Titles and abstracts

Johannes Aastrup: *On spectral triples in quantum gravity.*

(Joint work with J. Grimstrup and R. Nest) In the talk I will discuss the construction of a semi-finite spectral triple closely related to Loop Quantum Gravity as well as its interpretation.

Erik Alfsen: *Geometry of the space of separable states.*

Erik Bedos: *The full group C^*-algebra of the modular group is primitive.*

Toke Meier Carlsen: *Algebraic Cuntz-Pimsner rings.*

The Cuntz-Pimsner algebra construction has turned out to be an important tool in C^*-algebra with which one can construct many interesting classes of C^*-algebras such as crossed product by a single automorphism, Cuntz-Krieger algebras, graph algebras and Exel-Laca algebras.

I will in this talk tell how to adapt this construction to a purely algebraic setting, and how we thus recover some well know rings such as algebraic crossed product by a single automorphism, corner skew Laurent polynomial ring by a single corner automorphism, and Leavitt path algebras.

I will try to make the talk interesting from the point of view of operator algebra by putting emphasis on the similarities and differences between the C^*-algebra case and the purely algebraic case.

This is joint work with Eduard Ortega.

Erik Christensen: *Applications of the classification program for C^*-algebras to the theory of perturbations of C^*-algebras.*

The classification program provides results which tell that for certain classes of C^*-algebras there is a complete set of invariants, such as K-groups, traces and the pairing of the traces with K_0. The perturbation question consider two subalgebras of a common bigger C^*-algebra and we say that the algebras are close if their unit balls are close in the Hausdorff metric induced by the norm. One question is then if algebras which are sufficiently close are isomorphic. A way to a positive answer is to show that the invariants used in the classification results are stable under small perturbations of algebras. We give some positive answers to questions of this type. The talk will focus on the stability of length of C^*-algebras under perturbations. This a joint work with Allan Sinclair, Edinburgh, Roger Smith, Texas, and Stuart White, Glasgow.

Joachim Cuntz: *A new description for the C^*-algebra associated with the ring of integers.*

We give a new description of the "regular" C^*-algebra associated with the ring $\mathbb{Z}$. This reveals interesting connections with certain dynamical systems and leads to an efficient computation of the K-theory of this algebra.

Trond Digernes: *Physics over local fields.*

We discuss certain aspects of constructing physical models over a totally disconnected, local field.

Søren Eilers: *Classification of graph algebras.*

Since a simple graph C^*-algebra is either purely infinite or AF the classification of these objects by their K-theory follows immediately by the profound theorems of Kirchberg–Phillips and Elliott, respectively. But in the non-simple case one is faced with the challenge of classifying C^*-algebras which contain both infinite and finite subquotients. Using a result recently obtained with Restorff and Ruiz these challenges are overcome in the case of precisely one non-trivial ideal, and more general problems are discussed. Joint work with Mark Tomforde.

George Elliott: *The Cuntz semigroup as an invariant.*

It has recently been shown that the Cuntz semigroup classifies inductive limits of matrix algebras over the interval, or ideals of such a limit algebra (Ciuperca and Elliott), and that, when combined with the natural algebraic K_1 information, it also does this for inductive limits of matrix algebras over arbitrary locally compact spaces of dimension one (Ciuperca, Elliott, Robert, and Santiago). (The latter work is still in progress. Both these results depend on a category-theoretic treatment of the Cuntz semigroup by Coward, Elliott, and Ivanescu.)

Presumably, in these cases, the Cuntz semigroup can be computed in terms of more familiar invariants—this is known in the simple case (Brown, Perera, and Toms) and also in an interesting non-simple case (Elliott, Robert, and Santiago).

Toms has shown that the Cuntz semigroup can also distinguish algebras that are not distinguished by any other invariant—namely, certain inductive limits of matrix algebras over cubes of unbounded dimension (or the Hilbert cube). It would seem to be a reasonable question if it can distinguish any two such inductive limits which are not isomorphic.

Uffe Haagerup: *Dilation problems for completely positive maps on von Neumann algebras.*

The talk is based on a joint work in progress with Magdalena Musat. We study two dilation properties for completely positive unital trace preserving (for short, c.p.u.t.) maps on (M, tr), where M is a von Neumann algebra and tr is a normal faithful tracial state on M.

The first property is Kümmerer's Markov dilation property from the 80's, which is equivalent to Anantharaman-Delaroche's factorization property from 2004. For this, we provide, for instance, an example of one-parameter semigroup $(T_t)_{t\geq 0}$ of c.p.u.t. maps on the 4×4 matrices such that T_t fails to have the Markov dilation property for all small values of $t > 0$.

The second property is the non-commutative Rota dilation property introduced by Junge, Le Merdy and Xu in 2006. We show that the most natural generalization of Rota's classical dilation theorem to the non-commutative setting does not hold by providing an example of a selfadjoint c.p.u.t. map T on the $n \times n$ matrices for some large n, such that T^2 does not have the non-commutative Rota dilation property.

Frank Hansen: *Quantum statistics and measures of quantum information.*

The Wigner-Yanase-Dyson measures of quantum information may be derived from the geometrical description of quantum statistics. They are only examples of a more general class of measures of quantum information, the so called metric adjusted skew informations, that all enjoy the same general properties, discussed by Wigner and Yanase, of a good measure of our knowledge of a difficult-to-measure observable with respect to a conserved quantity.

Troels S. Jensen: *Completely Bounded Multiplier Norm of Spherical Functions on the Generalized Lorentz Groups*

There will be a short introduction to the basic structures of the talk, i.e., generalized Lorentz groups ($SO_0(1, n)$), Gelfand pairs, spherical functions and completely bounded multipliers of the Fourier algebra of a locally compact group G (written $M_0A(G)$).

The main result is an explicit formula for the $M_0A(G)$–norm of the spherical functions on $SO_0(1, n)$. As a corollary we get that the set of spherical functions on $SO_0(1, n)$ with finite $M_0A(G)$–norm does not have a uniform bound on the $M_0A(G)$–norms (earlier, De Cannière–Haagerup have found an upper bound estimate of the norm which admitted this as a possibility). This statement is also true for $SU(1, n)$, $Sp(1, n)$, $F_{4(-20)}$ and $PGL(\mathbb{Q}_q)$ (q prime). The case $PGL(\mathbb{Q}_q)$ follows from a result by Haagerup–Szwarc–S in which explicit formulas for the $M_0A(G)$–norm of the spherical functions on $PGL(\mathbb{Q}_q)$ are found. From this we get that for each of these groups there are $M_0A(G)$ functions which are not coefficients of strongly continuous uniformly bounded representations. The proof is inspired by an unpublished paper by Haagerup, in which he shows the analogue statement for the non–abelian free groups $\mathbb{F}_N$ ($2 \leq N < \infty$).

Jens Kaad: *A calculation of the multiplicative character.*

We give a formula, in terms of traces of products of commutators, for the application of the multiplicative character to higher Loday symbols.

David Kyed: *Kaplansky's zero-divisor conjecture in a quantum group context.*

Kaplansky's zero-divisor conjecture predicts that the group algebra of a discrete, torsion free group has no zero-divisors. Perhaps surprisingly, this conjecture is still open even for amenable groups, but in this case it is known, by a result of Elek, to be equivalent to the so-called analytic zero-divisor conjecture. In the talk I will discuss how Elek's result can be generalized to a suitable class of quantum groups.

Ryszard Nest: *Baum Connes conjecture for Quantum matrix pseudogroups.*

We'll sketch the proof of Baum-Connes conjecture for $\mathrm{SU}_q(2)$ and its generalisation to Woronowicz's matrix quantum groups.

Eduard Ortega: *The Corona Factorization Property and Non-stable K-theory.*

First we will summarize some known properties of C^*-algebras with the Corona Factorization Property (CFP). We will then proceed to characterize the CFP through comparison properties of the monoid of equivalences classes of projections and the Cuntz semigroup. We will finally obtain the CFP for some interesting classes of C^*-algebras.

Uuye Otgonbayar (Otogo): *Multiplicativity of index cocycles.*

Given a spectral triple (A, H, D), there is an index map from $K(A)$ to the integers. If the spectral triple is nice, for instance, finitely summable, this index map can be represented by a cyclic cocycle. We look at the problem of finding index cocycles that are multiplicative. We show that

- the JLO cocycle can be perturbed to a multiplicative cocycle, and
- this cocycle can be localized if the spectral triple admits an analogue of a Euler vector field.

Gunnar Restorff: *Classification of (non-simple) purely infinite C^*-algebras.*

We will recall some of the early results about classification of purely infinite C^*-algebras. Then we will continue to discuss some strategies of how to classify some non-simple purely infinite C^*-algebras—and look at some more recent progress of this topic.

Simen Rustad: *L^2-Betti numbers of equivalence relations.*

Given a countable standard equivalence relation, both D. Gaboriau and R. Sauer have associated to it L^2-Betti number invariants. We show that these coincide.

Tatiana Shulman: *On some lifting problems in C^*-algebras.*

For the standard epimorphism from a C^*-algebra A to its quotient A/I by a closed ideal I, one may ask whether an element b in A/I with some specific properties is the image of some element a in A with the same properties. This is known as a lifting problem for C^*-algebras. I am going to discuss some lifting problems connected with the notion of projectivity and semiprojectivity for C^*-algebras, in particular the question about lifting of nilpotent contractions posed by Loring and Pedersen.

Adam Sierakowski: *Purely infinite crossed products.*

We discuss when crossed product C^*-algebras are purely infinite in the non-simple case.

Christian Skau: *Orbit equivalence of minimal $\mathbb{Z}^d$ systems—the range of the invariant.*

We know that a complete invariant for orbit equivalence of minimal Cantor $\mathbb{Z}^d$ systems is a simple dimension group with trivial infinitesimal subgroup. If $d = 1$ the range of this invariant are all such dimension groups. For $d > 1$ we do not know the range, and this is related to finding a model for such systems in terms of a Bratteli diagram.

Erling Størmer: *Duality of cones of positive maps.*

I will talk about what I once called K-positive maps from $B(L)$ into $B(H)$ for finite dimensional Hilbert spaces corresponding to what I called a mapping cone K of positive maps of $B(H)$ into itself. In particular I will give characterizations of the dual cone of the cone of K-positive maps. Applications will be given to decomposable maps.

Klaus Thomsen: *Crossed products from minimal free actions of the infinite dihedral group on the Cantor set.*

I will describe the free minimal actions of the infinite dihedral group on the Cantor set whose crossed products are (stably) the unstable algebra in the sense of Putnam of a generalized 1-solenoid. Then I'll ignore 1-solenoids and tell you the general story about the algebras in the title.

Steen Thorbjørnsen: *Asymptotic expansions for random matrices.*

Wigner's semi-circle law states that for a (suitably normalized) $n \times n$ GUE random matrix X_n and for any continuous bounded function $f\colon \mathbb{R} \to \mathbb{R}$ we have

$$\mathbb{E}\big\{\mathrm{tr}_n(f(X_n))\big\} = \frac{1}{2\pi}\int_{-2}^{2} f(x)\sqrt{4-x^2}\,\mathrm{d}x + R_n(f),$$

where $R_n(f) \to 0$ as $n \to \infty$. Reporting on joint work with Uffe Haagerup, we present in the talk an asymptotic expansion of the remainder term as a power series in n^{-2}:

$$R_n(f) = \frac{\alpha_1(f)}{n^2} + \frac{\alpha_2(f)}{n^4} + \cdots + \frac{\alpha_k(f)}{n^{2k}} + O(n^{-2k-2}),$$

for suitable (uniquely determined) constants $\alpha_1(f), \ldots, \alpha_k(f)$, and for any k in $\mathbb{N}$. The case where $f(x) = (\lambda - x)^{-1}$ for some λ in $\mathbb{C} \setminus \mathbb{R}$ is of particular interest, and in that case we find explicit formulae for the coefficients $\alpha_j(f)$ as functions of λ. We present similar asymptotic expansions for covariances of the form: $\mathrm{Cov}\big\{\mathrm{Tr}_n(f(X_n)), \mathrm{Tr}_n(g(X_n))\big\}$. We also describe corresponding results for the case where the GUE matrices are replaced by Wishart matrices.

Wojciech Szymanski: *On permutation related automorphisms of the Cuntz algebras.*

We discuss recent work (joint with R. Conti and J. Kimberley) on permutation related endomorphisms of the Cuntz algebras. In particular, we present a combinatorial approach to the study of automorphisms of $\mathcal{O}_n$ arising this way.

Lyudmila Turowska: *Operator multipliers.*

A non-commutative analog of Schur multipliers called operator multipliers was recently introduced by Kissin and Shulman. They are defined as elements of the minimal tensor product of C^*-algebras. We establish a non-commutative (multidimensional) version of the characterisations by Grothendieck which shows that so called universal operator multipliers can be obtained as certain weak limits of elements of the algebraic tensor product of the corresponding C^*-algebras. We study compactness properties of such multipliers. In particular, we characterise completely compact operator multipliers and give sufficient conditions for the set of compact and completely compact multipliers to coincide.