

Operator algebras conference in memory of Étienne Blanchard

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Université Paris Diderot

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Groupoid extensions, group bundles and weights

Auteur: Jean Renault¹

¹ Univ. Orléans

We give a groupoid version of Mackey normal subgroup analysis in a *C-algebraic framework*. More precisely, we describe the *C-algebra* of a groupoid which is an extension by a group bundle. When the group bundle is abelian, one obtains a twisted groupoid *C-algebra*. *C-bundles* and the canonical weight of a group bundle play a crucial role in this study. This is joint work with M. Ionescu, A. Kumjian, A. Sims and D. Williams.

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Around the functional equation

Auteur: Ryszard Nest¹

¹ Univ. Copenhagen

The functional equation for the Riemann zeta function is based on analysis of asymptotic behaviour for $t \approx 0$ of expression like $\text{Tr}(\exp(-zD^2))$, where D is, say, an elliptic operator on a smooth closed manifold M . In particular, it depends heavily on the fact that the expressions like $\text{Tr}(\exp(-zD^2))$ have Melin transform which is holomorphic on a subspace of the complex plane of the form $\text{Re}(z) > C$, which is a consequence of finite dimensionality of M . We will construct an analogue of the meromorphic extension of the Riemann zeta function and prove the corresponding functional equation in the infinite dimensional limit case.

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NCG, Schur and Hadamard products

Auteur: Erik Christensen¹

¹ Univ. Copenhagen

Commutators in NCG like $[D, a]$ take the form of a Schur multiplication $((\lambda_i - \lambda_j)a_{ij})$. Schur multiplication of matrices is also named Hadamard multiplication. It is shown that inside many C^* -algebras, which have the form of a crossed product of a C^* -algebra by a discrete group, the obvious Hadamard product, given as $(\sum_g U_g a_g) \star_H (\sum_g U_g b_g) := \sum_g U_g a_g b_g$, has many nice properties such as having a Stinespring representation, and the Schur product is a special case of this.

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Conjecture de Baum-Connes et variétés de drapeaux

Auteur: Pierre Julg¹

¹ Université d'Orléans

On se pose la question de la conjecture de Baum-Connes à coefficients pour un groupe de Lie (semi)simple. Jusqu'à présent les seuls cas connus sont ceux de $SO(n,1)$ et $SU(n,1)$ qui ont la propriété de Haagerup ou a-T-moyennabilité. De vieux papiers de Kasparov (1984) et Kasparov-Julg (1994) ont traité ces groupes en considérant les variétés de drapeaux et leur géométrie. Je tenterai d'expliquer mon programme d'attaque du cas de $Sp(n,1)$. On y parlera de complexe BGG, de calcul pseudodifférentiel inhomogène et de cohomologie L^2 d'espaces symétriques.

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The Baum-Connes conjecture and Oka's principle

Auteur: Maria Gomez-Aparicio¹

¹ *Univ. Paris-Sud*

The Baum-Connes conjecture with coefficients is still open for higher rank Lie groups as this groups satisfy a variant of Lafforgue's Strong property (T) which prevents one to apply the methods that have been used so far to prove the conjecture. Nonetheless, a direction that is still open concerns applying the ideas of Bost, who defined a version of Oka principle in Noncommutative Geometry. In this talk, I will give a short survey on the conjecture and I will explain the statement linking it to Oka's principle.

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K-computability and propagation for operator algebras

Auteur: Hervé Oyono-Oyono¹

¹ *Univ. Lorraine*

In this lecture, we discuss some strategy to compute the K-theory of operator algebras equipped with a propagation structure. Prominent examples of such algebras are provided by Roe algebras, group *C-algebras and cross-products C-algebras*. The main tools we use to achieve this goal is quantitative K-theory and in this framework, coarse Mayer-Vietoris controlled exact sequences.

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Couple assorti de groupes localement localement compacts : cas d'une intersection quelconque

Auteur: Saad Baaj¹

¹ *Univ. Clermont-Auvergne*

A tout couple assorti de groupes localement compacts d'intersection quelconque, nous associons un groupoïde quantique au sens de Enock-Lesieur. Nous calculons les algèbres de Hopf-Von Neumann faibles sous-jacentes à ce groupoïde et nous montrons que la représentation régulière de ce groupoïde est donnée par une transformation pentagonale explicite.

Cette construction généralise le cas d'une intersection triviale (travaux de Baaj-Skandalis et Vaes-Vainerman) et celui d'un couple assorti de groupes finis (travail de J-M Vallin)

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Random walks and boundaries of free quantum groups

Auteur: Roland Vergnioux¹

¹ *Université de Caen Normandie*

I will review old results about probabilistic boundaries of free quantum groups and present some ongoing work about unique stationarity and convergence to the boundary.

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Random walks and quantum groups

Auteur: Amaury Freslon¹

¹ *Univ. Paris Sud*

We will discuss two basic problems concerning random walks on compact quantum groups. The first one is to find the possible limits of such a walk and I will explain how this problem is connected, in the finite case, to works of Etienne in collaboration with S. Baaj and G. Skandalis. The second one concerns the speed of convergence to the limit and I will detail some recent results as well as related open problems.

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Classifying (Weak) Coideal Subalgebras of Weak Hopf C^* -Algebras

Auteur: Leonid Vainerman¹

¹ *Université de Caen Normandie*

We develop a general approach to the problem of classification of weak coideal C -subalgebras of weak Hopf C -algebras. As an example, we completely classify these weak coideals in the case of weak Hopf C^* -algebras associated with Tambara Yamagami categories (in common with J.M.Vallin).

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On countable dense subgroups of the group of isometries of the Urysohn's space.

Auteur: Pierre Fima¹

¹ *Univ. Paris Diderot*

We show that many groups acting on trees are isomorphic to a dense subgroup of the group of isometries of the bounded Urysohn's space. This includes any free products of two infinite countable groups as well as surface groups. We also study the case of the unbounded Urysohn's space. This is a joint work with François Le Maître, Julien Melleray and Soyoung Moon.

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A Higher Rho Invariant for Nonisometric Flat Vector Bundles

Auteur: Yi-Jun Yao¹

¹ *Fudan University*

Using the localization algebras introduced by Guoliang Yu, one can define a higher rho invariant for a class of operators.

This is a collaboration with Xiang Tang, Zhizhang Xie and Guoliang Yu.

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Inverting the assembly map (after S. Nishikawa)

Auteur: Alain Valette¹

¹ *Univ. Neuchâtel*

In a recent preprint (<https://arxiv.org/abs/1808.08298>), Nishikawa introduces a property (γ) for elements x in the Kasparov ring $R(G)$: it says that the Fredholm module defining x carries a compatible action of $C_0(X)$, where X is a G -compact model for the classifying space for proper actions of G . The basic observation is that x then defines a morphism $K_*(C_r^*(G)) \rightarrow KK^G(C_0(X), C)$, that is a candidate for a right inverse for the Baum-Connes assembly map. It is proved that, if $x = 1$ in $R(G)$, it is indeed the case. Using this, new proofs of the Baum-Connes conjecture with coefficients are obtained for Euclidean motion groups, and for groups acting properly co-compactly on locally finite trees.

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How to hear the shape of a drum.

Auteur: Fabio Cipriani¹

¹ *Pol. Milano*

The aim of the talk is to show how to recognize conformal maps between Euclidean domains as those homeomorphisms which transform multipliers of the Sobolev-Dirichlet spaces of a domain into multipliers of the other and leave invariant the fundamental tone or first nonzero eigenvalue of the Dirichlet integral with respect to the energy measures of any multiplier. Related results hold true for quasiconformal and bounded distortion maps.

In the opposite direction, we prove that the trace of the Dirichlet integral, with respect to the energy measure of a multiplier, is a Dirichlet space that only depends upon the orbit of the conformal group of the Euclidean space on the multiplier algebra.

The methods involve potential theory of Dirichlet forms (changing of speed measure, multipliers) and the Li-Yau conformal volume of Riemannian manifolds.

This is work in collaboration with Jean-Luc Sauvageot

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A version of almost finiteness for non-commutative coefficient algebras.

Auteur: Joachim Zacharias¹

¹ *Univ. Glasgow*

Almost finiteness is an amenability or Rokhlin approximation type condition for group actions or groupoids which has turned out to be closely connected to Z-stability for the corresponding crossed product. Z-stability is one of the central classifiability conditions for nuclear simple separable C^* -algebras. We explore a version of the notion of almost finiteness for actions of discrete amenable groups on non-commutative algebras leading to similar results, in particular to Z-stability of the associated crossed product. (joint with J. Bosa, F. Perera and J. Wu)

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The ring of integers and C^* -algebras.

Auteur: Joachim Cuntz¹

¹ *Univ. Munster*

Among the most basic structures in mathematics are the sets of natural numbers and of integers with their operations of addition and multiplication. These structures give rise, in a completely natural way, to *C-algebras with intriguing properties*. The study of these *C*-algebras and in particular of their K-theoretical invariants reveals close connections with algebraic number theory. These connections can be extended, from the usual ring of integers to rings of algebraic integers in number fields.

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Spectral decompositions in finite von Neumann algebras

Auteur: Ken Dykema¹

¹ *Univ. Texas A&M*

Linear operators on finite dimensional spaces can be analyzed in terms of their spectra using Schur's upper triangular form and Jordan's canonical form. Regarding spectral analysis for operators on infinite dimensional Banach spaces, Dunford (in the 1950's) introduced the notions of spectral operators and operators of scalar type, while Apostol and Foias (in the 1960's) introduced the notion of decomposable operators. About a decade ago, Haagerup and Schultz, studying elements of finite von Neumann algebras, proved existence of invariant projections that behave well with respect to Brown measure, which is a sort of spectral distribution. We use these invariant projections to construct analogues of Schur's upper triangular forms for such operators, and explore connections to decomposability and spectrality of elements of finite von Neumann algebras. This includes joint work with Ian Charlesworth, Amudhan Krishnaswamy-Usha, Joseph Noles, Fedor Sukochev and Dmitriy Zanin.

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Homotopie combinatoire, carquois et norme de Gromov

Auteur: Alain Connes¹

¹ *IHES*

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Laplacians for smooth generalised distributions

Auteur: Iakovos Androulidakis¹

¹ *University of Athens*

We report on recent work with Yuri Kordyukov, concerning the construction of Laplacians for an arbitrary smooth generalised distribution (of non-constant rank), for instance the distributions appearing in sub-Riemannian geometry. For any distribution as such, we construct Riemannian metrics in a smooth way. This allows us to construct a sum of squares type Laplacian along the distribution, whose symbol is commutative. The Chernoff self-adjointness criterion applies for these operators. Moreover, viewing such Laplacians in the longitudinal pseudo-differential calculus of the smallest singular foliation containing the distribution, we prove its hypoellipticity. Finally, we generalise the Rothschild-Stein parametrix construction for these operators.

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A Baum–Connes conjecture localised at the unit element of a discrete group.

Auteur: Sara Azzali¹

¹ *Univ. Potsdam*

Let Γ be a discrete group. In this talk, we study a variant of the Baum–Connes isomorphism conjecture which can be called ‘localised at the unit element’ of Γ .

The localised assembly map is constructed in KK-theory with coefficients in \mathbb{R} . These KK-groups are natural receptacles of elements coming from traces on C^* -algebras.

We show that the localised Baum–Connes conjecture is weaker than the classical Baum–Connes conjecture but still implies the strong Novikov conjecture. Moreover, it does not see the difference between the reduced and maximal group C^* -algebras.

We explain these constructions and show the relation with the Novikov conjecture by explicitly comparing at the level of K-homology with real coefficients, the classifying space for free and proper actions $E\Gamma$ with the classifying space for proper actions $\underline{E}\Gamma$. This is joint work with Paolo Antonini and Georges Skandalis.

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Sur les travaux d’Etienne Blanchard

Auteurs: Claire Anantharaman¹; Georges Skandalis²

¹ *Université d’Orléans*

² *Université Paris Diderot*

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Non-closure of quantum correlation matrices and certain factorizable maps, traces on free product C^* -algebras, and the Connes Embedding Problem

Auteur: Mikael Rordam¹

¹ *Univ. Copenhagen*

We show that the convex set of factorizable quantum channels on a fixed matrix algebra of size at least 11 which factor through finite dimensional C^* -algebras is non-closed, and that there exist factorizable quantum channels on matrix algebras that require an ancilla of type II_1 . We also give a simplified proof of the result by Dykema, Paulsen and Prakash that the set of synchronous quantum correlations $C_q^s(5, 2)$ is non-closed. One can describe factorizable quantum channels on a given matrix algebra in terms of traces on the unital free product of that matrix algebra with itself. We give a description of which of these traces correspond to factorizable maps that can be approximated by ones with finite dimensional ancilla, and we relate this to the Connes Embedding Problem.

This is joint work with Magdalena Musat.

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Irreducible amenable subalgebras and Connes' bicentralizer problem

Auteur: Cyril Houdayer¹

¹ *Univ. Paris Sud*

We investigate the structure of irreducible inclusions of type III factors. We relate the problem of existence of irreducible amenable subalgebras to Connes' bicentralizer problem. Among other results, we prove a relative version of Haagerup's bicentralizer theorem and use it to solve Kadison's problem for discrete inclusions. Based on joint work with H. Ando, U. Haagerup and A. Marrakchi.

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Ergodicity and type of nonsingular Bernoulli actions

Auteur: Stefaan Vaes¹

¹ *KU Leuven*

I present a joint work with Michael Björklund and Zemer Kosloff on nonsingular Bernoulli actions. These are the translation actions of a discrete group G on the product space $\{0, 1\}^G$ equipped with the product of the probability measures μ_g on $\{0, 1\}$. We prove in almost complete generality that such an action is either dissipative or weakly mixing, and we determine its Krieger type. In particular, we prove that the group of integers does not admit a Bernoulli action of type II_∞ . We prove that a group G admits a Bernoulli action of type III_1 if and only if G has nonzero first L^2 -cohomology. We also prove that type III_λ only arises when G has more than one end.