

NORTH BRITISH FUNCTIONAL ANALYSIS SEMINAR

A meeting of the North British Functional Analysis Seminar will be held at Queen's University Belfast on Friday 28 October and Saturday 29 October 2022.

All interested are welcome to attend. All talks will take place in the Mathematics & Physics Teaching Centre, room no. 0G/017, and the coffee breaks will take place in the foyer opposite the lecture room.

Schedule:

Friday 28 October 2022

3.00 – 4.00: NBFAS talk by Professor Dr Hannes Thiel (I).

4.00 – 4.30: Coffee break.

4.30 – 5.30: NBFAS talk by Professor Dr Michael Hartz (I).

A joint dinner is planned for Friday evening at 7.00.

Saturday 29 October 2022

09.30 – 10.30: NBFAS talk by Professor Dr Michael Hartz (II).

10.30 – 11.00: Coffee break.

11.00 – 12.00: NBFAS talk by Professor Dr Hannes Thiel (II).

A joint lunch is planned for Saturday at 12.00.

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Professor Dr Michael Hartz

Department of Mathematics at Saarland University, Germany

Talk I. Hilbert function spaces and Pick's theorem

Abstract: Hilbert spaces of holomorphic functions play a key role at the interface of operator theory, complex analysis and harmonic analysis. One of the best understood spaces is the classical Hardy space H^2 on the unit disc. Other spaces of interest include the Dirichlet space and the Drury–Arveson space.

I will talk about an operator theoretic approach to many such spaces, which has its roots in a century old theorem of Pick. This leads to the notion of a complete Pick space. Over the last 30 years, it turned out that many theorems, which were initially thought to be specific to the Hardy space, actually hold in all complete Pick spaces. This has led to the solution of problems that were open even in the Dirichlet space. Based on joint work with Alexandru Aleman, John McCarthy and Stefan Richter.

Talk II. Finite dimensional representations of operator algebras

Abstract: A (non-selfadjoint) operator algebra is said to be residually finite dimensional (RFD) if it can be recovered from its finite dimensional representations. In addition to its abstract relevance, this property plays a role in the study of certain algebras of holomorphic functions.

Residual finite dimensionality is well studied in the context of C^* -algebras. In particular, a theorem of Exel and Loring characterizes RFD C^* -algebras in terms of the state space and in terms of a finite-dimensional approximation property for representations.

I will talk about a non-selfadjoint version of the Exel–Loring theorem. Moreover, I will explain how this is related to a question of Clouatre, Dor-On and Ramsay about the RFD property of the maximal C^* -algebra of a non-selfadjoint operator algebra.

Professor Dr Hannes Thiel

Department of Mathematics at Kiel University, Germany

Talk I. The generator problem of C^ -algebras*

Abstract: The generator problem asks to determine, for a given C^* -algebra, its minimal number of generators. In particular, one wants to know if every separable, simple C^* -algebra is generated by a single element. The generator problem was originally asked for von Neumann algebras, and Kadison included it as no. 14 of his famous list of 20 “Problems on von Neumann algebras”. The problem remains open, most notably for the reduced free group C^* -algebras and the free group factors.

I will first give an overview on the generator problem and then present some recent new results. Most interestingly, we will see a strong solution to the generator problem for separable, simple, classifiable C^* -algebras: They are not merely singly generated but they contain a dense set of generators.

Talk II. The zero-product structure of C^ -algebras*

Abstract: It is well known that every C^* -algebra is determined by its linear and multiplicative structure: Two C^* -algebras are $*$ -isomorphic if and only if they admit a multiplicative, linear bijection.

We study if, instead of the whole multiplicative structure, it suffices to record when two elements have zero product. While it is not clear if every C^* -algebra is determined this way, we obtain many positive results. In particular, two unital, simple C^* -algebras are $*$ -isomorphic if and only if they admit a linear bijection that preserves zero products.

This is joint work with Eusebio Gardella.