

SCHEDULE FOR GROUPOIDFEST 2021

Talks will be held in Room B213 of the Osborne Center for Science & Engineering (labeled OCSE on the campus map).

Friday, November 12

7:00PM–8:00PM Reception at the Caspian Cafe
(Address: 4375 Sinton Rd, Colorado Springs, CO 80907)

Saturday, November 13

10:00AM–10:30AM Coffee and Pastries

10:30AM–11:30AM “A counterexample to the HK-conjecture that is principal”,
Robin Deeley

11:30AM–12:30PM “Associativity and obstructions to integrability”,
Rui Loja Fernandes

12:30PM – 2:00PM Lunch at the Roaring Fork Dining Center

2:00PM – 3:00PM “Groupoid-Equivariant Index Theory”,
Zachary Garvey

3:00PM – 3:30PM Coffee Break

3:30PM – 4:30PM “Noncommutative Pierce Duality”,
Tristan Bice

7:00PM–9:00PM Conference Dinner at the Warehouse Restaurant
(Address: 25 West Cimarron Street, 80903
Free Parking on the East Side of the Building)

Sunday, November 14

10:00AM–10:30AM Coffee and Pastries

10:30AM–11:30AM “Expansive Systems and their C^* -Algebras”,
Andrew Stocker

11:30AM–12:30PM “Semidirect products of groupoid actions on Fell bundles”,
John Quigg

TITLES AND ABSTRACTS

Speaker: Robin Deeley (University of Colorado Boulder)

Title: A counterexample to the HK-conjecture that is principal

Abstract: Scarparo has constructed counterexamples to Matui's HK-conjecture. These counterexamples are essentially principal but not principal. For group actions the difference between essentially principal and principal is related to the difference between the action being topologically free and free. I will discuss a counterexample to the HK-conjecture that is principal. Like Scarparo's original counterexample, this counterexample is the transformation groupoid associated to a particular odometer. However, the relevant group is the fundamental group of a flat manifold (and hence is torsion-free) and the associated odometer action is free.

Speaker: Rui Loja Fernandes (University of Illinois Urbana Champaign)

Title: Associativity and obstructions to integrability

Abstract: Every Lie algebroid integrates to a local Lie groupoid, but not to a global one. Hence, the problem of enlarging a local Lie groupoid to a global one is related to the problem of integrating a Lie algebroid to a global one. I will explain the precise relationship between these two problems. Time permitting, I will sketch how this leads to obstructions to non-formal deformation quantization, via semi-classical Fourier integral operators. This talk is based on joint works with Alejandro Cabrera and Dan Michiels.

Speaker: Zachary Garvey (University of Colorado Boulder)

Title: Groupoid-Equivariant Index Theory

Abstract: Index theory, from a K-homological point of view, is a factorization of the (analytic) K-homology class of a Fredholm operator, $[P]$, into the KK-product of "topologically-defined" classes. For an elliptic pseudodifferential operator, P , on a compact manifold X , there is a factorization: $[P] = [\sigma_P] \otimes [D_{TX}]$, where σ_P is determined by the principal symbol of P , and D_{TX} is a Dirac operator on the spin^c manifold TX . Given a groupoid with some conditions, \mathcal{G} , we consider analogues of this factorization for \mathcal{G} -equivariant elliptic pseudodifferential operators on a proper, cocompact \mathcal{G} -manifold.

Speaker: Tristan Bice (Institute of Mathematics of the Czech Academy of Sciences)

Title: Noncommutative Pierce Duality

Abstract: Classic work of Pierce (1967) and Dauns-Hofmann (1966) shows that biregular rings are dual to bundles of simple rings over Stone spaces. More precisely, the sections of such a bundle form a biregular ring while, conversely, any biregular ring can be represented on such a bundle constructed from its Stone space of maximal ideals. Here we outline how to extend this to a duality of Steinberg rings, a purely algebraic generalisation of Steinberg algebras, with ringoid bundles over ample groupoids. This generalises very recent work of Armstrong et al. (2021) on the reconstruction of twisted Steinberg algebras, while also upgrading it to a true categorical duality. Our work is largely based on an even more general duality of Steinberg semigroups with ample category bundles which also encompasses Lawson's (2010) noncommutative Stone duality between Boolean inverse semigroups and ample groupoids.

Speaker: Andrew Stocker (University of Colorado Boulder)

Title: Expansive Systems and their C^* -Algebras

Abstract: Expansive systems are a class of topological dynamical systems which exhibit sensitivity to initial conditions. Following work by Klaus Thomsen, we will construct a C^* -algebra from an asymptotic equivalence relation on the points in a given expansive system. This generalizes the C^* -algebraic construction made by Ian Putnam for Smale Spaces, which are themselves an important special case of expansive systems. We will then present some results obtained for a type of expansive system called synchronizing systems, and we will compute this C^* -algebra for some specific examples. No knowledge of dynamical systems will be assumed for this talk.

Speaker: John Quigg (Arizona State University)

Title: Semidirect products of groupoid actions on Fell bundles

Abstract: An old theorem of Green says that if a locally compact group acts principally on a locally compact Hausdorff space, then the crossed product is Morita equivalent to $(C_0$ of) the orbit space. I'll give a selective history culminating in a version with a (locally compact Hausdorff) groupoid acting principally on a Fell bundle over another such groupoid. As an application we recover the Stabilization theorem of Ionescu, Kumjian, Sims, and Williams. This is joint work with Hall, Kaliszewski, and Williams, following on from work with Kaliszewski, Muhly, and Williams.