Titles and abstracts in alphabetical order

Francesca Arici

An operator algebraic approach to the topology of sphere bundles

Abstract: Cuntz–Pimsner algebras of self Morita equivalences can be thought of as total spaces of quantum circle bundles, and the associated six term exact sequence in K-theory can be interpreted as an operator algebraic version of the classical Gysin sequence for circle bundles. Is there hope to extend these results to higher dimensional sphere bundles?
In this talk I will provide a partial answer to this question: after reviewing the circle bundle case, I will report on work in progress concerning the construction of higher dimensional (quantum) sphere bundles in terms of Cuntz–Pimsner algebras of sub-product systems. Based on (ongoing) joint work with G. Landi and J. Kaad.

Arnaud Brothier

Jones representations of Thompson groups

Abstract:Thompson group F is the group of homeomorphisms of [0; 1] that are piecewise linear with slopes equal to a power of 2 and breakpoints a dyadic rational. While being one of the most studied discrete groups, it still remains allusive. By investigating constructions of conformal field theories, Jones recently discovered a large class of unitary representations of Thompson group F and other related groups (such as Thompson groups T, V, etc.). Those representations are constructed via a very flexible category/functor method. Many examples are given by Jones planar algebra framework as well as certain couples of operators. I will describe concrete examples of such representations and present some ongoing research.This is a joint work with Jones.

Marius Dadarlat

K-homology, connectivity and duality

Abstract: We will discuss realizations of K-homology of separable C*-algebras in terms of one-parameter families of asymptotic morphisms and will present a new picture of K-homology in the context of K-theoretic duality.The talk is based on joint work with Ulrich Pennig, and with Rufus Willett and Jianchao Wu.

Caleb Eckhardt

An introduction to nuclear and quasidiagonal C*-algebras via noncommutative tori

Abstract: I will discuss some basic features of nuclear C*-algebras including lifting theorems, amenable traces and nuclear dimension.Then I'll discuss quasidiagonality of C*-algebras and quasidiagonal traces. We'll examine the basic characterizations of "nuclear+quasidiagonal" and "nuclear+quasidiagonal trace" in terms of ultrapowers and/or corona algebras. Weaved

throughout all lectures will be a discussion of noncommutative tori and how the notions of nuclearity, finite nuclear dimension and quasidiagonal traces are displayed in these algebras.

Alexander Engel

Boundaries of spaces and groups

Abstract: We propose a C*-algebraic construction of boundaries of spaces and groups. It unifies the constructions of the boundaries of hyperbolic and CAT(0) spaces and of systolic complexes.

James Gabe

Traceless AF embeddings and unsuspended E-theory

Abstract: A major open problem in C*-algebras is whether any separable, exact, quasidiagonal C*-algebra is AF embeddable, i.e. admits an embedding into an AF-algebra. Ozawa proved that the cone and the suspension of any separable, exact C*-algebra is AF embeddable, and therefore, surprisingly, many traceless C*-algebras turn out to be AF embeddable. I show that for separable, exact, traceless C*-algebras, AF embeddability and quasidiagonality are equivalent conditions which are characterised by the primitive ideal space. By appealing to a recent theorem of Dadarlat and Pennig, I also show that for nuclear C*-algebras the primitive ideal space characterises exactly when Connes and Higson's E-theory can be unsuspended.

Eusebio Gardella

The classification problem for free ergodic actions

Abstract: One of the basic problems in ergodic theory is to determine when two measure-preserving transformations of the atomless Borel probability space are orbit equivalence. Since any two such actions of an amenable group are orbit equivalent by classical results of Dye and Ornstein-Weiss, the question is relevant only in the non-amenable case. In this direction, we show that, for every nonamenable countable discrete group, the relations of conjugacy and orbit equivalence of free ergodic actions are not Borel, thus answering questions of Kechris. The statement about conjugacy solves the nonamenable case of Halmos' conjugacy problem in Ergodic Theory, originally posed in 1956 for ergodic transformations. This is joint work with Martino Lupini.

Elizabeth Gillaspy

Monic representations for higher-rank graphs

Abstract: In the setting of Cuntz and Cuntz--Krieger algebras, monic representations have been studied extensively by Jorgensen and collaborators. We extend the theory of monic representations to the C*-algebras of higher-rank graphs, and we classify them (a new result

even in the Cuntz--Krieger setting). Our main result shows that every monic representation of $C^*(\Lambda)$ arises from a Λ-semibranching function system. We also show, using a variety of examples, how to use measure-theoretic properties of Λ-semibranching function systems to identify when the associated representation of $C^*(\Lambda)$ is monic.This is joint work with Carla Farsi, Sooran Kang, Palle Jorgensen, and Judith Packer.

Ilan Hirshberg

Nuclear dimension for transformation group C*-algebras

Abstract: I will survey ongoing work concerning permanence of finite nuclear dimension under crossed products by possibly non-free actions of flows and finitely generated nilpotent groups.This is joint work with Jianchao Wu.

David Kerr

Small boundary properties and the classification of crossed products

Abstract: I will discuss how the small boundary property, in both its measure-theoretic and topological versions, relates to finite approximation in topological dynamics and the classification of crossed product C*-algebras. The talk is based on joint work with Gabor Szabo.

Xin Li

Cartan subalgebras in C*-algebras

Abstract: I will start with an introduction to groupoid C*-algebras and Cartan subalgebras. I will then explain how these notions build bridges to topological dynamics and geometric group theory. Finally, I will discuss the connection between Cartan subalgebras and the UCT question, and describe how to construct Cartan subalgebras in classifiable C*-algebras.
As far as timing goes, it would be great if we could schedule my second lecture (where I plan to discuss the UCT) before Stuart's second lecture. Also, it would be helpful to schedule my last lecture after Stuart's second lecture, so that the audience has seen the classification theorem (unital case).

Zhuang Niu

The C*-algebra of a minimal homeomorphism with zero mean dimension

Abstract: The C*-algebra of a minimal homeomorphism with zero mean dimension is classified by its Elliott invariant. The small boundary property, which is equivalent to the zero mean dimension in this case, plays a central role in the proof. In the talk, I will discuss the details on how the small boundary property leads to the classifiability. This is based on a joint work with George Elliott.

Sven Raum

C*-superrigidity of 2-step nilpotent groups

Abstract: A discrete group is called C*-superrigid, if it can be recovered from its reduced group C*-algebra. This notion is defined in analogy with known W*-superrigidity results. In this talk, I will show how to prove C*-superrigidity for arbitrary finitely generated, torsion-free, 2-step nilpotent groups, combining K-theoretic methods with a C*-bundle decomposition of their group C*-algebras. This is joint work with Caleb Eckhardt.

Yasuhiko Sato

Actions of amenable groups and absorption of the Jiang-Su algebra

Abstract: In the recent classification theory of C∗-algebras, the absorption of the Jiang-Su algebra Z plays a central role. Actually, A. S. Toms and W. Winter conjectured that Z-absorption is equivalent to other regularity properties, such as strict comparison and finiteness of nuclear dimension, for standard nuclear C∗-algebras. Now, we know that this conjecture holds true under the assumption of unique tracial state.
In this talk, we study a permanence property of Z-absorption for crossed products by countable amenable groups. Assuming strict comparison and uniqueness of tracial state, we show that the crossed product of unital separable simple nuclear C∗-algebra absorbs the Jiang-Su algebra again.

Christopher Schafhauser

Subalgebras of AF-Algebras

Abstract: A long-standing open question, formalized by Blackadar and Kirchberg in the mid 90's, asks for an abstract characterization of C_-subalgebras of AF-algebras. I will discuss some recent progress on this question: every separable, exact C_-algebra which satis_es the UCT and admits a faithful, amenable trace embeds into an AF-algebra. Moreover, the AF-algebra may be chosen to be simple and unital with unique trace and the embedding may be taken to be trace-preserving. Modulo the UCT, this characterizes C_-subalgebras of simple, unital AF-algebras. As an application, for any countable, discrete, amenable group G, the reduced C_-algebra of G embeds into a UHF-algebra.

Thomas Sinclair

On the classification of group von Neumann algebras

Abstract: I will discuss recent progress and future directions on structural and classification results for II$_1$ factors associated to countable, discrete groups. This talk is based in part on joint works with Ionut Chifan, Ben Hayes, Daniel Hoff, and Rolando de Santiago.

Karen Strung

C*-algebras, Dynamical Systems, and Classification

Abstract: My lectures will focus on constructing C*-algebras from dynamical systems, namely crossed products by discrete groups (including group C*-algebras) and C*-algebras of étale groupoids. I will introduce K-theory and the Elliott invariant for C*-algebras in general, and then discuss the classification for C*-algebras arising from two interesting classes of dynamical systems: minimal homeomorphisms with mean dimension zero and mixing Smale spaces.

Gabor Szabo

An introduction to the classification of group actions on C*-algebras

Abstract: The plan of this lecture series is to give an introduction into some of the core ideas leading to the classification of single automorphisms on C*-algebras up to cocycle conjugacy. The emphasis shall be on the key methods and techniques, which will culminate in a master plan of sorts dictated by the past work of Kishimoto and others. More specifically, the plan is to discuss:
- the Rokhlin property for automorphisms;
- approximate cohomology vanishing as a consequence of the Rokhlin property;
- the Evans-Kishimoto intertwining argument.
From a practical point of view, this introduction is intended to be a gentle one, which will lead us to make special assumptions along the way in order to make some proofs more palatable. Nevertheless, the level of generality shall be high enough to arrive at some interesting statements, for example Kishimoto's theorem that there is a unique Rokhlin automorphism on every infinite-dimensional UHF algebra. If time permits, we may even end up proving a theorem together which goes beyond what can be found in the present literature.

Hannes Thiel

Infima in Cuntz semigroups and the structure of C*-algebras with stable rank one

Abstract: Let A be a C*-algebra with stable rank one. We show that the Cuntz semigroup of A satisfies Riesz interpolation. If A is also separable, it follows that the Cuntz semigroup of A has finite infima. This has several applications:
1. We confirm a conjecture of Blackadar and Handelman for unital C*-algebras with stable rank one: The (not necessarily lower semicontinuous) normalized dimension functions on A form a Choquet simplex.
2. We confirm the global Glimm halving conjecture for unital C*-algebras with stable rank one: For each natural number k, the C*-algebra A has no nonzero representations of dimension less than k if and only if there exists a morphism from the cone over the algebra of k-by-k matrices to A with full range.
3. We solve the rank problem for separable, unital (not necessarily simple) C*-algebras with

stable rank one that have no finite-dimensional quotients: For every lower semicontinuous, strictly positive, affine function f on the Choquet simplex of normalized 2-quasitraces on A, there exists a positive element in the stabilization of A that has rank f.
This is joint work with Ramon Antoine, Francesc Perera and Leonel Robert.

Aaron Tikuisis

Nuclear dimension, Z-stability, and affine partitions of unity

Abstract: Finite nuclear dimension and Z-stability are structural properties for C*-algebras. While they are a priori unrelated, in the context of (non-)classification of separable simple unital amenable C*-algebras, they were highlighted by Toms and Winter for having similar regularity-type connotations, and conjectured to be equivalent among such algebras. In joint work with Castillejos, Evington, White, and Winter, we have recently completed the proof of the remaining direction of this conjecture: that Z-stability implies finite nuclear dimension. I will discuss these concepts and this new result; the key new ingredient in its proof is a partition of unity with certain tracial properties.

Moritz Weber

Quantum symmetries of graph C*-algebras

Abstract: While compact groups describe the symmetries of a topological space, compact quantum groups are a reasonable approach to quantum symmetries of quantum topological spaces; the step from the classical to the noncommutative world building on Gelfand-Naimark's Theorem. Now, given a graph C*-algebras - what is its quantum symmetry group? In recent joint work with Simon Schmidt, we showed that it coincides with the quantum automorphism group of the graph, as defined by Banica. In other words, the graph C*-algebra hull preserves the quantum symmetries of the graph.
We report on this recent work and we motivate and introduce Woronowicz's quantum groups as well as quantum automorphism groups of finite graphs. Joint work with Simon Schmidt.

Stuart White

Classification of amenable operator algebras

Abstract: I'll discuss some aspects of the classification of simple separable unital C*-algebras of finite nuclear dimension. I intend to start out by discussing intertwining arguments, and contrasting Murray and von Neumann's work on hyperfinite II_1 factors with Elliott's classification of AF-algebras. I'll discuss Schafhauser's proof of the quasidiagonality theorem, and from there pick up some ingredients of the classification theorem.

Matthew Wiersma

Kirchberg's factorization property for locally compact groups

Abstract: A locally compact group G has the factorization property if the map $$\mathrm{C}^*(G)\odot\mathrm{C}^*(G)\ni a\otimes b\mapsto \lambda(a)\rho(b)\in \mathcal B(\mathrm{L}^2(G))$$ is continuous with respect to the minimal C*-norm (where λ and ρ denote the left and right regular representations of G). The factorization property for discrete groups is relatively well studied due to its connection to approximation and local properties of discrete group C*-algebras. In contrast, the factorization property was virtually unstudied for non-discrete groups until very recently. I will discuss recent developments on the factorization property for non-discrete groups.

Jianchao Wu

C*-regularity properties and dynamics

Abstract: The breathtaking development of the Elliott classification program of C*-algebras in the last decade was triggered by the introduction of C*-regularity properties such as finite nuclear dimension and Z-stability. Effort is underway to transport these ideas to the setting of topological (and C*-) dynamical systems, in hope of applying them to study the structure and rigidity of dynamical systems. To this end, several analogs of finite nuclear dimension have been conceived, and Kerr's notion of almost finiteness can be considered as an analog of Z-stability in the dynamical setting. I will discuss some further ideas in this direction.