

WABASH EXTRAMURAL MODERN ANALYSIS SEMINAR

April 9

2:00 p.m.

at

Wabash College

in rooms 114 and 118 Baxter Hall

*Times given are Eastern Time,
which is currently local time for Central Indiana and Ohio.*

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| 2:00–2:30 | <i>Refreshments and conversation</i> |
| 2:30–3:30 | Factorizable completely positive maps and quantum information theory
<i>MAGDALENA MUSAT, University of Copenhagen</i> |
| 3:30–4:00 | <i>More refreshments and conversation</i> |
| 4:00–5:00 | Purely infinite C*-algebras arising from actions of exact groups
<i>MIKAEL RØRDAM, University of Copenhagen</i> |
| 5:00–... | <i>Refreshments and farewells</i> |

The purpose of Wabash Seminar talks is to present surveys of interest to all analysts, including graduate students and scholars working in areas far from the speaker's specialty. Come and meet your fellow analysts, learn what's going on, and spread the word.

Next Meeting: TBA

For further information call

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Factorizable completely positive maps and quantum information theory

MAGDALENA MUSAT

In recent work with Uffe Haagerup, we study factorization and dilation properties of Markov maps between von Neumann algebras, motivated by the question of existence of non-factorizable Markov maps, as formulated by C. Anantharaman-Delaroche. We provide simple examples of non-factorizable Markov maps on $M_n(\mathbf{C})$ for all $n \geq 3$, as well as an example of a one-parameter semigroup $(T(t))_{t \geq 0}$ of Markov maps on $M_4(\mathbf{C})$ such that $T(t)$ fails to be factorizable for all small values of $t > 0$.

The existence of non-factorizable Markov maps turned out to have an interesting application to an open problem in quantum information theory, known as *the asymptotic quantum Birkhoff conjecture* (AQBP). We solve the conjecture in the negative by showing that every non-factorizable Markov map on $M_n(\mathbf{C})$, $n \geq 3$, provides a counterexample. We also discuss very recent developments concerning the question whether every factorizable map does satisfy the AQBP. In connection with this, we put into evidence a new asymptotic property of factorizable maps and establish connections to the Connes embedding problem.

Purely infinite C^* -algebras arising from actions of exact groups

MIKAEL RØRDAM

We discuss conditions that will ensure that a crossed product of a C^* -algebra by a discrete exact group is purely infinite (simple or non-simple). We are particularly interested in the case of a discrete non-amenable exact group acting on a unital commutative C^* -algebra, where our sufficient conditions for example can be phrased in terms of paradoxicality of subsets of the spectrum of the abelian C^* -algebra. As an application of our results we show that every discrete countable non-amenable exact group admits a free amenable minimal action on the Cantor set such that the corresponding crossed product C^* -algebra is a Kirchberg algebra in the UCT class. In a more recent development one can show that also certain amenable groups admit free minimal action on a totally disconnected locally compact (non-compact) Hausdorff space such that the corresponding crossed product C^* -algebra is a (non-unital) Kirchberg algebra. (Joint work with Adam Sierakowski.)