, every exact sequence of the form $\textrm{Rep} (G) \longrightarrow \mathcal C \longrightarrow \mathcal D$ gives rise to a group Γ and mutual actions by permutations $\triangleright:\Gamma \times G \to G$ and $\triangleleft: \Gamma \times G \to \Gamma$ that make (G, Γ) into matched pair of groups endowed with a natural crossed action on $\mathcal D$ such that $\mathcal C$ is equivalent to a certain associated crossed extension of $\mathcal D$. Dually, we shall show that an exact sequence of finite tensor categories of the form $\textrm{Vec}_G \longrightarrow \mathcal C \longrightarrow \mathcal D$ induces an $\textrm{Aut}(G)$-grading on $\mathcal C$ whose neutral homogeneous component is a $(Z(G), \Gamma)$-crossed extension of a tensor subcategory of $\mathcal D$. As an application of these results, we shall prove that such extensions $\mathcal C$ of $\mathcal D$ are weakly group-theoretical fusion categories if and only if so is $\mathcal D$. In particular, every semisolvable semisimple Hopf algebra is weakly group-theoretical.

Nikshych Dmitri (University of New Hampshire, USA)
Title: Classifying braidings on fusion categories
We show that braidings on a fusion category C correspond to certain fusion subcategories of the Drinfeld center of C transversal to the canonical Lagrangian algebra. This allows to classify braidings on non-degenerate and group-theoretical fusion categories.

Schweigert Christoph (Hamburg University, Germany)
Title: String-net models and invariants for mapping class groups
Given a spherical fusion category, the Turaev-Viro construction provides a three-dimensional topological field theory and thus a coherent system of representations of mapping class groups of surfaces. We explain an alternative construction of these representations based on string nets. It can be used to find invariants for the action of the mapping class groups.

Shibata Taiki (Okayama University of Science, Japan)

Title: Algebraic supergroups and their representations over a field

An algebraic supergroup is a group-valued functor on the categoryof commutative superalgebras represented by a finitely generated commutative Hopf superalgebra. It has been known that representations of algebraic supergroups can be applied in non-super (modular) representation theory. In 2011, V. Serganova introduced the notion of quasireductive supergroups as a super-version of the notion of split reductive groups. This is an interesting and important class of algebraic supergroups including Chevalley supergroups (introduced by R. Fioresi and F. Gavarini, 2012) and queer supergroups Q(n) (whose Lie superalgebra is a queer superalgebra q(n)). She constructed irreducible representations of quasireductive supergroups over an algebraically closed field of characteristic zero, in terms of their Lie superalgebras. In this talk, I explain a Hopf-algebraic approach to the study of quasireductive supergroups and, as an application, give a generalization of Serganova's result to the case where the base field is arbitrary. The main tool of this approach is the superhyperalgebra hy(G) of an algebraic supergroup G (due to M. Takeuchi) which is a refinement of the notion of the Lie superalgebra Lie(G).

Shimizu Kenichi (Shibaura Institute of Technology, Japan)

Title: Class functions and the action functor

For a finite tensor category $\mathcal{C}$, the algebra $\mathrm{CF}(\mathcal{C})$ of `class functions' has been introduced with motivation coming from logarithmic conformal field theories and `non-semisimple' modular tensor categories. If $\mathcal{C}$ is the representation category of a finite-dimensional pivotal Hopf algebra H, then the algebra $\mathrm{CF}(\mathcal{C})$ is identified with the algebra $\mathrm{SLF}(H)$ of symmetric linear forms on H and hence one may use some ring-theoretic methods to study $\mathrm{CF}(\mathcal{C})$. In principal, such a method can be used in the general case: Let $\mathcal{C}$ be a pivotal finite tensor category and choose an arbitrary algebra L such that $\mathcal{C} \approx L\text{-mod}$ as linear categories. Then $\mathrm{CF}(\mathcal{C})$ is isomorphic to $\mathrm{SLF}(L)$ as a vector space. The existence of such an isomorphism is non-trivial since the assumption that $\mathcal{C}$ is finite abelian is not essential in the definition of $\mathrm{CF}(\mathcal{C})$ and, in fact, the set $\mathrm{CF}(\mathcal{C})$ can be defined for an arbitrary monoidal category $\mathcal{C}$ such that the forgetful functor $\mathcal{Z}(\mathcal{C}) \to \mathcal{C}$ admits a right adjoint. This talk aims to introduce a systematic framework to connect some notions defined in terms of a monoidal category, such as $\mathrm{CF}(\mathcal{C})$, and some ring-theoretic notions. A key ingredient is the `action' functor $\rho: \mathcal{C} \to \mathrm{Rex}(\mathcal{C})$ defined by $\rho(X) = X \otimes (-)$ for $X \in \mathcal{C}$, where $\mathrm{Rex}(\mathcal{C})$ is the category of right exact linear endofunctors on $\mathcal{C}$. If we choose an algebra L such that $\mathcal{C} \approx L\text{-mod}$, then $\mathrm{Rex}(\mathcal{C})$ is equivalent to $L\text{-bimod}$. Several ring-theoretic notions can be described in terms of the category of bimodules and one can send them to $\mathcal{C}$ through the equivalence

$L\text{-bimod} \approx \mathrm{Rex}(\mathcal{C})$ and an adjoint of the functor ρ. I will explain how to establish basic results on $\mathrm{CF}(\mathcal{C})$ by using this framework and show further applications such techniques. If time permits, I will talk about a generalization to exact module categories.

Sommerhäuser Yorck (Memorial University of Newfoundland, Canada)
Title: Cores in Yetter-Drinfel'd Hopf Algebras: Examples
For a semisimple commutative Yetter-Drinfel'd Hopf algebra over a finite abelian group, one can define the core of a one-dimensional character, at least when the base field is algebraically closed of characteristic zero. The core is both a subalgebra and a subcoalgebra that controls the outside action of the abelian group on the character from inside the algebra. In the case where the finite abelian group has prime order, the cores themselves are always completely trivial in the sense that both the action and the coaction of the group on the core are trivial. In this talk, we describe examples of Yetter-Drinfel'd Hopf algebras whose cores are not completely trivial. The corresponding Radford biproducts are semisimple Hopf algebras of dimension 32 that appear not to have been considered in the literature before. The talk is based on joint work with Yevgenia Kashina, who will give the subsequent talk and discuss these biproducts from the point of view of extensions.

Torrecillas Blas (University of Almeria, Spain)
Title: On sovereign, balanced and ribbon quasi-Hopf algebras
We define and study sovereign, spherical and balanced quasi-Hopf algebra. We investigate the connections between these, as well as their connections with the class of pivotal, involutory and ribbon quasi-Hopf algebras, respectively. Examples of balanced and ribbon quasi- Hopf algebras are obtained from a sort of double construction which associates to a braided category (resp. rigid braided) a balanced (resp. ribbon) one. This is joint work with D. Bulacu. Module categories, relative Serre functors and conformal field theory

Wakui Michihisa (Kansai University, Japan)
Title: Indecomposability of weak Hopf algebras
In this talk we study on the direct sum construction of weak Hopf algebras, which is a generalization of Kaplansky type construction studied by Chebel and Makhlouf. Any finite-dimensional weak Hopf algebra can be uniquely decomposed into finitely many indecomposable weak Hopf algebras up to isomorphism. So, indecomposable weak Hopf algebras are fundamental and important. We determine the indecomposable low-dimensional weak Hopf algebras listed by Chebel and Makhlouf, and show that a finite-dimensional Hopf algebra is always indecomposable as a weak Hopf algebra. A categorical viewpoint for indecomposability is also discussed.

Wang Zhengfang (Max Planck Institute for Mathematics, Germany)
Title: B-infinity algebras and Keller's conjecture

Recall that a B-infinity algebra is an A-infinity algebra such that the canonical dg coalgebra structure on the bar construction can be extended to a dg bialgebra structure. In this talk, we will discuss a natural construction of B-infinity algebras from Kontsevich-Soibelman's minimal operad. The concrete examples we will consider are Hochschild cohomology and Tate-Hochschild cohomology. Recall that the Tate-Hochschild cohomology of an algebra is defined as the Yoneda algebra of the identity bimodule in the singularity category (in the sense of Buchweitz and Orlov) of bimodules. Recently, Keller proves that the Tate-Hochschild cohomology of an algebra A is isomorphic as graded algebras to the Hochschild cohomology of the dg singularity category of A. He also conjectures that this isomorphism lifts to a B-infinity quasi-isomorphism at the complex level. We will give a proof of Keller's conjecture for radical square zero algebras. This is a joint work with X.W. Chen and H. H. Li.

Yakimov Milen (Louisiana State University, USA)

Title: Irreps and Poisson geometry of large quantum groups

In this talk we will address the classification of irreducible representations of the Drinfeld doubles of the distinguished pre-Nichols algebras associated to finite dimensional Nichols algebras of diagonal type (large quantum groups in short). This is a large class of Hopf algebras which are module finite over their centers. It includes all quantum supergroups at roots of unity as special cases. On each of them we construct a structure of Poisson order in the sense of De Concini-Kac-Procesi and Brown-Gordon. Unlike the previous arguments for quantum groups at roots of unity which used low rank computations, our constructions are based on general arguments with dualities between specializations of integral forms of Hopf algebras and Poisson geometric arguments. This is a joint work with Nicolas Andruskiewitsch and Ivan Angiono.

Zhou Guisong (Ningbo University)

Title: The structure of connected (graded) Hopf algebras

In this talk, we will present a structure theorem for connected graded Hopf algebras over a field of characteristic 0 by claiming the existence of a family of homogeneous generators and a total order on the index set that satisfy some excellent conditions. The approach to the structure theorem is based on the combinatorial properties of Lyndon words and the standard bracketing on words. As consequences of the structure theorem, we will show that connected graded Hopf algebras of finite Gelfand-Kirillov dimension over a field of characteristic 0 are all iterated Hopf Ore extensions of the base field as well as some keystone facts of connected Hopf algebras over a field of characteristic 0. This is a Joint work with Di-Ming Lu and Yuan Shen.