

Special Week on Operator Algebras

June 17–June 21, 2013

Research Center for Operator Algebras
East China Normal University, Shanghai, China

Abstracts

Liming Ge (University of New Hampshire)

Title: *Uncertainty principle for abelian groups.*

Abstract: TBA.

Guihua Gong (University of Puerto Rico)

Title: *Classification of simple C^* -algebras of generalized tracial rank one.*

Abstract: In this talk, I will present a classification theorem of unital C^* -algebras of generalized tracial rank one. In the level of Elliott Invariant, this class cover all the Elliott invariant of simple, separable, nuclear, stably finite, Jiang-Su stable C^* -algebras. This is a joint work with Huaxin Lin and Zhuang Niu.

Uffe Haagerup (University of Copenhagen)

Title: *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. In 2011 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 from 2012, we extend their result by proving that $Sp(2, \mathbb{R})$ and more generally all simple connected Lie groups of real rank ≥ 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. In a second paper (in preparation) Tim de Laat and I have now removed the finite center condition from our result from 2012.

Ja A Jeong (Seoul National University)

Title: *Cuntz-Krieger Algebras associated with Labeled Graphs.*

Abstract: As a generalization of the Cuntz-Krieger algebras a class of C^* -algebras associated with directed graphs has been investigated by many authors for the past about fifteen years while other generalizations that engage infinite matrices, ultragraphs, or higher rank graphs also made significant progress. In this talk, I will review main results known for graph C^* -algebras and then discuss about similar results that hold for labeled graph C^* -algebras which was recently introduced by Bates and Pask.

Dan Li (Max Planck Institute)

Title: *Harper operators: their geometry and physics.*

Abstract: I will discuss about the spectral theory of Harper operators, as a discretized model of magnetic Laplacians, from the point of view of algebraic geometry. The geometry of an associated family of Bloch varieties will be described, which is an ind-pro-variety and Cantor-like geometric space. The density of states over approximating components can be expressed in terms of period integrals over Fermi curves, and it satisfies a Picard-Fuchs equation. A mirror map is derived based on mirror symmetry of elliptic curves, which further gives a q -expansion of the energy level for the electronic model.

Magdalena Musat (Universitat of Copenhagen)

Title: *Factorizable completely positive maps and the Connes embedding problem.*

Abstract: The class of factorizable completely positive maps (originating in work of C. Anantharaman-Delaroche) has gained particular significance in quantum information theory in connection with the settling (in the negative) of the asymptotic quantum Birkhoff conjecture. More precisely, in joint work with Uffe Haagerup we proved earlier that every non-factorizable unital completely positive and trace-preserving map on $M_n(\mathbb{C})$, $n \geq 3$, provides a counterexample for the conjecture.

We will explain a recently established connection to the Connes embedding problem in terms of a newly formulated asymptotic property of factorizable maps.

Zhuang Niu (University of Wyoming)

Title: *C^* -algebras of certain non-minimal homeomorphisms on a Cantor set.*

Abstract: We shall consider a homeomorphism on a Cantor set with finitely many minimal invariant closed subsets (assume none of them are clopen), and consider the crossed-product C^* -algebra and certain sub-algebras. It turns out that if the Cantor system has more than two minimal subsets, then the dimension group of the ideal (corresponding to the standard invariant open set) of the Bratteli-Vershik model must contain infinitesimal elements. Using these infinitesimal elements, a necessary-and-sufficient condition is given on certain (unordered) Bratteli

diagrams so that they can be ordered to model Cantor systems with finitely many minimal subset (This is a joint work with Sergey Bezuglyi and Wei Sun).

Hiroiyuki Osaka (Ritsumeikan University)

Title: *LP property for C^* -algebras.*

Abstract: A C^* -algebra is said to have the LP property if the linear span of projections is dense in a given algebra. It is well-known that the LP property of a C^* -algebra A is inherited to the matrix tensor product $M_n(A)$ and the quotient $\pi(A)$ for any $*$ -homomorphism π . But it is not stable under the hereditary subalgebra of A . We discuss LP property for AH algebras, fixed point algebras and crossed product algebras by finite groups. This is a joint work with Dinh Trung Hoa and Toan Minh Ho.

Hervé Oyono-Oyono (University of Lorraine)

Title: *Persistent Approximation Property for C^* -algebras with propagation.*

Abstract: The study of elliptic differential operators from the point of view of index theory and its generalisations to higher order indices gives rise to C^* -algebras where propagation makes sense and encodes the underlying large scale geometry. Prominent examples for such C^* -algebras are Roe algebras, group C^* -algebras and crossed product C^* -algebras. Unfortunately, K-theory for operator algebras does not keep track of these propagation properties. Together with G. Yu, we have developed a quantitative version of K-theory that takes into account propagation phenomena. In this lecture we explain that in many cases, these quantitative K-theory groups approximate in a particular relevant way the K-theory. We also discuss connection with the Baum-Connes and the Novikov conjecture.

Mikael Rordam (University of Copenhagen)

Title: *Central sequences and tensorial absorption of the Jiang-Su algebra.*

Abstract: Matui and Sato proved that a simple separable nuclear unital C^* -algebra with finite dimensional trace simplex absorbs the Jiang-Su algebra if and only if it has strict comparison of positive elements. In a joint work with Eberhard Kirchberg we extend this result by relaxing the assumption on the trace simplex and the assumption on strict comparison. We shall also discuss some properties of the central sequence algebra.

Zhong-jin Ruan (University of Illinois at Urbana-Champaign)

Title: *Multipliers of locally compact groups and quantum groups.*

Abstract: I will first recall some properties of Schur multipliers and Herz-Schur multipliers on discrete and general locally compact groups. There is a natural group action on the Schur

multiplier algebra. I will show that a group G is amenable if and only if there is a fixed point property for this action. This result can also be generalized to the case of locally compact quantum groups.

Qin Wang (East China Normal University)

Title: *Some progress on the coarse Novikov conjecture .*

Abstract: The coarse Novikov conjecture is a geometric analogue of the (strong) Novikov conjecture and provides an algorithm for determining non-vanishing of the higher indices of (generalized) elliptic differential operators on non-compact complete Riemannian manifolds. It has many applications in topology and geometry. In particular, it implies the Gromov conjecture on non-existence of positive scalar curvature metrics on uniformly contractible complete Riemannian manifolds. In this talk, we will report some recent progress on the coarse Novikov conjecture .

Yasuhiko Sato (Kyoto University)

Title: *Decomposition rank of UHF-absorbing C^* -algebras.*

Abstract: Let A be a unital separable simple C^* -algebras with a unique tracial state. We prove that if A is nuclear and quasidiagonal, then A tensored with the universal UHF-algebra has decomposition rank at most one. Then it is proved that A is nuclear, quasidiagonal and has strict comparison if and only if A has finite decomposition rank. For such A , we also give a direct proof that A tensored with a UHF-algebra has tracial rank zero.

Wei Sun (East China Normal University)

Title: *The relationship between approximate conjugacies and K -theory for certain dynamical systems.*

Abstract: For certain minimal dynamical systems, we studied the K -theory of the corresponding crossed product C^* -algebras. A sufficient condition for approximate conjugacy is given. The relationship between “approximate conjugacies” and the K -theory of the crossed products is also studied.

Feng Xu (University of California)

Title: *On questions about intermediate subfactors.*

Abstract: In this talk I will describe some questions about intermediate subfactors motivated by group theory and report on recent progress.

Yijun Yao (Fudan University)

Title: *On K-theory of some noncommutative orbifolds .*

Abstract: In this talk(based on our joint work with Xiang Tang), we plan to discuss the computation of K-theory groups of some crossed-product C^* -algebras, by using an equivariant version of Rieffel's strict deformation.

Guoliang Yu (Vanderbilt University)

Title: *Finite part of K-theory for group C^* -algebras and its applications.*

Abstract: I will discuss the computation of the finite part of K-theory for group C^* -algebras and discuss its applications to topology and geometry. I will make an effort for this talk to be accessible to graduate students.