CV - Jeremy B. Hume

Email: jeremybhume@gmail.com **Nationality:** Canadian

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

Education and Academic Employment

Research Associate, Mathematics *Starting January 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 (Submitted). 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. 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.

Invited and Contributed Talks

NMSU Analysis Seminar (Online), New Mexico State University, USA *September 2025*
(Invited talk: Characterization of vanishing singular ideal in non-Hausdorff groupoids)

Canadian Operator Symposium, University of Waterloo, Canada *June 2025*
(Contributed talk: Non-Hausdorff groupoids and the vanishing singular ideal property)

Operator Algebra Seminar, University of Southern Denmark, Odense, Denmark *November 2024*
(Invited talk: Dynamical covers)

Functional Analysis Seminar, University of Oxford, England *November 2024*
(Invited talk: Spectral gap in the operator on traces induced from a C*-correspondence)

Operator Algebras in the South of the UK, Southampton, England *September 2024*
(Invited talk: The K-theory of the C*-algebras associated to complex dynamical systems)

OdenSeaG, Odense, Denmark *August 2024*
(Invited talk: Contracting C*-correspondences)

UK Operator Algebras Conference, Newcastle, England *June 2024*
(Contributed talk: Katsura groupoid actions and their limit spaces)

YMC*A 2023, Leuven, Belgium *August 2023*
(Contributed talk: The K-theory of a rational function)

Algebra, Geometry and C^*-algebras, ICMS, Edinburgh, Scotland *June 2023*
(Invited talk: The K-theory of a rational function)

Analysis seminar University of Waterloo, Canada *January 2023*
(Invited talk: The K-theory of a rational function)

Organizing

YMC*A 2024, University of Glasgow, Scotland *August 2024*
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.

Analysis working seminar, University of Glasgow, Scotland *September 2022 - April 2023*
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.

Teaching

Calculus for Engineering or Physics, Carleton University, Canada *Fall 2025*
I am teaching a first year undergraduate calculus course (MATH 1004 B).

Complex analysis tutorial, University of Glasgow, Scotland *Winter 2021*
I led the 4^{th} year honours complex analysis tutorial where I taught supplemental material and went through problem set excercises carefully with students.

Teichmüller theory seminar, University of Victoria, Canada *Fall 2019*
I hosted a Teichmüller theory seminar at the University of Victoria and gave two one-hour lectures each week.

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** *2024*

Glasgow Mathematical Journal Trust Award for YMC*A 2024[2] **£3000 GBP** *2024*

University of Glasgow Graduate Scholarship[1] **£60 000 GBP** *2021*

British Columbia Graduate Scholarship $15 000 CAD *2019*

[3](Conference grant, joint with U. Chakraborty, J. Gonzales, F. Pagliuca and S. Pilgrim)
[2](Conference grant, joint with F. Pagliuca)
[1](funded through ERC grant No. 817597)

University of Victoria Graduate Award $4872 CAD *2019*

Margaret Ronald Taylor & Thomas Paxton Taylor Scholarship $1414 CAD *2019*

Dean's List (University of Toronto) *2016, 2017, 2018*

F Ray Irwin Scholarship $1000 CAD *2018*

Regents In-Course Scholarship $1000 CAD *2017*

Dr John Benjamin Gullen Scholarship $1000 CAD *2016*

President's Entrance Scholarship $2000 CAD *2015*