Jan Cameron, Vassar College

Bimodules over regular subalgebras of von Neumann algebras

Motivated by recent work on bimodule isomorphisms for Cartan subalgebras, we study bimodules over a von Neumann algebra M in two related contexts. The first is in inclusions of the form $M \subseteq M \rtimes G$, where G is a discrete group acting on a von Neumann algebra M by outer automorphisms. The second is a regular inclusion $M \subseteq N$ of finite factors. In the crossed product setting, we obtain structural results for certain weak*-closed M-bimodules in $M \rtimes G$, and these lead to a version for crossed products of a result of Mercer on extending certain weak$*$-continuous isometric bimodule maps. Similar results are obtained for regular inclusions of finite factors, which generalizes the crossed product situation when the group G acts on a finite factor. This is joint work with Roger Smith.

Tyrone Crisp, University of Copenhagen

Frobenius reciprocity and operator algebras

I will explain how certain reciprocity theorems from the representation theory of reductive groups, which have only partial analogues in the setting of group C*-algebras, translate in a more direct way to the context of operator algebras and their modules.

Joachim Cuntz, WWU Münster

New aspects of periodic cyclic homology

This is a talk on methods of noncommutative geometry in an unusual connection. We develop a version of (analytic) cyclic homology over fields of characteristic 0 but which establishes a cohomology theory for algebras over a field of characteristic p. This new theory generalizes a cohomology theory well known in algebraic geometry.

Siegfied Echterhoff, WWU Münster

K-theory for exotic crossed products

In this lecture we report on joint work with Alcides Buss and Rufus Willett about functorial properties of exotic crossed-product functors with applications to the computation of K-theory groups of certain exotic group algebras and crossed products by K-amenable groups.

Dominic Enders, University of Copenhagen

Semiprojectivity for Kirchberg algebras

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.

David Evans, University of Cardiff

Subfactors and conformal field theory

George Elliott, University of Toronto and University of Copenhagen

On the classification of ASH C*-algebras

Using recent joint work of Zhuang Niu, Luis Santiago, Aaron Tikuisis, and me, concerning not necessarily simple Jiang-Su stable (locally) subhomogeneous C*-algebras, the class of separable, simple, unital such C*-algebras is shown (by means of a criterion of Winter) to coincide with the class of C*-algebras recently classified by Guihua Gong, Huaxin Lin, and Niu. (Joint work with Zhuang Niu.)

Jens Kaad, Radboud University Nijmegen

Unbounded Kasparov products by differentiable Hilbert C*-modules

In this talk I will give an introduction to the current developments in unbounded KK-theory. The starting point for these investigations is to find explicit unbounded representatives for interior Kasparov products in bounded KK-theory. An example would here be to represent a K-homology class by an explicit spectral triple. This turns out to be deeply linked to the understanding of differentiable structures in Hilbert C*-modules. After having reviewed the general framework I will focus on a situation of particular interest for the theory: One could consider an ideal in a C*-algebra which already carries a spectral triple (for example an open subset in n-dimensional Euclidean space). The problem of computing the unbounded Kasparov product then amounts to (the highly non-trivial task of) restricting the spectral triple to the ideal in question.

Matthew Kennedy, Carleton University

C*-simplicity and the unique trace property for discrete groups

I will discuss recent work with M. Kalantar which establishes necessary and sufficient conditions for the simplicity of reduced C*-algebras of discrete groups, and subsequent work with E. Breuillard, M. Kalantar and N. Ozawa which characterizes when these algebras have a unique tracial state.

Nadia Larsen, University of Oslo

Von Neumann algebras of strongly connected higher-rank graphs

In recent work with Laca, Neshveyev, Sims and Webster we investigate the factor types of the extremal KMS states for the preferred dynamics on the C*-algebra of a strongly connected finite k-graph. At inverse temperature 1, the prevalent outcome is a type III factor. We compute its Connes invariant in terms of the spectral radii of the coordinate matrices and the degree of cycles in the graph.

Michel Lapidus, University of California, Riverside

Analysis on Fractal Manifolds via Dirac Operators, Geodesic Metrics and Noncommutative Geometry

In this talk, we will report on recent work connecting aspects of geometric analysis on fractals and noncommutative fractal geometry. We construct spectral triples and Dirac operators on a class of fractals built on curves, including the Sierpinski gasket, the harmonic gasket (which is ideally suited for developing analysis on fractals and is a good model for the elusive notion of a 'fractal manifold'), as well as suitable quantum graphs, Cayley graphs and other infinite graphs. We recover from the spectral triple the geodesic metric intrinsic to the fractal, as that metric is shown to coincide with the noncommutative metric naturally associated with the spectral triple. This main result is especially interesting in the case of the harmonic gasket, which will be the key example used to illustrate our theory. This work is joint with Jonathan Sarhad (J. of Noncommutative Geometry, No. 4, vol. 8, 2014, pp. 947-985; Math.arXiv:1207.6681v2 [math-ph], 2014, IHES preprint, IHES/M/12/22, 2012). It builds on and significantly extends earlier work of the author, joint with Eric Christensen and Cristina Ivan (published in "Advances in Math.", vol. 217, 2008, pp. 1497-1507) in which we constructed geometric Dirac operators allowing us to recover the natural geodesic metric and the natural Hausdorff measure of the Euclidean Sierpinski gasket (as well of other fractals built on curves). It also builds on earlier work of the author (carried out in the 1990s) in which, in particular, a broad research program was proposed for developing ”noncommutative fractal geometry”. The new advance highlighted here is that we can now deal with a significantly broader class of fractals, including the harmonic Sierpinski gasket (which can be viewed as a kind of ”measurable Riemannian manifold”, according to the recent work of Jun Kigami), allowing us to get one step closer to developing aspects of geometric analysis truly connected with the study of fractal manifolds and their intrinsic families of geodesic curves. In closing, we mention that during the first part of the talk, we will provide and discuss in broad terms some of the necessary background concerning operator algebras and related topics, so as to ease the transition to the main part of the lecture.

Toshi Natsume, Nagoya University
The geometry of a phantom circle

In homotopy theory there are maps, called phantom maps. Let X be a connected CW-complex, and let X_n denote its n-skeleton. A map $f : X \to Y$ is called a phantom map if its restriction to X_n is null-homotopic.

In this talk we chase a phantom which appears in the theory of operator algebras. The C*-algebra of continuous functions on the one-third Cantor set K has the structure of an AF-algebra. The C^*-algebra $C(K)$ contains a copy of $C(S^1)$ that has trivial intersections with finite parts of $C(K)$. For this reason we call this algebra a phantom circle. We show that cyclic cocycles can be hired to catch this phantom.

This is joint work with H. Moriyoshi (Nagoya U).

Vern Paulsen, University of Houston / University of Waterloo
Connes, Tsirelson and Non-local Games on Graphs

The graph coloring game and the graph homomorphism game are two examples of games on graphs. A winning random strategy for such a game is a conditional probability density such that the probability of violating any of the rules of the game is 0. Such densities can arise from classical events or quantum events. But depending on the validity of conjectures of Connes and Tsirelson there is either one set of quantum probabilities or three different sets. In this talk we will survey these ideas and introduce some new C*-algebras affiliated with graphs such that these games have winning strategies iff the corresponding algebra has a tracial state.

Gilles Pisier, Texas A&M University and Université Paris VI
Beyond Exactness

We discuss a generalization of the notion of exact operator space involving the subexponential growth of certain matricial realizations. We call subexponential the operator spaces satisfying it. The corresponding bounded growth is equivalent to exactness. This leads to a version of Grothendieck's theorem for (jointly) c.b. bilinear maps on subexponential operator spaces. We describe an example (using random matrices) of a subexponential C*-algebra which is not exact. We propose several further generalizations analogous to what is known in the Banach space type/cotype context.

Jean Renault, University of Orléans
Partial semigroup actions and C*-algebras

I will present groupoid constructions of C*-algebras related to partial semigroup actions. I shall emphasize a notion of directed action and relate it to two classes of semigroups, Ore semigroups and quasi-lattice ordered semigroups. I shall give as an example the construction of the C*-algebra of a topological P-graph, where P is the positive semigroup of a quasi-lattice ordered group Q and establish the nuclearity of this C*-algebra when Q is amenable. This is a report on joint work with D. Williams.

Mikael Rørdam, University of Copenhagen

Elementary amenable groups have quasidiagonal C^*-algebras

Rosenberg proved in 1987 that if the C^*-algebra of a discrete group is quasidiagonal, then the group is amenable, and he conjectured that the converse also holds. Using techniques from the classification of C^*-algebras and a description of elementary amenable groups due to Chou and Osin we confirm Rosenberg's conjecture for elementary amenable groups. This is a joint work with N. Ozawa and Y. Sato.

Roger Smith, Texas A&M University

Perturbations of von Neumann algebras

In 1972, Kadison and Kastler began the study of perturbations of operator algebras. They measured the distance between two algebras M and N on a Hibert space H by the Hausdorff distance between their unit balls, and N is said to be a perturbation of M if this distance is suitably small. Two questions arise from their work:

(i) Are close operator algebras isomorphic, or even unitarily equivalent?
(ii) In the absence of a positive answer to (i), what properties transfer between pairs of close algebras?

Work of Choi and Christensen gave a negative answer to (i) for C^*-algebras, but it is still open for von Neumann algebras. Christensen settled (i) positively when one of the algebras is injective. In this talk I will present some joint work with Cameron, Christensen, Sinclair, White and Wiggins that constructs a class of non-injective II_1 factors which, in every representation, are unitarily conjugate to their close neighbours. Time permitting, I will also discuss what is known about (ii).

Maria Solano, Universidade Federal de Santa Catarina

K-theory of C^*-algebras for substitutional tilings

In this talk I will give a brief introduction to the theory of substitution tilings. First, I will show how to construct the tiling space in two different ways. Secondly I will show the construction of three equivalence relations on the tiling space, namely the stable, unstable, and asymptotic equivalence relations coming from a Smale space of the tiling. Then I will show how we can equip these equivalence relations with appropriate topologies to construct the stable, unstable, and asymptotic C^*-algebras, respectively. And finally, I will show how the computation of their K-theories is done for some cases, and mention the construction of other C^*-algebras for tilings.

Erling Størmer, University of Oslo

Separable states, maximally entangled states, and positive maps

I introduce an numerical invariant for $n \times n$ density matrices based on their maximal value under the action of maximally entangled states. For separable density matrices the value is between 0 and 1, and the maximal value is n, obtained for density matrices of maximally entangled states, We analyse the case when the value for a separable matrix in n, and then apply our result to the structural physical approximation, the SPA, of a positive map.

Steen Thorbjørnsen, University of Aarhus

Unimodality of the freely selfdecomposable probability laws

In 1978 M. Yamazato settled in the positive the long standing conjecture on unimodality of the selfdecomposable probability laws. In doing so Yamasato also gave the first full proof of the unimodality of the stable distributions. In 1999 P. Biane proved that the stable distributions in free probability are unimodal, and in recent joint work with T. Hasebe the speaker established that the same conclusion in fact holds for all selfdecomposable laws in free probability. The talk will present an outline of the proof of the latter result and describe some of the involved techniques based on Stieltjes inversion.

Wilhelm Winter, WWU Münster

Amenability and Regularity in C^**-Dynamics*

Recent developments in the structure and classification theory of nuclear C^*-algebras have revealed deep and subtle connections between certain C^*-algebraic regularity properties. The flavour of these is topological, functional analytic, and algebraic, respectively. They allow to analyze similar phenomena from very different perspectives and in some way or other are crucial ingredients of all known classification theorems for simple nuclear C^*-algebras. There are particularly satisfactory results for C^*-algebras coming from topological dynamics. Perhaps even more important, to a large extent the regularity properties and their interplay can already be observed at the level of the underlying dynamical systems themselves. This point of view opens up exciting new connections between nuclear C^*-algebras, topological dynamics and geometric group theory.