

## Conference on von Neumann Algebras and Related Topics

January 9 (Mon) — January 13 (Fri), 2012

Room 420, RIMS, Kyoto University

Organizers: M. Izumi, Y. Kawahigashi, H. Matui, H. Okamoto, N. Ozawa, Y. Ueda

	January 9	January 10	January 11	January 12	January 13
9:40 – 10:30	Haagerup	Popa	Ozawa	Doplicher	Voiculescu
11:00 – 11:50	Xu	Vaes	Monod	Carpi	Dykema
13:20 – 14:10	Bisch	Izumi		Ogata	Peterson
14:30 – 15:20	Morrison	Kida		Wenzl	Sinclair
15:50 – 16:40	Evans	Ueda		Tomatsu	Houdayer
17:00 – 17:50	Tanimoto	Dabrowski		Masuda	

Dietmar Bisch (Vanderbilt University)

Composition of subfactors, and planar algebras

Sebastiano Carpi (Universita di Chieti-Pescara ‘G. d’Annunzio’)

Operator algebras and the characters of the discrete series of  $N = 2$  super-Virasoro algebra representations

Yoann Dabrowski (Université Lyon 1)

New applications of random matrices and free processes to free entropy

Abstract: First, we will explain how the use of classical entropy of random matrices instead of volumes of microstates enables us to solve old problems for microstate free entropy. Especially we produce a concavification of Voiculescu’s free entropy and we extend orbital free entropy to not necessarily hyperfinite multivariables. As a consequence we solve an old problem for microstate free entropy, in proving that additivity of microstate free entropy implies freeness (in the block multivariable case). This part of the talk comes from a joint work with P. Biane.

Second, we will explain how several problems for non-microstate free entropy can be attacked in thinking in terms of conjugate variables of processes and in terms of the free analogues of relative entropy of a process with respect to Wiener measure. These problems contain changes of variables for non-microstate free entropy, free LSI with respect to convex potentials, inequalities with mutual information or microstate variants. We will explain our progresses in completing this program.

Sergio Doplicher (University of Rome ‘La Sapienza’)

Superselection structure in Local Quantum Theories with (neutral) massless particle

Abstract: Joint work in progress with Detlev Buchholz and John E. Roberts. We study the superselection structure in theories with massless particles which do not carry superselection quantum numbers. The results valid in the massive case do extend, in particular we have the intrinsic notion of particle statistics of superselection sectors, and the existence of a unique compact group, dual to the superselection structure. Problems with covariance and spectrum condition remain in the case of non simple sectors (i.e. obeying a parastatistics).

Ken Dykema (Texas A&M University)

Some partial answers to natural questions about  $\text{II}_1$  factors

Abstract: The following are natural questions in a  $\text{II}_1$ -factor  $M$ , because their direct analogues in  $M_n(\mathbb{C})$  have positive answers.

(a) Is every element in  $M$  whose trace value is zero equal to a single commutator of elements of  $M$ ?

(b) If  $A$  is a masa in  $M$  and if an element  $x$  of  $A$  is positive and of norm  $\leq 1$ , is there a projection  $p$  in  $M$  such that  $E_A(p) = x$ , where  $E_A$  is the trace-preserving conditional expectation onto  $A$ ?

Both questions are still open, and in this talk we'll discuss some partial answers and a related question.

We'll discuss partial answers to (a), from joint work with Anna Skripka.

Question (b) is known as the carpenter problem, thus named by R.V. Kadison. It is a particular case of the Schur-Horn problem in  $\text{II}_1$ -factors, which was formulated by Arveson and Kadison. We'll discuss answers to the carpenter and Schur-Horn problems in some cases, from joint work with Junsheng Fang, Don Hadwin and Roger Smith.

David Evans (Cardiff University)

TBA

Uffe Haagerup (University of Copenhagen)

Approximation properties for groups and von Neumann algebras

Abstract: This talk is about recent advances concerning approximation properties for groups and group von Neumann algebras. In 1994 Jon Kraus and I introduced a new approximation property (AP) for locally compact groups and we proved that for discrete groups AP is equivalent to the property  $W^*$ -OAP of Effros and Ruan for the group von Neumann algebra. Recently Vincent Lafforgue and Michael de la Salle has proved that  $SL(n, \mathbb{R})$  and  $SL(n, \mathbb{Z})$  does not have the property AP for  $n \geq 3$ . In a joint work with Tim de Laat we extend their result by proving that  $Sp(2, \mathbb{R})$  and more generally all simple connected Lie groups of real rank  $\geq 2$  and with finite center do not have the AP. The proof uses some careful estimates of Jacobi polynomials obtained in collaboration with Henrik Shlichtkrull.

Cyril Houdayer (Ecole Normale Supérieure de Lyon)

Indecomposability of nonsingular equivalence relations and von Neumann algebras

Masaki Izumi (Kyoto University)

Subfactors of index 5 and beyond 5

Yoshikata Kida (Kyoto University)

Invariants for orbit equivalence relations of Baumslag-Solitar groups

Toshihiko Masuda (Kyushu University)

Rohlin flows on injective factors

Nicolas Monod (Ecole Polytechnique Fédérale de Lausanne)  
Fixed points and derivations

Scott Morrison (University of California, Berkeley)  
On the classification of small index subfactors

Yoshiko Ogata (University of Tokyo)  
Non-Equilibrium Statistical Mechanics

Narutaka Ozawa (RIMS, Kyoto University)  
Survey on weak amenability for groups

Jesse Peterson (Vanderbilt University)  
TBA

Sorin Popa (University of California, Los Angeles)  
On the Cartan decomposition of  $II_1$  factors

Abstract: I will review the known results on the existence/absence of Cartan subalgebras in  $II_1$  factors and on the uniqueness of such a subalgebra, when it exists. I will also discuss some open problems on this subject.

Thomas Sinclair (University of California, Los Angeles)  
 $II_1$  factors of hyperbolic groups

Yoh Tanimoto (Universität Göttingen)

Construction of wedge-local nets through Longo-Witten endomorphisms

Abstract: Longo and Witten have studied a certain kind of endomorphisms of the chiral component of the free massless field algebra to construct nets of von Neumann algebras on two-dimensional spacetime with boundary. We find that it is possible to construct wedge-local nets on two-dimensional spacetime without boundary using such endomorphisms. It turns out that these constructions coincide with the deformed nets recently investigated by Lechner. We further construct a new family of endomorphisms and accordingly new wedge-local nets.

Reiji Tomatsu (Hokkaido University)

Classification of actions of amenable discrete Kac algebras on injective factors

Yoshimichi Ueda (Kyushu University)

Free product von Neumann algebras: with special emphasis on type III factors

Stefaan Vaes (Katholieke Universiteit Leuven)

Unique Cartan decomposition for  $II_1$  factors arising from arbitrary actions of free groups

Dan Voiculescu (University of California, Berkeley)

Is there a mod Hilbert-Schmidt BDF-type theorem for operators with trace-class self-commutator ?

Hans Wenzl (University of California, San Diego)  
Subfactors from non-standard  $q$ -deformations of Lie algebras

Feng Xu (University of California, Riverside)  
On problems related to Wall conjecture