Steven Patrick Flynn Curriculum Vitae

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Research Interest

- Geometric Inverse Problems. Hypoelliptic PDEs. Sub-Riemannian geometry.

Education

- **University of California, Santa Cruz,** Ph.D., Mathematics, June 2020.
  Thesis title: "*Unraveling Geodesic X-ray Transforms on the Heisenberg Group.*"
  Co-Advisors: François Monard, Richard Montgomery.
- **University of California, Santa Cruz,** M.A., Mathematics, June 2015.
- **University of California, Santa Cruz,** B.A., Pure Mathematics (honors) June 2014.

Employment

- **University of Padova,** Postdoctoral Research Associate, Sep. 2023–present.
- **University of Bath,** Postdoctoral Research Associate, Jan. 2021–Sep 2023.
  Quantum Limits for Subelliptic Operators; Funded by the Leverhulme Trust under Véronique Fischer (PI) and Clotilde Fermanian-Kammerer (Co-PI)
- **University of California, Santa Cruz, (UCSC)** Graduate Researcher/Graduate Student Instructor/Teaching Assistant, Sep. 2014–Jun. 2020.

Accepted Publications

1. S. Flynn "Singular Value Decomposition of the X-ray Transform on the Reduced Heisenberg group, and a Two-Radius Theorem" (Proceeding) To appear in Springer Volume, Trends in Mathematics: Ghent Analysis and PDE Center. (2023)
2. C. Fermanian-Kammerer, V. Fischer, and S. Flynn. "Some Remarks on Semi-Classical Analysis on Two-Step Nilmanifolds" (Proceeding) Springer INdAM Series (2022).
3. C. Fermanian-Kammerer, V. Fischer, and S. Flynn. "Geometric invariance of the semi-classical calculus on nilpotent graded Lie groups." *Journal of Geometric Analysis* (2023).
4. S. Flynn. "Injectivity of the Heisenberg X-ray transform." *Journal of Functional Analysis 280.5* (2021): 108886.

Articles in preparation

1. S. Flynn. "Fourier Slice Theorems and Injectivity Sets for the X-ray transform on H-type Groups."
2. C. Fermanian-Kammerer, V. Fischer, and S. Flynn. Working Title: "A Non-commutative Semi-classical Calculus on Filtered Manifolds and Applications to Semi-classical Measures"

Selected Research Experience

- 2019, Mathematics Sciences Research Institute (MSRI), UC Berkeley; Microlocal Analysis; Invited as a Program Associate for the Fall 2019 semester.
- 2019, UC Santa Cruz; Explicit methods for linear and non-linear tomography; Supported as Graduate Student Researcher on the NSF grant titled above (DMS-1814104, 2018-2020, PI: François Monard).

Invited Talks

- October 2023 - *Tomography on H-type groups*; University College London
- May 2023 - *Inhomogeneous Semi-classical calculus with noncommutative symbols*; Operator Algebras in the South of the UK Link; University of Southampton
- Mar 2023 - *Inhomogeneous Semi-classical calculus with noncommutative symbols*; CAGE mini-seminar; Sorbonne Université
- Nov 2022 - *Geometric Invariance of the Semi-Classical Calculus on Graded Lie groups.*; Conference on Noncommutative Analysis and PDEs ; Queen Mary University of London.
- Nov 2022 - *Tensor Tomography on H-type groups.*; Geometry and Analysis Seminar Link; University of Bristol
- May 2022 - *The Heisenberg X-ray transform: A first approximation Inverse Problems on sub-Riemannian manifolds.*; Analysis and Differential Geometry International Seminar Link; University of Aveiro
- Mar 2022 - *The Spectral Decomposition of sR-Ray Transforms*; AGeNT Seminar Link; University of Bath
- Nov 2021 - *Unraveling the Heisenberg X-ray Transform*; Problèmes Spectraux en Physique Mathématique Link; Institut Henri Poincaré
- Sep 2021 - *Unraveling X-ray Transforms on Heisenberg group*; Bath Analysis Seminar Link; University of Bath
- April 2021 - *Unraveling the Heisenberg X-ray Transform*; Sub-Riemannian Seminars Link.
- May 2020 - *Quantizing The Fourier Slice Theorem*; UCSC Geometry and Analysis Seminar.
- Jan 2020 - *Integral Geometry on Contact Manifolds*; Joint Math Meeting, Denver Colorado.
- Sep 2019 - *Integral Geometry on Contact Manifolds*; MSRI, Berkeley CA.
- Nov 2019 - *Noncommutative methods for inverting the Subriemannian X-ray transform on the Heisenberg group*; Mathematical Sciences Research Institute, Berkeley, CA.
- April 2019 - *Inverting the Heisenberg X-ray Transform*; AMS Sectional meeting, Sub-Riemannian and CR Geometric Analysis, University of Connecticut, Hartford.
- Mar 2019 - *Inverting the Heisenberg X-ray Transform*; Graduate Student Geometry and Topology Conference, University of Illinois, Urbana-Champaign.
- June 2018 - *The Heisenberg X-ray Transform*; UCSC Geometry and Analysis Seminar.
- April 2017 - *X-rays and Heisenberg*; Eastern Illinois Integrated Conference in Geometry, Dynamics and Topology.

Teaching Experience

- **UCSC Graduate Student Instructor**: I gave lectures, write exams, assign homework, manage a teaching assistant, and distribute grades for one lower and three upper division mathematics classes for 20 hours per week concurrently with my graduate studies:

  Summer 2017 Math 3, Precalculus; Summer 2019 Math 105A Real Analysis; Spring 2019 ,Math 105B Real Analysis; Summer 2018 Math 105A Real Analysis
- **Teaching Assistant**: I have six years experience working as a teaching assistant 20 hours per week concurrently with my graduate program. My duties included delivering axillary lectures, review sessions, grading work/exams and holding office hours:

  Math 2 CL (Collaborative Learning), College Algebra*; Math 3, Precalculus; Physics 5, 5L, Intro to Physics (Lab); Math 11A, Calculus with Applications; Math 19A, Calculus for Science, Engineering, and Mathematics; Math 19B, Calculus for Science,

Engineering, and Mathematics; Math 21, Linear Algebra; Math 23A, Vector Calculus; Math 23B, Vector Calculus; Math 100, Intro to Proofs; Math 105A, Real Analysis; Math 105B, Real Analysis II; Math 152, Programming for Math (Python) *(Funded by Title V HSI grant); I revived additional training to address the needs of students from disadvantaged background.

- **Directed Reading Program Mentor**: Supervised an undergraduate research project on the isoperminetric problem at UCSC. The student presented on their work. Spring 2018.

Funding

- June 2022 - Grant for travel and accommodation to attend the conference "Conformal Geometry, Analysis and Physics" at the University of Washington. Funded by the Clay Mathematics Institute Enhancement and Partnership Program. $1000.
- January 2022 - Travel Grant from the London Mathematics Society to attend the ICM 2022: £400 + accommodation (canceled)
- September 2021 - Fellowship to attend *The Unity of Mathematics: A conference in honor of Sir Michael Atiyah, Issac Newton Institute*: Travel and accommodation
- June 2020 - UC Santa Cruz Mathematics Department Summer Research Fellowship, $3000.
- June 2019 - UC Santa Cruz Mathematics Year-End Fellowship, $4000. Fellowship awarded to support research over the summer.
- August 2019 - Supported in 2019 as Graduate Student Researcher on the NSF grant "Explicit methods for linear and non-linear tomography" (DMS-1814104, 2018-2020, PI: Francois Monard).
- July 2015 to 2020 - UC Santa Cruz Travel/Research Grants, totaling $\approx$ $5000.
- June 2015 - UC Santa Cruz Mathematics Early Academic Achievement Award ($500 funding award for early completion of Preliminary Exams).

Service

- 2023 - Reviewer for the *Journal of Functional Analysis*.
- 2022 - Organizer of the Bath Analysis Seminar, University of Bath
- 2022 - Organizer of the University of Bath Postdoc Away Day.
- Fall 2019 - Organizer, Graduate Student Seminar, MSRI.
- Spring 2018 - Organizer, Graduate Differential Geometry Seminar, UC Santa Cruz.
- Fall 2018 - Organizer, Microlocal Analysis Seminar, UC Santa Cruz.

Workshops

- 2022 - Winter School: Foliations, Pseudodifferential Operators and Groupoids Mathematical Institute of the University of Göttingen.
- 2019 - Introductory Workshop: Microlocal Analysis; MSRI, UC Berkeley
- 2019 - Subriemannian Geometry and Beyond II ; University Jyvaskyla
- 2018 - Subriemannian Geometry and Beyond; University of Jyvaskyla.
- 2017 - Seminaire de Mathematiques Superieures: Contemporary Dynamical Systems, University of Montreal.
- July 2015 - "": Geometric and Computational Spectral Theory, University of Montreal.

Recent Conferences

- 2023 - Geometry and Control in Cortana
- 2022 - Conference on Noncom Analysis and PDE; London Mathematical Society and QMUL
- 2022 - Tomography Across the Scales: Geometrical Inverse Problems; Johann Radon Inst.
- 2022 - Inverse Problems in Analysis and Geometry; University of Helsinki
- 2022 - AMS Joint International Meeting; Sub-Riemannian Geometry; Université Grenoble
- 2022 - Conformal Geometry, Analysis and Physics; University of Washington
- 2021 - Pauda Paris Sub-Riemannian Seminar; Università di Padova.
- 2021 - The Unity of Mathematics: A conference in honor of Sir Michael Atiyah; INI.
- 2019 - Recent Developments in Microlocal Analysis; MSRI, UC Berkeley.

Collaborative visits

- Apr 2023 - Centro di Ricerca Matematica Enno de Giorgi. With Veronique Fischer, Francesca Tripaldi and Fulvio Ricci to meet Sundaram Thangavelu. 3 days.
- Mar 2023 - Sorbonne Université. Lino Benedetto 2 days.
- Jan 2023 - Université dAngers. Clotilde Fermanian-Kemmerer, Veronique Fischer; 4 days.
- May 2022 -Institut Henri Poincaré. With Clotilde Fermanian-Kammerer. 4 days
- Nov 2021 - Institut Henri Poincaré. With Clotilde Fermanian-Kammerer. 2 weeks

Software LaTex, Python, C++, MATLAB, Git.