Titles and Abstracts

Sara Arklint: **Hereditary subalgebras of graph C^*-algebras**.

Abstract. Combining non-stable K-theory considerations with basic moves on a graph E with finitely many vertices, one can show that a unital C^*-algebra Morita equivalent to the unital graph C^*-algebra $C^*(E)$ is itself a graph C^*-algebra. As a consequence, corners of Cuntz-Krieger algebras are Cuntz-Krieger algebras, and hereditary subalgebras of unital graph C^*-algebras are graph C^*-algebras provided they admit a countable unit of projections. Combined with K-theoretical classification of C^*-algebras with finitely many ideals, this becomes a powerful tool for constructing well-known and manageable concrete representations of various C^*-algebras. In particular, this allows one to determine whether they are semiprojective.

This is joint work with J. Gabe and E. Ruiz.

Selcuk Barlak: **Sequentially split *-homomorphisms (Part II)**.

Abstract. We define and examine equivariantly sequentially split *-homomorphismss between C^*-dynamical systems. For such a *-homomorphism, it follows that the induced *-homomorphisms between the corresponding crossed products is itself sequentially split. In this way, a multitude of C^*-algebraic approximation properties pass from the crossed product of the target system to the one of the domain system. We will explain well-behavedness of this notion, which includes a Takai Duality-type result. We discuss various settings in which equivariantly sequentially split *-homomorphisms appear in a natural way. One important class of examples of such arises from C^*-dynamical systems of compact group actions with the Rokhlin property. We will use this new point of view to see that Izumi's well-known duality result concerning the Rokhlin property and approximate representability for finite abelian group actions extends naturally to the setting of compact abelian group actions. If time permits, we will discuss possible further directions towards generalizing this concept, such as semigroup actions.

This is joint work with Gábor Szabó.

Rasmus Bentmann: **Localizing the classification problem for Kirchberg X-algebras at the universal UHF-algebra**.

Abstract. I will describe how localization at the universal UHF-algebra turns the classification problem of separable, stable, nuclear, strongly purely infinite C^*-algebras with finitely many ideals and with all simple subquotients satisfying the universal coefficient theorem into a purely algebraic problem and discuss some consequences of this result.

Joan Bosa: **Equivalent definitions of Corona Factorization property**.

Abstract. En route of answering negatively the crucial question if a simple real rank zero C^*-algebra can contain finite and infinite projections, which implies that these C^*-algebras are always either stably finite or purely infinite, we provide a wealth of comparison properties that are equivalent to the Corona Factorization Property (CFP). We show that, under minor assumptions, CFP is equivalent to the ω-comparison property. The question when CFP is equivalent to the ω-comparison property was induced in (Ort.-Per.-Ror. 11). We finish using this fact to concrete the structure of the semigroups belonging to the category Cu that come from a C^*-algebra.

George Elliott: **Toms-Winter ASH algebras are classifiable**.

Abstract. Using recent results on SH (subhomogeneous) algebras (joint work with Zhuang Niu, Luis Santiago, and Aaron Tikuisis), together with the recent very slightly restricted classification of Jiang-Su stable (simple, unital) ASH algebras by Guihua Gong, Huaxin Lin, and Zhuang Niu, one can extend this classification to arbitrary such algebras. (This class must then coincide with the Gong-Lin-Niu class, and so a TA(something) characterization of the Toms-Winter ASH algebras results.)

This is joint work with Zhuang Niu.

Dominic Enders: **Semiprojectivity for Kirchberg algebras**.

Abstract. It has been a long-standing open problem whether all Kirchberg algebras in the UCT-class with finitely generated K-groups are semiprojective. In this talk we show that this is indeed the case, thereby confirming a conjecture by Blackadar.

Ilijas Farah: **Strongly self-absorbing algebras and relative commutants**.

Abstract. Set-theoretic wrinkles aside, ultrapowers are characterized by two of their abstract properties: Loss theorem and countable saturation. In particular, logic provides a framework for complete understanding of ultrapowers. Unfortunately (?) most applications of ultrapowers to operator algebras are actually applications of relative commutants, and they have no well-studied abstract analogue. Not surprisingly, relative commutants of strongly self-absorbing algebras are better understood than the relative commutants of arbitrary separable algebras.

This is a joint work with Bradd Hart, Mikael Rørdam, and Aaron Tikuisis.

James Gabe: **Lifting theorems for completely positive maps**.

Abstract. Lifting theorems for completely positive maps (as done by Choi-Effros and Effros-Haagerup) have been important to the study of C^*-algebras. We will explain how to get a lifting theorem for completely positive maps mapping out of a separable, exact C^*-algebra, for which we preserve the structure induced by a closed operator convex cones (as introduced by Kirchberg). This result combined with an application of Michael's selection theorem, implies that if X is a second countable space (not necessarily Hausdorff), and A and B are separable, nuclear, continuous C^*-algebras over X, then $E(X;A,B) = KK(X;A,B)$. This can be used to classify all purely infinite graph C^*-algebras with vanishing K_1-group, possibly with infinitely many ideals, using K-theory.

Eusebio Gardella: **The equivariant Cuntz semigroup and classification of actions**.

Abstract. The Cuntz semigroup is an analog of the Murray-von Neumann semigroup of a C^*-algebra using positive elements instead of projections. It has proved to be a finer invariant than K-theory for certain classes of C^*-algebras, and has been extensively used in classification. In this talk, we will introduce an equivariant version of this semigroup, where an action of a compact group is taken into account. The equivariant Cuntz semigroup is naturally a semimodule over the representation semiring of the group, and this semimodule satisfies a number of additional structural regularity properties. We will show that the equivariant Cuntz semigroup of a dynamical system is naturally isomorphic, as semigroups, to the Cuntz semigroup of the crossed product; we also compute the induced semimodule structure. We present two applications: first, freeness of a compact Lie group action on a compact Hausdorff space can be characterized in terms of a canonically defined map into the equivariant Cuntz semigroup; and second, we use this functor to classify equivariant homomorphisms between certain actions of finite groups on a class of C^*-algebras containing all AI-algebras.

This is joint work with Luis Santiago.

Thierry Giordano: **Orbit equivalence of Cantor minimal systems and their (continuous) spectrum**.

Abstract. In 1992, using ideas of A. Vershik, Richard Herman, Ian Putnam and Christian Skau constructed a remarkable model for minimal homeomorphisms of the Cantor set. They associated to a Cantor minimal system (X, φ) an ordered Bratteli diagram and proved that the corresponding Bratteli-Vershik transformation is conjugate to φ. The approximately finite (AF) equivalence relation and the dimension groups associated to this model were key in the classification up to orbit and strong orbit equivalence of Cantor minimal systems.

In this talk I will present new recent results on properties of the continuous spectrum and the dimension groups of a Cantor minimal system.

Ilan Hirshberg: **Rokhlin dimension for flows**.

Abstract. I'll discuss a notion of Rokhlin dimension for actions of $\mathbb{R}$ on C^*-algebras. This generalizes Kishimoto's Rokhlin property for flows, and is analogous to the existing theory of Rokhlin dimension for actions of $\mathbb{Z}$ and other discrete groups. Crossed products by actions with finite Rokhlin dimension preserve important structural properties, namely finite nuclear dimension and D-stability.

This is joint work with Szabó, Winter and Wu.

Matthew Kennedy: **C^*-simplicity and the unique trace property for discrete groups**.

Abstract. I will discuss joint work with E. Breuillard, M. Kalantar and N. Ozawa on simplicity and uniqueness of the trace for reduced C^*-algebras of discrete groups. I will briefly mention work in progress with M. Kalantar that generalizes these results to quantum groups.

Nadia Larsen: **C^*-algebras of right LCM semigroups**.

Abstract. A left cancellative semigroup S in which any two principal ideals are either disjoint or intersect in another principal right ideal is called a right LCM semigroup. The defining condition is also known as Clifford's condition, cf. Lawson and Norling. This is a large class of semigroups: it includes the quasi-lattice ordered pairs of Nica, but also many semigroups with non-trivial group of units. The associated semigroup C^*-algebra in Li's sense has many attractive features. In the talk I will discuss properties of $C^*(S)$ including uniqueness results, functoriality and K-theory, and I will present some examples.

This is based on joint work with N. Brownlowe and N. Stammeier.

Huaxin Lin: **Crossed products and minimal dynamical systems**.

Abstract. Let X be an infinite compact metric space with finite covering dimension and let $\alpha, \beta\colon X \to X$ be two minimal homeomorphisms. We prove that the crossed product C^*-algebras $C(X) \rtimes_\alpha \mathbb{Z}$ and $C(X) \rtimes_\beta \mathbb{Z}$ are isomorphic if and only if they have isomorphic Elliott invariant. In a more general setting, we show that if X is an infinite compact metric space and if $\alpha\colon X \to X$ is a minimal homeomorphism such that (X, α) has mean dimension zero, then the tensor product of the crossed product with a UHF-algebra of infinite type has generalized tracial rank at most one. This implies that the crossed product is in a classifiable class of amenable simple C^*-algebras.

Zhuang Niu: **The classification of ASH algebras**.

Abstract. Ill talk about the classification of locally ASH algebras. Consider the class of Jiang-Su stable C^*-algebras which can be rationally tracially approximated by unital subhomogeneous C^*-algebras with one dimensional spectra. Then this class of C^*-algebras exhausts all possible values of the Elliott invariant for Jiang-Su stable simple finite unital C^*-algebras. In a joint work with Huaxin Lin and Guihua Gong, it is shown that any C^*-algebra in this class is classifiable and is indeed an ASH algebra if it satisfies the UCT. In a recent joint work with George Elliott, it is shown that any simple unital Jiang-Su stable locally ASH algebra is actually in this class, and thus is classifiable.

Narutaka Ozawa: **The Furstenberg boundary and C^*-simplicity**.

Abstract. A (discrete) group G is said to be C^*-simple if the reduced group C^*-algebra of it is simple. I will first explain Kalantar and Kennedy's characterization of C^*-simplicity for a group G in terms of its action on the maximal Furstenberg boundary. Then I will talk about my result with Breuillard, Kalantar, and Kennedy about examples and stable properties of C^*-simple groups.

Cornel Pasnicu: **Crossed products by spectrally free actions**.

Abstract. We define spectral freeness for actions of discrete groups on C^*-algebras. We relate spectral freeness to other freeness conditions; an example result is that for an action of a finite group, spectral freeness is equivalent to strong pointwise outerness, and also to the condition that the strong Connes spectrum of the action of the integers generated by a nontrivial group element is always nontrivial. We then prove permanence results for reduced crossed products by exact spectrally free actions, for crossed products by arbitrary actions of the two element group, and for extensions, direct limits, stable isomorphism, and several related constructions, for the following properties:

(1) The combination of pure infiniteness and the ideal property;
(2) Residual hereditary infiniteness (closely related to pure infiniteness);
(3) Residual (SP) (a strengthening of Property (SP) suitable for nonsimple C^*-algebras);
(4) The weak ideal property (closely related to the ideal property).

For the weak ideal property, we can allow arbitrary crossed products by any finite abelian group. These properties of C^*-algebras are shown to have formulations of the same general type, allowing them all to be handled using a common set of theorems.

This is joint work with N. C. Phillips, and it will appear in J. Funct. Anal.

Ulrich Pennig: **Crossed module actions on continuous trace C^*-algebras**.

Abstract. Let A be a continuous trace C^*-algebra with spectrum X, such that X carries a free action of the n-torus. This setup is the starting point of topological T-Duality in noncommutative geometry. The torus action on X can always be lifted to a homomorphism from $\mathbb{R}^n$ to $\mathrm{Out}(A)$. However, there is a topological obstruction to lifting it further to an honest action on A. In this talk I will report on a joint project with Ralf Meyer: We provide an extension of $\mathbb{R}^n$ to a crossed module (independent of A), such that the outer action always lifts to an honest action of this extension. I will provide some background on how our setup connects to topological T-Duality.

Sven Raum: **Powers group methods for locally compact groups acting on trees**.

Abstract. In this talk we report on our recent work on operator algebras associated with locally compact not necessarily discrete groups acting on a tree. Studying the action on the tree's boundary, we can apply Powers averaging method. This follows an idea of de la Harpe and Praux, who studied C^*-simplicity of discrete HNN extensions. For a natural class of locally compact non-discrete groups, we prove C^*-simplicity and uniqueness of a normalised KMS-weight on the reduced group C^*-algebra. We also show factoriality and non-amenability of the group von Neumann algebra and determine its type.

Finally, we put our results in contrast to recent work of Kalantar and Kennedy. Topological freeness of a boundary action, established as a criterion for C^*-simplicity of discrete groups in their work, does not play a role for C^*-simplicity of locally compact groups.

Sarah Reznikoff: **The faithful subalgebra**.

Abstract. The classical uniqueness theorems for representations of combinatorially defined C^*-algebras demand either that the map itself intertwine gauge actions or that the underlying structure satisfy an aperiodicity condition. In the last several years we have developed a new genre of uniqueness theorems that rely on neither of these assumptions. In particular, we have identified a special subalgebra in a graph, k-graph, or groupoid algebra that captures failure of aperiodicity in the underlying combinatorial structure and in turn reflects failure of injectivity in the representation. Very new results indicate conditions under which this subalgebra is Cartan.

We will review the history of uniqueness theorems, describe our theorems, and discuss the properties of the subalgebra.

This is joint work with Jonathan Brown, Gabriel Nagy, Aidan Sims, and Dana Williams.

Luis Santiago: **Classification of actions of compact groups on C^*-algebras with the Rokhlin property**.

Abstract. The classification of group actions on operator algebras started with Connes' classification of automorphisms and periodic automorphisms of the hyperfinite II_1 factor. These results were then extended by the work of many hands; for instance, to actions of finite groups by Jones. An essential ingredient in the proof of these classification results is the use of the Rokhlin property, which is a noncommutative analog of freeness. In the C^*-algebra setting actions of finite groups with the Roklhin property were classified by Izumi. In this talk I will explain how to extend Izumi's result to actions of compact groups.

This is a joint work with Eusebio Gadella.

Yasuhiko Sato: **Classification of certain order zero c.p. maps by traces**.

Abstract. Order zero c.p. maps were systematically studied by W. Winter, J. Zacharias, and M. Wolf. These are c.p. maps preserving orthogonality, they are particularly well-behaved. In this talk, we introduce a classification of certain order zero c.p. maps up to approximate unitary equivalence by their behavior on tracial states. As an application of this classification, it was shown that the nuclear dimension of unital separable simple amenable $\mathcal{Z}$-absorbing C^*-algebra is at most one if its extreme boundary of trace space is compact.

This is a joint work with J. Bosa, N.P. Brown, A. Tikuisis, S. White, and W. Winter.

Christian Skau: **AF-equivalence relation, Bratteli diagrams, orbit equivalence and all that**.

Abstract. AF-equivalence relations are the topological counterpart of hyperfinite equivalence relations in the measure-theoretic setting. AF-equivalence relations are intimately related to Bratteli diagrams– a combinatorial object–which again can be given a dynamical interpretation, thus connecting it to Cantor dynamical systems. We will give a survey of this interconnection and its relation to the various orbit structures. Finally, we will comment on the associated C^*-algebras.

Nico Stammeier: **The boundary quotient for algebraic dynamical systems**.

Abstract. I will present recent advances in the study of C^*-algebras associated to algebraic dynamical systems. The main object of interest will be the boundary quotient, for which simplicity and pure infiniteness shall be discussed. This part represents a nice application of Starling's findings for boundary quotients of right LCM semigroups building on the work of Exel and Pardo.

The talk is based on joint work with Nathan Brownlowe and Nadia S. Larsen.

Gábor Szabó: **Sequentially split *-homomorphisms (Part I)**.

Abstract. We define and examine sequentially split *-homomorphisms between C^*-algebras. For a *-homomorphism, the property of being sequentially split can be regarded as an approximate weakening of being a split-injective inclusion. We discuss well-behavedness of this notion in various settings. We will see that for a sequentially split *-homomorphisms, a multitude of C^*-algebraic approximation properties pass from the target algebra to the domain algebra, including many properties of paramount importance to the Elliott classification program. Moreover, a sequentially split *-homomorphism induces a well-behaved map on many C^*-algebraic invariants. We also discuss a few settings in which sequentially split *-homomorphisms arise naturally. This will then allow us to effortlessly recover several well-known results concerning either finite group actions with the Rokhlin property, or more generally inclusions of C^*-algebras with the Rokhlin property in the sense of Osaka. More examples will be covered in Part II by Selcuk Barlak, where he discusses the equivariant generalization of this theory.

This is joint work with Selcuk Barlak.

Andrew Toms: **TBA**.

Jianchao Wu: **The amenability dimension and company**.

Abstract. We showcase a number of recently emerged concepts of dimensions defined for topological dynamical systems, such as the amenability dimension. These dimensions turn out to be of great use to the study of the Baum-Connes and the Farrell-Jones conjectures as well as the nuclear dimensions of crossed product C^*-algebras. They have close relations with the Rokhlin dimension, and often take finite values under reasonable assumptions. We also discuss the case of topological groups, e.g. flows. As an application, one obtains that every free flow on a finite-dimensional space produces a crossed product C^*-algebra whose nuclear dimension is finite.

The talk includes joint work with Szabo and Zacharias, as well as that with Hirshberg, Szabo and Winter.