

# CV - Jeremy B. Hume

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## Education and Academic Employment

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

*Starting January 2026*

**Postdoctoral Fellow**, Mathematics  
Carleton University (Supervisor: Charles Starling)

*January 2025 - December 2025*

**PhD**, Mathematics  
University of Glasgow (Supervisor: Xin Li)

*September 2021 - December 2024*

**MSc**, Mathematics  
University of Victoria (Supervisor: Ian F. Putnam)

*September 2019 - August 2021*

**H.BSc**, Mathematics  
University of Toronto

*September 2015 - May 2019*

## Research Interests

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

## Papers and Preprints

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### **$KK$ -duality for self-similar groupoid actions on graphs**

arxiv:2302.03989 (Published in Transactions of the American Mathematical Society). 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 (Accepted June 2025 as an invited submission to a special edition of the Journal of the Australian Mathematical Society in honour of 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

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

## Organizing

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<b>YMC*A 2024</b> , 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>
<b>Analysis working seminar</b> , 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

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<b>Calculus for Engineering or Physics</b> , Carleton University, Canada I am teaching a first year undergraduate calculus course (MATH 1004 B).	<i>Fall 2025</i>
<b>Complex analysis tutorial</b> , University of Glasgow, Scotland I led the 4 <sup>th</sup> year honours complex analysis tutorial where I taught supplemental material and went through problem set exercises carefully with students.	<i>Winter 2021</i>
<b>Teichmüller theory seminar</b> , 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>
<b>Calculus</b> , Toronto, Canada I taught an approximately 100-hour-long course on high-school level calculus to an individual through Forest Hill Tutoring Company in Toronto.	<i>July 2019</i>

## Awards and Scholarships

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<b>Heilbronn Institute’s Small Grant Award for YMC*A 2024</b> <sup>3</sup> £3500 GBP	<i>2024</i>
<b>Glasgow Mathematical Journal Trust Award for YMC*A 2024</b> <sup>2</sup> £3000 GBP	<i>2024</i>
<b>University of Glasgow Graduate Scholarship</b> <sup>1</sup> £60 000 GBP	<i>2021</i>
<b>British Columbia Graduate Scholarship</b> \$15 000 CAD	<i>2019</i>

<sup>3</sup>(Conference grant, joint with U. Chakraborty, J. Gonzales, F. Pagliuca and S. Pilgrim)

<sup>2</sup>(Conference grant, joint with F. Pagliuca)

<sup>1</sup>(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