

Miniworkshop

Operator Theoretic Aspects of

Ergodic Theory

Leipzig, May 03, 2019

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Plenary talks

1.) FRIDAY, MAY 03, 9:00-10:00

AUTHOR: **Martin Schneider** (Dresden)

TITLE: Følner sets in topological groups

ABSTRACT: The talk will revolve around a characterization of amenability for general (i.e., not necessarily locally compact) topological groups in terms of the existence of almost invariant finite subsets, which generalizes a classical result due to Følner. This topological version of Følner's theorem is formulated in terms of finite combinatorial objects and provides a new amenability criterion even in the case of locally compact groups (as it does not involve Haar measures). I will survey some applications of this result, e.g. in topological dynamics and coarse geometry, and discuss some surprising interactions with the phenomenon of measure concentration, which have strong consequences for the ergodic theory of infinite-dimensional topological groups.

Apart from my own work, the talk will include joint results with Andreas Thom as well as Vladimir Pestov.

2.) FRIDAY, MAY 03, 16:30-17:30

AUTHOR: **Yonatan Gutman** (Warsaw)

TITLE: *Almost sure convergence of the multiple ergodic average for certain weakly mixing systems*

ABSTRACT: The family of pairwise independently determined (PID) systems, i.e. those for which the independent joining is the only self joining with independent 2-marginals, is a class of systems for which the long standing open question by Rokhlin, of whether mixing implies mixing of all orders, has a positive answer. This is a key fact in the spectacular advancements on this question by Host, Kalikow and Ryzhikov. We show that in the class of weakly mixing PID one finds a positive answer for another long-standing open problem, whether the multiple ergodic averages

$$\frac{1}{N} \sum_{n=0}^{N-1} f_1(T^n x) \cdot \dots \cdot f_d(T^{dn} x)$$

almost surely converge as $N \rightarrow \infty$.

Joint work with Wen Huang, Song Shao and Xiangdong Ye.

3.) SATURDAY, MAY 04, 9:00-10:00

AUTHOR: **Dominik Kwietniak** (Krakow)

TITLE: *Sarnak's conjecture implies Chowla's conjecture along a subsequence*

ABSTRACT: The talk will have two parts: first, I will try to explain motivations and intuitions staying behind the conjectures of Chowla and Sarnak. Both problems remain open for quite some time (Chowla stated his question over 50 years ago), and both try to quantify apparent randomness observed in the behaviour of the Möbius function. I will also present a reformulation of the conjectures mentioned above as problems about particular dynamical systems.

In the second part, I will discuss a recent result of Gomilko, Lemańczyk and myself saying that Sarnak's conjecture implies the existence of an increasing sequence of integers along which the Chowla conjecture holds. Our proof has two ingredients: Tao's result on the equivalence of logarithmic versions of conjectures of Sarnak and Chowla, and the study of the set of limit points of the sequence of harmonic empirical measures.