Abstracts of Workshop Lectures

The use of C*-algebras in singular foliations and their representation theory
Iakovos Androulidakis, University of Athens

The Baum-Connes conjecture (BC) asserts that all the analytic representations really come from geometry. It is strongly linked with other important results in topology and algebra, such as the Novikov and the Kaplansky conjectures. In this lecture we will first try to explain BC in its simplest form. Then we'll examine its formulation for an arbitrary singular foliation. To this end, we will introduce a notion of "height" for the singularities involved, and use C*-algebras to detect their organization in the ambient manifold. This is joint work with G. Skandalis (Paris 7).

Rotating orbits of operators
George Costakis, University of Crete

We investigate what is the effect of rotating orbits of hypercyclic operators by polynomial phases. Denseness issues of the resulting sequence will be the main concern of the talk.

Shilov boundary for "holomorphic functions" on a quantum matrix ball
Lyudmila Turowska, Chalmers University of Technology and University of Gothenburg, Sweden

The Shilov boundary of a compact Hausdorff space X relative to a uniform algebra $\mathcal{A}$ in $C(X)$ is the smallest closed subset $K \subset X$ such that every function in $\mathcal{A}$ achieves its maximum modulus on K. This notion is encountered, in particular, in the theory of analytic functions in relation to the maximum modules principle. We will be interested in its non-commutative analog. The latter was introduced by W. Arveson.

In the middle of 90s, within the framework of the quantum group theory, L.Vaksman and his coauthors started a "quantisation" of bounded symmetric domains. One of the simplest of such domains is the matrix ball $\mathbb{D} = \{z \in Mat_m : zz^* < I\}$, where Mat_m is the algebra of complex $m \times m$ matrices. The Shilov boundary of $\mathbb{D}$ relative to the algebra of holomorphic functions in $C(\overline{\mathbb{D}})$ is the set of unitary $m \times m$-matrices. In this talk I will discuss the Shilov boundary ideal for the q-analog of holomorphic functions on the unit ball. This is a joint work with O.Bershtein, O.Gisselson and D.Proskurin.

Minimal and maximal matrix convex sets
Orr Shalit, Technion, Haifa

With every convex body K, one may associate a minimal matrix convex set $Wmin(K)$, and a maximal matrix convex set $Wmax(K)$, which have K as their ground level. For a convex body K, we aim to find the optimal constant C such that $Wmax(K) \subseteq CWmin(K)$; we achieve this goal for all the ℓ^p unit balls, as well as for other sets. For example, if $B_{p,d}$ is the closed unit ball in $\mathbb{R}^d$ with the ℓ^p norm, then we show that the constant is $d^{1-|1/p-1/2|}$. Moreover, we obtain that a convex body K satisfies $Wmax(K) = Wmin(K)$ if and only if it is a simplex.

These problems relate to dilation theory, convex geometry, operator systems, and completely positive maps. We discuss and exploit these connections as well. For example, our results show that every d-tuple of self-adjoint operators of norm less than or equal to 1, can be dilated to a commuting family of self-adjoints, each of norm at most the square root of d.