Miniworkshop

Operator Theoretic Aspects of Ergodic Theory

Leipzig, January 20-21, 2017

Organizers: Tanja Eisner and Agnes Radl
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Plenary talks

1.) FRIDAY, JANUARY 20, 09:00–10:00

AUTHOR: **Michael Lin** (Beer-Sheva)

TITLE: *Ergodic theorems and geometry of Banach spaces*

ABSTRACT: Kakutani and Yosida proved (separately) that if a power-bounded operator T on a Banach space X, is (what we now call) weakly almost periodic (all orbits are weakly conditionally compact), then T is mean ergodic, and concluded that all power-bounded operators on a reflexive Banach space are mean ergodic.

In general, a power-bounded operator on a reflexive space need not be almost periodic (all the orbits are conditionally compact), even in Hilbert space; weakly mixing probability preserving transformations which are not mixing provide examples.

We analyze the ergodic properties of power-bounded operators on a reflexive Banach space, which have the form "scalar plus compact-power", and show that they are almost periodic. If such an operator is weakly mixing, then it is stable (its powers converge in the strong operator topology), and so is also its adjoint.

Let X_{ISP} be the separable reflexive indecomposable Banach space constructed by Argyros and Motakis, in which every operator has an invariant subspace. Every operator on X_{ISP} (and on its subspaces) is of the form $\alpha I + S$ with S^3 compact, and we conclude that every power-bounded operator on (a closed subspace of) X_{ISP} is almost periodic.

2.) FRIDAY, JANUARY 20, 14:00–15:00

AUTHOR: **Zoltán Buczolich** (Budapest)

TITLE: *Almost everywhere convergence of ergodic averages*

ABSTRACT: In this talk I would like to survey some of my results concerning almost everywhere convergence of non-conventional ergodic averages of L^1 functions. I plan to discuss some topics which were not mentioned in my talk given in Kiel during the 2nd Workshop on Operator Theoretic Aspects of Ergodic Theory. These topics include:

- divergence of ergodic averages along the squares;
- convergence along some sequences of zero Banach density;
- convergence for arithmetic weights: the prime divisor functions ω and Ω.

3.) SATURDAY, JANUARY 21, 09:00–10:00

AUTHOR: **Oliver Butterley** (Trieste)

TITLE: *The statistical properties of chaotic flows and the associated operator semigroups*

ABSTRACT: I will discuss chaotic flows, for example Anosov flows, from a dynamical systems point of view. A major goal is to establish statistical properties of the system, in particular the existence of physically-relevant invariant measures, rates of mixing and the behaviour of properties under perturbation. Naturally associated to any flow is an operator semigroup (often called the transfer operator). I will explain how, by choosing/constructing a dynamically relevant Banach space (often anisotropic), one can obtain good spectral properties of the operator semigroup. This information can then be used to obtain statistical properties of the original dynamical system. This is an approach which has already been proven to be effective for many systems.