

CV - Jeremy B. Hume

Email: jeremybhume@gmail.com

Nationality: Canadian

Website: <https://jeremybhume.github.io/>

Education and Academic Employment

Research Associate, Mathematics *Starting 2026*
University of New South Wales (Supervisor: Aidan Sims)

Postdoctoral Fellow, Mathematics *January 2025 - December 2025*
Carleton University (Supervisor: Charles Starling)

PhD, Mathematics *September 2021 - December 2024*
University of Glasgow (Supervisor: Xin Li)

MSc, Mathematics *September 2019 - August 2021*
University of Victoria (Supervisor: Ian F. Putnam)

H.BSc, Mathematics *September 2015 - May 2019*
University of Toronto

Research Interests

C^* -algebras, K -theory, groupoids and dynamical systems.

Papers and Preprints

KK -duality for self-similar groupoid actions on graphs

arxiv:2302.03989, in *Transactions of the American Mathematical Society*, 377 (2024), 5513-5560. Joint with N. Brownlowe, A. Buss, D. Gonçalves, A. Sims and M. F. Whittaker. We prove that two naturally associated C^* -algebras to a regular and contracting self-similar groupoid are Spanier-Whitehead dual (in KK -theory) to each other by showing they are strongly Morita equivalent to the stable and unstable Ruelle C^* -algebras of a Smale space arising from the self-similar limit space.

Katsura-Exel-Pardo self-similar actions, Putnam's binary factors and their limit spaces

arxiv:2405.19863, to appear in *The Journal of the Australian Mathematical Society (special memorial issue for Iain Raeburn)*. Joint with M. F. Whittaker. We investigate the properties of a certain class of self-similar groupoid actions, the *Katsura-Exel-Pardo actions*. We show a recent class of dynamical systems studied by Putnam can be realized as a sub-class of the limit space dynamical systems associated to Katsura-Exel-Pardo actions. We prove these limit spaces embed into the plane, answering a question of Putnam.

The K -theory of the C^* -algebras associated to a rational function

arxiv:2307.13420, accepted in *Advances in Mathematics*. We compute the K -theory of the three C^* -algebras associated to a rational function, thought of as a dynamical system acting on its Julia set, Fatou set or the entire Riemann sphere. Our results yield new dynamical invariants for rational functions and a C^* -algebraic formulation of the Density of Hyperbolicity Conjecture for quadratic polynomials.

Minimal covers with continuity-preserving transfer operators for topological dynamical systems

arXiv:2408.11917 (Submitted). Joint with K. A. Brix and X. Li. To a non-invertible dynamical system we construct two covers of it by better behaved systems, generalizing the Krieger and Fischer covers of a sub-shift. We show these covers are functorial, have universal properties and study the relationship between properties of the original system and the cover.

On Hausdorff covers for non-Hausdorff groupoids

arXiv:2503.23203 (Submitted). Joint with K. A. Brix, J. Gonzales and X. Li. We develop a new approach to non-Hausdorff étale groupoids using Hausdorff covers. As an application, we characterize in terms of a groupoid property when singular ideals vanish for Steinberg algebras and for C^* -algebras of groupoids satisfying a finiteness condition. Also, our approach reduces questions about simplicity, the ideal intersection property and amenability for groupoids to the Hausdorff case.

Characterizations of zero singular ideal in étale groupoid C^* -algebras via compressible maps

arXiv:2509.07262 (Submitted). We characterize when the singular ideal in a non-Hausdorff étale groupoid C^* -algebra is zero in terms of a geometric property of the isotropy groups and certain subgroups obtained from the groupoid. This is achieved through the interplay between the Hausdorff cover and restriction maps on C^* -algebras of groupoids to reductions by closed locally invariant subsets. We also prove a simpler algebraic characterization of zero singular ideal that holds whenever the isotropy groups are direct limits of virtually torsion free solvable groups.

On dense subalgebras of the singular ideal in groupoid C^* -algebras

arXiv:2509.07262. Joint with J. Gonzales. We prove that ideals in amenable non-Hausdorff étale groupoid C^* -algebras are determined by their isotropy fibres. As an application, we characterize when the singular functions in Connes' algebra are dense in the singular ideal in terms of a property of explicit ideals in the isotropy group C^* -algebras.

Invited and Contributed Talks

GroupoidFest 2025 , New Mexico State University, USA (Invited talk: Characterization of zero singular ideal in non-Hausdorff groupoid C^* -algebras)	<i>November 2025</i>
South Atlantic Noncommutative Geometry Seminar (Online) , Universidad de Buenos Aires (Invited talk: Characterization of zero singular ideal in non-Hausdorff groupoid C^* -algebras)	<i>November 2025</i>
Noncommutative Geometry in NYC Seminar (Online) , St. John's University, USA (Invited talk: Characterization of zero singular ideal in non-Hausdorff groupoid C^* -algebras)	<i>October 2025</i>
Ottawa Analysis Seminar , Ottawa, Canada (Invited talk: Characterization of zero singular ideal in non-Hausdorff groupoid C^* -algebras)	<i>October 2025</i>
NMSU Analysis Seminar (Online) , New Mexico State University, USA (Invited talk: Characterization of vanishing singular ideal in non-Hausdorff groupoids)	<i>September 2025</i>
Canadian Operator Symposium , University of Waterloo, Canada (Contributed talk: Non-Hausdorff groupoids and the vanishing singular ideal property)	<i>June 2025</i>
Operator Algebra Seminar , University of Southern Denmark, Odense, Denmark (Invited talk: Dynamical covers)	<i>November 2024</i>
Functional Analysis Seminar , University of Oxford, England (Invited talk: Spectral gap in the operator on traces induced from a C^* -correspondence)	<i>November 2024</i>
Operator Algebras in the South of the UK , Southampton, England (Invited talk: The K -theory of the C^* -algebras associated to complex dynamical systems)	<i>September 2024</i>
OdenSeaG , Odense, Denmark (Invited talk: Contracting C^* -correspondences)	<i>August 2024</i>
UK Operator Algebras Conference , Newcastle, England (Contributed talk: Katsura groupoid actions and their limit spaces)	<i>June 2024</i>
YMC*A 2023 , Leuven, Belgium (Contributed talk: The K -theory of a rational function)	<i>August 2023</i>
Algebra, Geometry and C^*-algebras , ICMS, Edinburgh, Scotland (Invited talk: The K -theory of a rational function)	<i>June 2023</i>
Analysis seminar University of Waterloo, Canada (Invited talk: The K -theory of a rational function)	<i>January 2023</i>

Organizing

YMC*A 2024 , University of Glasgow, Scotland I led the organizing committee for “Young Mathematicians in C^* -algebras”, which was an international conference designed for early career researchers working in the field of operator algebras. The number of participants was 115.	<i>August 2024</i>
Analysis working seminar , University of Glasgow, Scotland I organized with two fellow PhD students a weekly seminar for members of the analysis department and visiting scholars to present topics related to their research.	<i>September 2022 - April 2023</i>

Teaching

Calculus for Engineering or Physics , Carleton University, Canada I taught and administrated a first year undergraduate calculus course (MATH 1004 B).	<i>Fall 2025</i>
Complex analysis tutorial , University of Glasgow, Scotland I led the 4 th year honours complex analysis tutorial where I taught supplemental material and went through problem set exercises carefully with students.	<i>Winter 2021</i>
Teichmüller theory seminar , University of Victoria, Canada I hosted a Teichmüller theory seminar at the University of Victoria and gave two one-hour lectures each week.	<i>Fall 2019</i>

Calculus, Toronto, Canada

July 2019

I taught an approximately 100-hour-long course on high-school level calculus to an individual through Forest Hill Tutoring Company in Toronto.

Awards and Scholarships

Heilbronn Institute's Small Grant Award for YMC*A 2024 ³ £3500 GBP	<i>2024</i>
Glasgow Mathematical Journal Trust Award for YMC*A 2024 ² £3000 GBP	<i>2024</i>
University of Glasgow Graduate Scholarship ¹ £60 000 GBP	<i>2021</i>
British Columbia Graduate Scholarship \$15 000 CAD	<i>2019</i>
University of Victoria Graduate Award \$4872 CAD	<i>2019</i>
Margaret Ronald Taylor & Thomas Paxton Taylor Scholarship \$1414 CAD	<i>2019</i>
Dean's List (University of Toronto)	<i>2016, 2017, 2018</i>
F Ray Irwin Scholarship \$1000 CAD	<i>2018</i>
Regents In-Course Scholarship \$1000 CAD	<i>2017</i>
Dr John Benjamin Gullen Scholarship \$1000 CAD	<i>2016</i>
President's Entrance Scholarship \$2000 CAD	<i>2015</i>

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²(Conference grant, joint with F. Pagliuca)

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