PAUL BAUM
Pennsylvania State University

Geometric Structure in the Representation Theory of Reductive P-Adic Groups

Let G be a reductive p-adic group. Examples are GL(n,F) SL(n,F) where F can be any finite extension of the field Q_p of p-adic numbers. A theorem of V.Lafforgue asserts that the BC (Baum-Connes) conjecture is true for these groups. The theme of this talk is to take Lafforgue's result not as the end of the story, but as the beginning. This point of view leads to a conjecture about the smooth dual of G (i.e. the set of smooth irreducible representations of G modulo equivalence). According to this conjecture, each connected (or Bernstein) component of the smooth dual has the structure of a complex affine algebraic variety. These varieties are explicitly identified as extended quotients. The infinitesimal character of Bernstein is, conjecturally, an algebraic deformation of the evident projection of the extended quotient onto the ordinary quotient. This algebraic deformation is given by cocharacters of the relevant complex torus. These cocharacters appear to be arising from Langlands paramters, so at this point the conjecture begins to connect to the local Langlands conjecture.

The above is joint work with A.M.Aubert and R.J.Plymen.

KATIA CONSANI
Johns Hopkins University

The integral BC-endomotive and its reduction mod. p.

The talk will focus on the definition and the properties of an integral model for the non-commutative space which supports the "BC-dynamical system" as well as the description of its reduction at rational primes.

HEATH EMERSON
University of Victoria

Duality in equivariant Kasparov theory

I will talk about work with Ralf Meyer on duality in equivariant Kasparov theory. As time allows, I will also indicate how to use duality to connect the localisation approach to Baum-Connes and the approach using topological K-theory, to the problem of describing equivariant Kasparov groups geometrically, and to the construction and computation of Lefschetz maps and Euler characteristics for proper actions of locally compact groupoids. [Joint work with Ralf Meyer (Gottingen)]

FARZAD FATHI ZADEH
University of Western Ontario

Towards a local index formula for twisted spectral triples

The notion of twisted spectral triple has recently been introduced by Connes and Moscovici. We give a sufficient condition for a twisted spectral triple to yield a local Connes-Chern character in the (b, B)-bicomplex. The new cocycle is based on twisted commutators. This is joint work with M. Khalkhali.

ALEXANDER GOROKHOVSKY
University of Colorado, Boulder

Algebraic index theorem for Fourier integral operators

In their work on integral transforms, V. Guillemin and S. Sternberg introduced certain classes of Fourier integral operators which form an algebra. We describe the counterpart of this construction in the framework of formal deformations. We then proceed to discuss the algebraic index theorem in this context. This is a report on joint work with P. Bressler, R. Nest and B. Tsygan.

ERIK GUENTNER
University of Hawaii at Manoa

Decomposition complexity of metric spaces

I shall describe the notion of finite decomposition complexity, introduced in joint work with Romain Tessera and Guoliang Yu on the Novikov and related conjectures. The talk will focus on examples of groups having finite decomposition complexity.

EUGENE HA
Johns Hopkins University

On Z_∞ structures and the Bost-Connes system

I will discuss Durov's notion of Z_∞ structures within the context of the Bost-Connes system.

PIOTR M. HAJAC
Polish Academy of Sciences

Equivariant Pullbacks and Finite Free Distributive Lattices

The motivating result is that the freeness of actions of compact quantum groups on unital C*-algebras (principality of comodule algebras) is preserved under one-surjective pullbacks. This talk is an elementary review of an unexpected by-product result on multimorphism pullbacks: the category of ordered N-coverings of algebras is equivalent to the category of flabby sheaves of algebras over the projective space $P^(N-1)(Z/2Z)$ with topology generated by the covering of affine spaces. Here an ordered N-covering of an algebra is an ordered family of N algebra surjections whose ideals intersect to zero and generate a distributive lattice. A key step in the proof is to show that all non-empty open subsets of this projective space form a free distributive lattice. It is interesting that Determining the number of elements in this lattice is the celebrated Dedekind problem open since 1897. (Based on joint work with U.Kraehmer, R.Matthes, E.Wagner and B.Zielinski.)

NIGEL HIGSON
Pennsylvania State University

Mackey's analogy and admissible representations of complex semisimple groups

Mackey proposed that there ought to be a close analogy between the unitary representations of a real semisimple group and those of the associated Cartan motion group. It has been understood for some time that Mackey's proposed analogy is closely related to the Connes-Kasparov conjecture in operator K-theory. I shall describe some of the issues that arise when one considers the related proposal for admissible representations.

GIOVANNI LANDI
Universita' di Triest

Monopoles and Laplacians on quantum Hopf bundles

We study gauged Laplacian operators on line bundles on a quantum 2-dimensional sphere. Symmetry under the (co)-action of a quantum group allows for their complete diagonalization. These operators describe 'excitations moving on the quantum sphere' in the field of a magnetic monopole. The energies are not invariant under the exchange monopole/antimonopole, that is under inverting the direction of the magnetic field.

To integrate the gauge curvature on the quantum sphere one needs a 'twisted integral'. The result is not an integer but rather a q-winding number which can be interpreted as the q-index of a suitable Dirac operator.

There are also interesting models on the noncommutative torus and on isospectral spheres.

HANFENG LI
SUNY at Buffalo

Metric aspects of Noncommutative Heisenberg manifolds

When a Lie group acts continuously and ergodically on a unital separable C*-algebra, one can define naturally a seminorm on this C*-algebra. When the Lip group is compact, this is known to represent a quantum metric on the corresponding noncommutative space. However, the general situation is not clear. I will show that for the action of the Heisenberg Lie group on the noncommutative Heisenberg manifolds, we do get quantum metrics. Furthermore, this family of quantum metric spaces is continuous under the quantum Gromov-Hausdorff distance.

SNIGDHAYAN MAHANTA
University of Toronto

Noncommutative correspondence categories and homotopy groups of separable C-algebras.*

A method of construction of homotopy groups of separable C*-algebras will be put forward. The construction relies on the derived category of modules over such algebras. In the process we would also obtain a functorial relation between Kasparov's KK-category and a version of (algebraic) noncommutative correspondence category.

BOGDAN NICA
Vanderbilt University

Relatively spectral morphisms and applications to K-theory

Spectrum-preserving morphisms between Banach algebras are useful for comparing their K-theory and their 'noncommutative dimensions' as expressed by various notions of stable ranks. It may happen, however, that the preservation of the spectrum is only known over a dense subalgebra. This talk is concerned with such "relatively" spectral morphisms.

JOHN PHILLIPS
University of Victoria

An Index Theory for Certain Gauge Invariant KMS States on C^*-algebras

We present, by examples, an index theory appropriate to algebras without trace. In particular, our examples include the Cuntz algebras and a larger class of unital separable C^*-algebras that generate all injective III_λ factors for $0 < \lambda < 1$. These algebras are denoted by O^λ and include the Cuntz algebras: $O^{1/n} = O_n$. Our main result is an index theorem (formulated in terms of spectral flow) using a twisted cyclic cocycle where the twisting comes from the modular automorphism group for a natural gauge (circle action) invariant KMS state. We introduce a modified K_1-group for these algebras that we can pair with this twisted cocycle. As a corollary we obtain a noncommutative geometry interpretation for Araki's notion of relative entropy in these examples. This is joint work with Alan Carey and Adam Rennie.

JORGE PLAZAS
IHES

Heisenberg modules and arithmetic properties of noncommutative tori

We will investigate various arithmetical properties of noncommutative tori arising from the relationship between these objects and elliptic curves via representations of algebraic Heisenberg groups.

RAPHAEL PONGE
University of Toronto

Noncommutative geometry and lower dimensional volumes in Riemannian geometry

In this talk I will explain how we can define the "lower dimensional" volumes of any compact Riemannian manifold as the integrals of local Riemannian invariants. For instance a sense can be given to the area and the length of such a manifold in any dimension. The reasoning is motivated by an idea of Connes and involves in an essential way noncommutative geometry and the analysis of Dirac operators on spin manifolds. However, the ultimate definitions of the lower dimensional volumes don't involve noncommutative geometry or spin structures at all.

ARASH POURKIA
University of Western Ontario

Hopf-cyclic cohomology in braided monoidal categories

We start with a Hopf algebra $(H, m, \eta, \Delta, \epsilon, \delta, \sigma)$ in a strict symmetric braided monoidal abelian category $(C, \square, I, \Psi)$, and define a Hopf cyclic theory for H. As a non-trivial example we develop a Hopf cyclic theory for super Hopf algebras. At the end we give some results for non-symmetric categories.

This is joint work with M. Khalkhali.

MARC RIEFFEL
University of California Berkeley

Dirac operators for coadjoint orbits

For some time I have been studying how matrix algebras converge to coadjoint orbits, in the manner used by theoretical high-energy physicists, often in a mathematically imprecise way. For the simplest case, the 2- sphere, physicists use at least 3 inequivalent Dirac operators on the corresponding matrix algebras. Physicists have not done much with Dirac operators for matrix algebras corresponding to other coadjoint orbits. In hopes of sorting out this situation for matrix algebras, I have worked out a quite explicit global (i.e. using no local coordinates) expression for "the" Dirac operator on a coadjoint orbit of a compact semisimple Lie group. I find the picture quite rich and attractive. I will report on this. it does not use the structure theorem for semisimple Lie algebras.

XIANG TANG
Washington University

Algebraic higher index theorem

In this talk, we present an explicit formula of a cyclic cocycle on the Weyl algebra. We will explain how to use this cocycle to give a new proof of Nest-Tsygan's higher algebraic index theorem on symplectic manifolds. And we will discuss the generalization of this theorem to symplectic orbifolds. This is a joint work with Pflaum and Posthuma.

BORIS TSYGAN
Northwestern University

Deformation quantization of Lagrangian submanifolds

In a talk related to that of A. Gorokhovsky, we will review questions of deformation quantization of Lagrangian submanifolds, with applications to index theorems.

RAIMAR WULKENHAAR
Westfalischen Wilhelms-Universitat Munster

A spectral triple for harmonic oscillator Moyal space

Scalar field theory on harmonic oscillator Moyal space is expected to exist as a 4-dimensional non-perturbative quantum field theory. We show that the noncommutative geometry behind this type of models is in fact a non-compact spectral triple. In particular, the Mehler heat kernel for the harmonic oscillator Hamiltonian allows us to compute the dimension spectrum as $4 - \mathbb{N}$. All residues are local, i.e. integrated Moyal products. This is further support for the conjecture that residues of operator zeta-functions are the noncommutative geometrical counterpart for locality in physics.

We also compute the spectral action for the corresponding Connes-Lott two-point model. The result shows a deep entanglement between gauge and Higgs fields in a unified potential.

YI-JUN YAO
Vanderbilt University

Some results on Rankin-Cohen deformations

Rankin-Cohen brackets and the corresponding deformation questions appeared first in the theory of modular forms, but got involved with noncommutative geometry in the past few years. We will try to explain some results related to this topic as well as (operator algebraic) motivations of these studies.