Workshop

(February 7 - 9, 2022)

Titles and Abstracts (in alphabetic order)

Amenability of C*-dynamical Systems
Alex Bearden (two lectures)
University of Texas at Tyler

Abstract: The notion of amenability of a locally compact group was generalized to certain operator algebraic settings by Anantharaman-Delaroche in the late 70s. We will review the history and triumphs of amenability in W*- and C*-dynamical systems, and then describe recent progress in the understanding of the various competing notions of amenability from the work of Buss/Echterhoff/Willett, Ozawa/Suzuki, and our joint work with Jason Crann.

Structure of von Neumann Algebras via Free Probability and Random Matrices
Benjamin Hayes (two lectures)
University of Virginia

Abstract: I will discuss a way to study von Neumann algebras via quantifying "how many" finite-dimensional approximations they have. This line of study goes back in the 90's with work of Voiculescu, who used it to solve many long-standing open problems. My first lecture will start with a brief overview of this area of operator algebras. I will then transition to some recent developments, highlighting connections to random matrices as well as group theory.

Noncommutative Convexity
Matthew Kennedy (first lecture)
University of Waterloo

Abstract: Recently, Davidson and I introduced a new framework for noncommutative convexity and noncommutative function theory, along with a corresponding noncommutative Choquet theory that generalizes much of classical Choquet theory. A key point is that the category of compact noncommutative sets is dual to the category of operator systems. In recent work with Kim and Manor, we extended this duality to the

category of (potentially) non-unital operator systems in the sense of Werner and Connes-van Suijlekom. I will motivate and discuss these developments, as well as some applications to C*-algebras and noncommutative dynamics.

Amenability, Proximality and Higher Order Syndeticity
Matthew Kennedy (second lecture)
University of Waterloo

I will discuss new descriptions of some universal flows associated to a discrete group, obtained using what we view as a kind of "topological Furstenberg correspondence." The descriptions are algebraic and relatively concrete, involving subsets of the group satisfying a higher order notion of syndeticity. We utilize them to establish new necessary and sufficient conditions for strong amenability and amenability. Throughout, I will discuss connections to operator algebras. This is joint work with Sven Raum and Guy Salomon.

Boundary Actions and Quasi-regular Representations
Eduardo Scarparo (two lectures)
Federal University of Santa Catarina

Abstract: We will present applications of boundary actions to the investigation of the ideal and tracial structure of C*-algebras generated by unitary representations. In particular, for quasi-regular representations associated to stabilizers of boundary actions we have a complete understanding of the trace space of such C*-algebras and when they are simple. We will also present some examples coming from Thompson's groups and topological full groups which do not fit yet in the general theory.

A Notion of Index for Inclusions of Operator Systems
Thomas Sinclair (two lectures)
Purdue University

Abstract: We define an invariant for an inclusion of operator systems based on Pimsner and Popa's formulation for the Jones index of a subfactor. We will discuss how this index is connected with certain invariants studied in quantum information theory. This is joint work with Roy Araiza and Colton Griffin.

Classifying Embeddings of C*-algebras

Aaron Tikuisis (two lectures)
University of Ottawa

Abstract: A well-popularized problem in C*-algebra theory is the classification of C*-algebras up to isomorphism. Through an intertwining argument, this is generally achieved through understanding and classifying *-homomorphisms between C*-algebras - a problem that is also natural in its own right. In joint work with J. Carrión, J. Gabe, C. Schafhauser, and S. White, we have classified *-homomorphisms using minimal (and abstract) hypotheses on the domain A and codomain B: A can be any separable exact C*-algebra satisfying the UCT, and B can be any separably Z-stable C*-algebra with compact tracial state space and strict comparison with respect to traces. I will discuss this result in the context of classification of C*-algebras, and some of the key ideas in our approach.