

Journées Groupes Quantiques : Programme et résumés - Schedule and abstracts
IRMA, 14-16 Février 2008

Jeudi 14-02-2008

09:30 - 10:30

Julien Bichon (Université Blaise Pascal, Clermont-Ferrand)
Hopf-Galois objects and integration formulae

I will give a simple and straightforward introduction to Hopf-Galois objects using the formalism of cogroupoids, and speculate on their possible use to provide concrete integration formulae on quantum groups.

11:00 - 12:00

Teodor Banica (IMT, Toulouse)
Combinatorial aspects of free quantum groups

The free quantum algebras $A_o(n)$, $A_u(n)$, $A_s(n)$ were introduced by Wang in the mid-nineties, and have been intensively studied since then. In the first part of the talk I will discuss the basic properties of these algebras. In the second part I will discuss a number of versions and generalizations (quantum permutation algebras, free quantum algebras).

14:30 - 15:30

Benoît Collins (ENS, Lyon)
Weingarten calculus and combinatorics of free probability

We will review representation theoretic methods allowing to evaluate the Haar integral of any polynomial function over a compact (quantum) group, nowadays known as Weingarten calculus. Time allowing, we will also review notions of free probability, giving insight into the asymptotic behaviour of integrals over free quantum groups. This talk is introductory and should be complementing the talk of Teo Banica.

16:00 - 17:00

Peter Schauenburg (LMU, Munich)
Aspects of braided Hopf-Galois theory

We report on the theory of Hopf-Galois objects over Hopf algebras in a braided tensor category. In particular, these are related to ordinary Hopf-Galois objects in the case of Yetter-Drinfeld Hopf algebras. We also consider a notion of cocommutative Hopf-bi-Galois object that arises if the braided Hopf algebra in consideration is cocommutative in a certain sense.

Vendredi 15-02-2008

09:30 - 10:30

Hans-Jurgen Schneider (LMU, Munich)
Nichols algebras and the Weyl groupoid

First I will give a short introduction to Nichols algebras of Yetter-Drinfeld modules over arbitrary Hopf algebras H . To understand Nichols algebras over group algebras is the first fundamental step to classify pointed Hopf algebras. The plus part of the Drinfeld-Jimbo quantum group of a semisimple Lie algebra is an important example of a Nichols algebra where H is the group algebra of a free abelian group of finite rank. Then I will discuss recent joint work with N. Andruskiewitsch and I. Heckenberger. We define and investigate the Weyl groupoid of a finite-dimensional Nichols algebra of a semisimple Yetter-Drinfeld module. The crucial ingredient is a "reflection" in the class of such Nichols algebras. As an application we conclude the classification of finite-dimensional pointed Hopf algebras over the symmetric group S_3 , and of finite-dimensional Nichols algebras over S_4 .

11:00 - 12:00

Andreas Thom (Georg-August-Universität Göttingen)
L2-Invariants for groups and quantum groups

I will give a survey about possibilities to study infinite discrete groups using L2-invariants. Many concepts and questions have natural generalizations in the context of quantum groups.

14:00 - 15:00

Roland Vergnioux (LMNO, Caen)
Cayley graphs and free quantum groups

I will recall the construction of the classical and quantum Cayley graphs associated to a discrete quantum group. I will then present some of their geometrical features (growth, boundary, length,...) and explain how they can be used to derive operator-algebraic properties of the corresponding quantum groups, in particular for free quantum groups.

15:15 - 16:15

Pierre Fima (Université de Franche-Comté, Besançon)
Twisting and Rieffel's deformation of locally compact quantum groups

We develop the twisting construction for locally compact quantum groups with a bicharacter on an abelian subgroup. A new feature in contrast with previous work on this subject is a non-trivial deformation of the Haar measure. Then we construct Rieffel's deformation of locally compact quantum groups and we compute the left Haar measure. This allows us to give new interesting concrete examples of locally compact quantum groups: new deformations of the $az+baz+b$ group.

16:45 - 17:45

Thomas Aubriot (IMB, Dijon)

On the classification of Galois objects viewed as fibre functors

We will show how the point of view of monoidal categories and precisely fibre functors can be used in the classification of the Galois objects of a Hopf algebra. We will present this idea via two very different examples where the Hopf algebras are the infinite dimensional quantum groups $O_q(SL(2))$ and where the Hopf algebras are neither pointed nor semisimple finite dimensional Hopf algebras.

Samedi 16-02-2008

09:30 - 10:30

Johannes Härtel (Georg-August-Universität Göttingen)

Gröbner basis and resolution for the orthogonal free quantum group $Ao(n)$.

(joint work with I. Yudin). We apply the theory of Gröbner bases for non-commutative algebras to the orthogonal free quantum group $Ao(n)$. We thus provide a complete reduction system with which we can identify normal forms in the free algebra F_n^2 , i.e. we solve the word problem for $Ao(n)$. These elements form a linear basis for $Ao(n)$. As further application we construct a free resolution of the 1-dim- $Ao(n)$ modules and compute their Hochschild homologies.

10:45 - 11:45

Christian Kassel (IRMA, Strasbourg)

Hopf Galois objects and polynomial identities

(joint work with Eli Aljadeff). Polynomial identities are a powerful tool to investigate noncommutative algebras. I'll show how to define polynomial identities in the context of Hopf Galois objects and how to use them to construct versal families of such objects.