Joshua L. Flynn

CONTACT INFORMATION

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EMPLOYMENT

McGill University
CRM-ISM Postdoctoral Fellow — 2022 - present

RESEARCH INTERESTS

Analysis on flat and curved geometries (e.g., hyperbolic spaces) and noncommutative groups (e.g., the Heisenberg group) using Fourier analysis, geometric analysis and PDE methods. Current projects include problems in harmonic analysis, geometric flows, PDEs and sharp geometric inequalities.

EDUCATION

University of Connecticut

Ph.D. Mathematics, 2022

- Dissertation Topic: sharp geometric inequalities on noncompact rank one symmetric spaces and their boundaries.
- Advisor: Guozhen Lu

University of Washington

B.Sc. in Mathematics, 2015

PAPERS

J. Flynn, N. Lam, G. Lu and S. Mazumdar: Hardy's Identities and Inequalities on Cartan-Hadamard Manifolds, submitted (2021), accepted to the Journal of Geometric Analysis (2022), arXiv:2103.12788.

J. Flynn, N. Lam, G. Lu: Hardy-Poincaré-Sobolev type inequalities on hyperbolic spaces and related Riemannian manifolds, submitted (2021), Journal of Functional Analysis (2022)

C. Cazacu, J. Flynn and N. Lam, *Sharp second order uncertainty principles*, Journal of Functional Analysis (2022), arXiv:2012.12667.

A. Burchard, J. Flynn, G. Lu and M.-C. Shaw, *Extendability and the $\bar{\partial}$ Operator on the Hartogs Triangle*, Math. Zeit (2021), 1-22. arXiv:2106.09867.

C. Cazacu, J. Flynn and N. Lam, *Short proofs of refined sharp Caffarelli-Kohn-Nirenberg inequalities*, Journal of Differential Equations, 302, 533-459 (2021).

J. Flynn, N. Lam and G. Lu, *Sharp Hardy Identities and Inequalities on Carnot Groups*, Advanced Nonlinear Studies, 21(2), 281-302 (2021).

J. Flynn, *Sharp L^2-Caffarelli-Kohn-Nirenberg inequalities for Grushin vector fields*, Nonlinear Analysis, 199, 111961 (2020).

J. Flynn, *Sharp Caffarelli-Kohn-Nirenberg-Type Inequalities on Carnot Groups*, Advanced Nonlinear Studies, 20(1), 95-111 (2020).

Preprints

J. Flynn, G. Lu and Q. Yang, *Sharp Hardy-Sobolev-Maz'ya, Adams and Hardy-Adams inequalities on quaternionic hyperbolic spaces and the Cayley hyperbolic plane*, submitted (2021), arXiv:2106.06055.

C. Cazacu, J. Flynn and N. Lam: Sharp Caffarelli-Kohn-Nirenberg Inequalities for Curl-Free Vector Fields and Second Order Derivatives, submitted (2021), accepted after revision in CVPDE arXiv:2111.15067.

Talks Given and Upcoming

Sharp Hardy Integral Identities and Inequalities on Domains, AMS special session on Advances and Applications in Integral and Differential Equations, 2023 Joint Mathematics Meeting, Boston, MA (Jan 2023)

Sharp Second Order Uncertainty Principles and Related Inequalities for Vector Fields, AMS special session on Advances and Applications in Integral and Differential Equations, 2023 Joint Mathematics Meeting, Boston, MA (Jan 2023)

Helgason-Fourier Analysis and Sharp Geometric Inequalities on the Rank One Symmetric Spaces, CMS Special session on Approximation theory, function spaces and harmonic analysis, University of Toronto, Toronto, Ont. (Dec 2022)

Sharp Hardy-Sobolev-Maz'ya Inequalities for the Rank One Symmetric Spaces Geometric Analysis Seminar, McGill University, Montreal, QC. (Nov 2022)

Sharp Uncertainty Principles for Physical Vector Fields and Second Order Derivatives, Geometric and Functional Inequalities and Applications, international virtual seminar. (Oct 2022)

Helgason-Fourier Analysis on the Hyperbolic Spaces, Séminaire Analyse Harmonique, Centre de Recherches Mathématiques, Montreal, QC. (Oct 2022)

Hardy-Sobolev-Maz'ya and Adams Inequalities for the Quaternionic Hyperbolic Spaces, Spring Western Sectional Meeting Special Session on Geometric and Functional Inequalities and Applications to PDEs, formerly University of Denver. (May 2022)

Some Sharp Uncertainty Principles and Related Geometric Inequalities, Ghent Methusalem Junior Seminar. (May 2022)

Sharp Hardy-Sobolev-Maz'ya, Adams and Hardy-Adams inequalities on quaternionic hyperbolic spaces and the Cayley hyperbolic plane, 2022 Joint Mathematics Meeting, formerly at Seattle, WA. (Apr 2022)

Hardy-Sobolev-Maz'ya inequalities on Siegel domains, Mathematics Seminar, Bridgewater State University. (Mar 2022)

Sharp Hardy-Sobolev-Maz'ya, Adams and Hardy-Adams inequalities on quaternionic hyperbolic spaces and the Cayley hyperbolic plane, 17th Prairie Analysis Seminar, Kansas State University. (Nov 2021)

Sharp Caffarelli-Kohn-Nirenberg Inequalities for the Grushin operator and Iwasawa Groups, Annual New York State Regional Graduate Mathematics Conference, Syracuse University. (Apr 2021)

Hardy Identities on Domains, Spring Eastern Sectional Meeting Special Session on Metric techniques in Analysis, Brown University. (Mar 2021)

Sharp Caffarelli-Kohn-Nirenberg Inequalities for Grushin Vector Fields and Iwasawa Groups, Tenth Ohio River Analysis Meeting, University of Kentucky. (Mar 2021)

Hardy-Sobolev-Maz'ya and Adams Inequalities on Quaternionic Hyperbolic Spaces, Spring Eastern Sectional Meeting Special Session on Geometric and Functional Inequalities and Nonlinear Partial Differential Equations, Brown University. (Mar 2021)

Algebraic Aspects of Dunkl Theory, Binghamton University Graduate Conference in Algebra and Topology, Binghamton University. (Nov 2020)

Sharp Caffarelli-Kohn-Nirenberg Inequalities for Grushin Vector Fields and Iwasawa Groups, Geometric and Functional Inequalities and Applications, international virtual seminar. (Nov 2020)

Sharp L^2-Caffarelli-Kohn-Nirenberg-Type Inequalities for the Grushin operator and Iwasawa Groups, Fall Central Sectional Meeting Special Session on Geometric Inequalities and Nonlinear Partial Differential Equations, University of Texas. (Sep 2020)

Sharp Caffarelli-Kohn-Nirenberg Type Inequalities on Iwasawa Groups, 2020 Joint Mathematics Meeting, Denver, CO. (Jan 2020)

Some Geometric Inequalities by Algebraic Trickery, Mathematics Continued Conference, University of Connecticut. (Nov 2019)

Conferences and Seminars Organized

2022-present	Co-organizer of the *Geometric Analysis Seminar* at McGill University.
2020-present	Co-organizer of the international virtual seminar *Geometric and Functional Inequalities and Applications.* `geometricinequalities.com`
2023	Co-organizing the JMM Special Session on *Advances in Partial Differential Equations, Numerical Analysis, and their Applications* at the 2023 Joint Mathematics Meetings in Boston, MA
2022	Co-organized the AMS Special Session on *Geometric and Functional Inequalities and Applications to PDEs* at the Spring Western Sectional Meeting (formerly at the University of Denver).
2021	Co-organized the AMS Special Session on *Geometric and Functional Inequalities and Nonlinear Partial Differential Equations* at the Spring Eastern Sectional Meeting (formerly at Brown University).
2020	Co-organized the AMS Special Session on *Geometric Inequalities and Nonlinear Partial Differential Equations* at the Fall Central Sectional Meeting (formerly at University of Texas at El Paso).
2020	Co-organized a virtual learning seminar on *Analysis on Groups of Polynomial Growth.*

Awards

2022	Michael Neumann Dissertation Award
2021	Conference Participation Award
2021	Summer Doctoral Dissertation Fellowship
2020	Predoctoral Fellowship
2019	Provost Excellence in Teaching

Referee Services

Communications on Pure and Applied Analysis, Acta Mathematica Sinica

Mentorship and Misc.

2017-2022 — TA Mentor Network Volunteer
- Mentored incoming graduate students in the mathematics Ph.D. program at the UConn.

2021 — Directed Reading Program Volunteer
- Mentored an undergraduate of mathematics at UConn and guided them in completing a project and presentation on the finite element method and Matlab.

2020 — Prelim Review Summer Position
- Paid Summer position at UConn to hold weekly review sessions and guide graduate students to prepare for the analysis preliminary exam.

Teaching Experience

Spring	2022	Teaching Assistant, Calculus I
Fall	2021	Instructor, Technical Writing in Mathematics
Spring	2021	Teaching Assistant, Elementary Differential Equations
Fall	2020	Teaching Assistant, Elementary Differential Equations
Spring	2020	Instructor, Elementary Differential Equations
Fall	2019	Instructor, Calculus for Business and Economics
Spring	2019	Instructor, Elementary Differential Equations
Fall	2018	Teaching Assistant, Calculus I
Spring	2018	Instructor, Elementary Differential Equations
Fall	2017	Teaching Assistant, Calculus I
Spring	2017	Instructor, Calculus for Business and Economics
Fall	2016	Instructor, Calculus for Business and Economics
Spring	2016	Instructor, Calculus for Business and Economics
Fall	2015	Instructor, Problem Solving