K-THEORY WORKSHOP

ABSTRACTS

Thursday 26 July

9:30 - 10:20 Paul Bressler

On quasi-classical limits in deformation quantization

Star-products (one parameter formal deformations of the usual product on functions) serve as local models for DQ-algebroids. A DQ-algebroid is a formal one-parameter deformation its "classical limit" which in general is a twisted form of the structure sheaf of the the manifold. As is well known, a star-product on functions on a manifold gives rise to a Poisson on the sheaf of functions. I will explain what sort of additional structure arises on the classical limit of a DQ-algebroid generalizing and extending the Poisson structure.

11:00 - 11:50 Rufus Willett

Almost commutation, KK-theory, and Bott periodicity

Ill discuss a new model for Kasparovs bivariant KK-theory based on almost commutation and the localization algebras of Guoliang Yu (without assuming prior knowledge of these topics). As an example, Ill also discuss a concrete computation with almost commuting unitary matrices, and why this is in some sense equivalent to Bott periodicity.

This is partly based on joint work with Marius Dadarlat and Jianchao Wu, and partly based on work of (but not with) Dan Voiculescu and Terry Loring.

12:00 - 12:50 Daniel Juan Pineda

Higher algebraic K-theory of some group rings

The validity of the Farrell-Jones conjecture has been used to compute some lower algebraic K-theory groups of group rings. We will show some examples where higher algebraic K-groups may be accesible.

15:00 - 15:20 **Christopher Wulff** (Contributed talk)

Coronas for properly combable spaces

Coronas of spaces (i.e. boundaries at infinity) have become an indispensable tool for the investigation of non-positively curved spaces. In this talk I will present a very conceptual construction of such coronas for combable spaces under a new additional assumption on the combing, called properness. This yields applications to well-known isomorphism conjectures. This is joint work with Alexander Engel.

15:30 - 15:50 **Jonathan Belcher** (Contributed talk)

Bridge Cohomology A Generalization of Cyclic and Hochschild Cohomologies and Applications in Non-Commutative Geometry

The connection between Hochschild and cyclic cohomologies with generalized De Rham homology and index theories for arbitrary algebras has long been established by the work of Connes, Karoubi, Loday, Feigin, Tsygan, et al. Here we generalize these cohomology theories even further, essentially creating a theory that establishes a step-wise bridge between the two. This theory can then be used to establish similar geometric results for manifolds with boundaries, and may have applications in exterior differential systems, as well as extend to higher K-theories.

16:00 - 16:20 **Diego Montero** (Contributed talk)

Homotopy classification of purely infinite simple Leavitt path algebras

In this talk we address the classification problem for purely infinite simple Leavitt path algebras of finite graphs over a field ℓ. Each graph E has associated a Leavitt path ℓ-algebra $L(E)$. There is an open question which asks whether the pair $(K_0(L(E)), [1_{L(E)}])$, consisting of the Grothendieck group together with the class $[1_{L(E)}]$ of the identity, is a complete invariant for the classification, up to algebra isomorphism, of those Leavitt path algebras of finite graphs which are purely infinite simple. We show that $(K_0(L(E)), [1_{L(E)}])$ is a complete invariant for the classification of such algebras up to polynomial homotopy equivalence. To prove this we develop the bivariant algebraic K-theory of Leavitt path algebras and obtain several results of independent interest.

16:50 - 17:40 **Severino Toscano**

K-theory of pseudodifferential operators with semiperiodic symbols on a cylinder

Let B be a compact Riemannian manifold, let Ω denote the cylinder $\mathbb{R} \times B$, Δ_Ω its Laplace operator and $\Lambda = (1-\Delta_\Omega)^{-1/2}$. Let $\mathfrak{A}$ denote the C*-algebra of bounded operators on $L^2(\mathbb{R} \times B)$ generated by all the classical pseudodifferential operators on $\mathbb{R} \times B$ of the form $L\Lambda^N$, N a nonnegative integer and L an N-th order differential operator whose (local) coefficients approach 2π-periodic functions at $+\infty$ and $-\infty$. Let $\mathfrak{E}$ denote the kernel of the continuous extension of the principal symbol to $\mathfrak{A}$. The problem of computing the K-theory index map $\delta_1(K_1(\mathfrak{A}/\mathfrak{E})) \to K_0(\mathfrak{E}) \simeq \mathbb{Z}^2$ on an element of $K_1(\mathfrak{A}/\mathfrak{E})$ is reduced to the problem of computing the Fredholm indices of two elliptic operators on the compact manifold $S^1 \times B$. In the case $B = S^1$, it follows from considerations about various exact sequences of C*-subalgebras of $\mathfrak{A}$ that δ_1 is onto and that $K_0(\mathfrak{A}) \simeq \mathbb{Z}^5$ and $K_1(\mathfrak{A}) \simeq \mathbb{Z}^4$. This talk is based on joint work with Patricia Hess.