CRMDS-IPM Joint Workshop on Operator Algebras

A joint workshop of the Centre for Research in Mathematics and Data Science (Western Sydney Uni) and Institute for Research in Fundamental Sciences (Tehran, IPM) on *Operator Algebras* will be held 30 Sep 2-Oct via Zoom.

	Sydney/Wollongong 20:30 PM Tehran 15 PM Leuven & Göttingen 12:30 PM Baltimore 6:30 AM Florianópolis 7:30 AM Reno 3:30 AM Orléans 12:30 PM	Sydney/Wollongong 22 PM Tehran 16:30 PM Leuven & Göttingen 14 PM Baltimore 8 AM Florianópolis 9 AM Reno 5 AM Orléans 14 PM	Sydney/Wollongong 23:30 PM Tehran 18 PM Leuven & Göttingen 15:30 PM Baltimore 9:30 AM Florianópolis 10:30 AM Reno 6:30 AM Orléans 15:30 PM	Sydney/Wollongong 1 AM Tehran 19:30 PM Leuven & Göttingen 17 PM Baltimore 11 AM Florianópolis 12 AM Reno 8 AM Orléans 17 PM
Wednesday September 30	**Aidan Sims** (Australia) (lecture 1)	**Ralf Meyer** (Germany) (lecture 1)	**Dana Williams** (USA) (lecture 1)	**Jean Renault** (France)
Thursday October 1	**Aidan Sims** (Australia) (lecture 2)	**Ralf Meyer** (Germany) (lecture 2)	**Dana Williams** (USA) (lecture 2)	**Gabor Szabo** (Belgium)
Friday October 2	**Ralf Meyer** (Germany) (lecture 3)	**Alcides Buss** (Brazil)	**Dana Williams** (USA) (lecture 3)	**Alex Kumjian** (USA)

Titles and Abstracts (in alphabetic order)

Amenability for actions of groups on C*-algebras

Alcides Buss
Federal University of Santa Catarina

Abstract: In this lecture I will explain recent developments in the theory of amenability for actions of groups on C*-algebras and Fell bundles, based on joint works with Siegfried Echterhoff, Rufus Willett, Fernando Abadie and Damián Ferraro. Our main results prove that essentially all known notions of amenability are equivalent. We also extend Matsumura's

theorem to actions of exact locally compact groups on commutative C*-algebras and give a counter-example for the weak containment problem for actions on noncommutative C*-algebras.

Pushouts of groupoids by abelian group bundles

Alex Kumjian
University of Nevada

Abstract: Given a groupoid extension of a locally compact Hausdorff groupoid by a bundle of abelian groups on which it acts, we construct a pushout twist over the groupoid semidirect product of the groupoid acting on the dual of the bundle regarded as a topological space. We then show that the C*-algebra of the original extension groupoid is isomorphic to the twisted groupoid associated to the pushout. We will also discuss examples. This talk is based on current joint work with Marius Ionescu, Jean Renault, Aidan Sims and Dana Williams.

Groupoid models and C*-algebras of diagrams of groupoid correspondences

Ralf Meyer
Georg-August-Universität Göttingen

Abstract: A groupoid correspondence is a generalised morphism between étale groupoids. Topological graphs, self-similarities of groups, or self-similar graphs are examples of this. Groupoid correspondences induce C*-correspondences between groupoid C*-algebras, which then give Cuntz-Pimsner algebras. The Cuntz-Pimsner algebra of a groupoid correspondence is isomorphic to a groupoid C*-algebra of an étale groupoid built from the groupoid correspondence. This gives a uniform construction of groupoid models for many interesting C*-algebras, such as graph C*-algebras of regular graphs, Nekrashevych's C*-algebras of self-similar groups and their generalisation by Exel and Pardo for self-similar graphs. If possible, I would also like to mention work in progress to extend this theorem to relative Cuntz-Pimsner algebras, which would then cover all topological graph C*-algebras. Groupoid correspondences form a bicategory. This structure is already used to form the groupoid model of a groupoid correspondence. It also allows us to define actions of monoids or, more generally, of categories on groupoids by groupoid correspondences. Passing to C*-algebras, this gives a product system where the unit fibre is a groupoid C*-algebra. If the monoid is an Ore monoid, then the Cuntz-Pimsner algebra of this product system is again a groupoid C*-algebra of an étale groupoid, which is defined directly from the action by groupoid correspondences. For more general monoids, the two constructions become different, however. We show this in a special case that is related to separated graph C*-algebras and their tame versions.

KMS states and groupoid C*-algebras

Jean Renault
Université d'Orléans

Abstract: I will illustrate the use of groupoids in the study of KMS states and weights on C*-algebras. The KMS condition, which was introduced in quantum statistical mechanics to characterize equilibrium states, plays a crucial role in the theory of von Neumann algebras. The study of KMS states and their phase transitions on specific C*-algebras, in particular graph algebras, is an active field of research where the groupoid techniques are well suited.

Reconstruction of groupoids, and classification of Fell algebras

Aidan Sims
University of Wollongong

Abstract: I will the history of reconstruction of groupoids from pairs of operator algebras, from Feldman and Moore's results on von Neumann algebras through Kumjian's and then Renault's results about C*-algebras of twists, and including some recent results about groupoids that are not topologically principal. I will finish by outlining how Kumjian's theory leads to a Dixmier-Douady classification theorem for Fell algebras.

Dynamical criteria towards classifiable transformation group C*-algebras

Gabor Szabo
KU Leuven

Abstract: In this talk I will report on joint work with David Kerr regarding the structure and classification of certain transformation group C*-algebras. It is a general important question when free minimal actions of amenable groups on compact spaces give rise to crossed product C*-algebras that fall within the scope of Elliott's program. After some years of research where this had been partially settled for special classes of groups with methods related to noncommutative dimension theory, Kerr's notion of almost finiteness opens the door to systematically study this problem for all amenable groups. I will give an overview of these techniques and the current state-of-the-art, culminating in our result that asserts the classifiability of such crossed products if the underlying space is finite-dimensional and the group has subexponential growth.

Morita equivalence, the equivariant Brauer group, and beyond

Dana Williams
Dartmouth College

Abstract: I will give a brief survey of work on the equivariant Brauer group together with the necessary preliminaries as well as generalizations involving groupoid C*-algebras.