Steven Patrick Flynn   Curriculum Vitae

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Research Interest
- Analysis on Sub-Riemannian and singular geometries. Their Spectral Theory and associated inverse problems. Applications to Mathematical Physics.

Employment
- **University of Bath,** Postdoctoral Research Associate, Jan. 2021–present.
- **University of California, Santa Cruz,** Graduate Researcher/Graduate Student Instructor/Teaching Assistant, Sep. 2014–Jun. 2020.

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

Research Programs
- 2021 - Quantum Limits for Subelliptic Operators
  Postdoctoral Position at University of Bath
  Funded by the Leverhulme Trust under Véronique Fischer (PI) and Clotilde Fermanian-Kammerer (Co-PI)
- 2019 - Microlocal Analysis
  Mathematics Sciences Research Institute, UC Berkeley
  Formally Invited as a Program Associate for the Fall 2019 semester.

Grants, Fellowships, & Awards
- 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.
- August 2019 - NSF grant DMS-1814104 (PI: François Monard).
- June 2019 - UC Santa Cruz Mathematics Year-End Fellowship, $4000.
- July 2015 to Present - UC Santa Cruz Travel/Research Grants, totaling $\approx$ $5000.
- June 2015 - UC Santa Cruz Mathematics Early Academic Achievement Award ($500 grant for early completion of Preliminary Exams).

Publications & Preprints

1. S. Flynn. "Tensor Tomography on H-type Nilmanifolds." (In preparation)

2. C. Fermanian-Kammerer, V. Fischer, and S. Flynn. "Some Remarks on Semi-Classical Analysis on Two-Step Nilmanifolds" (proceeding; to appear in the 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." *arXiv preprint arXiv:2112.11509* (2021).

4. S. Flynn. "Injectivity of the Heisenberg X-ray transform." *Journal of Functional Analysis 280.5* (2021): 108886.

5. S. Flynn. Unraveling Geodesic X-ray Transforms on the Heisenberg group. University of California, Santa Cruz, 2020. (Ph.D. Thesis.)

Teaching Experience

- **University of Bath, Bristol, Imperial, Oxford, Warwick and Swansea** (planned)
  I am preparing to a graduate level course in Geometric Mechanics to be delivered through the Taught Course Center in the January to March 2023 session. TCC is a collaboration between the Mathematics Departments at the Universities of Bath, Bristol, Imperial, Oxford, Warwick and Swansea. TCC offeres graduate courses to all participating universities, delivered through Microsoft Teams.

- **University of California, Santa Cruz**
  Graduate Student Instructor: As a GSI, I independently taught one lower and three upper division mathematics classes for 20 hours per week concurrently with my graduate studies. I was responsible to give lectures, write exams, assign homework, manage a teaching assistant, assess students' work and distribute grades.

  Lower Division:
  Summer 2017 Math 3   Precalculus

  Upper Division:
  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.

  Elementary Courses:
  Math 2 CL (Collaborative Learning), College Algebra (Funded by Title V HSI grant)*
  Math 3, Precalculus
  Physics 5, 5L, Intro to Physics (Lab)

  *For Math 2 CL, I revived additional training to address the needs of students from disadvantaged background.

  Lower Division:
  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

Upper Division:
Math 100, Intro to Proofs
Math 105A, Real Analysis
Math 105B, Real Analysis II
Math 152, Programming for Math (Python)**

**I taught students to use Python (in Jupyter) to visualize, formulate and test number-theoretic conjectures, such as the Collatz conjecture.

Invited Talks

- May 2022 - *The Heisenberg X-ray transform: A first approximation Inverse Problems on sub-Riemannian manifolds.*
  University if Aveiro

- March 2022 - *The Spectral Decomposition of sR-Ray Transforms*
  AGeNT Seminar Link
  University of Bath

- November 2021 - *Unraveling the Heisenberg X-ray Transform*
  Problèmes Spectraux en Physique Mathématique
  Institut Henri Poincaré Link

- September 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.
  (Online).

- May 2020 - *Quantizing The Fourier Slice Theorem*
  UC Santa Cruz Geometry and Analysis Seminar.

- January 2020 - *Integral Geometry on Contact Manifolds*
  Joint Mathematics Meeting, Denver Colorado.

- September 2019 - *Integral Geometry on Contact Manifolds*
  Mathematics Sciences Research Institute, Berkeley CA.

- November 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.

- March 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*
  UC Santa Cruz Geometry and Analysis Seminar.

- April 2017 - *X-rays and Heisenberg*
  Eastern Illinois Integrated Conference in Geometry, Dynamics and Topology.

Service	• Fall 2022 - Organizer of the Bath Analysis Seminar, University of Bath
	• 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.
	• Spring 2018 - Mentor for the UCSC Directed Reading Program. Guided an undergraduate mathematics student through a research project on the isoperimetric problem. Student presented their work at the end of the semester.
Workshop Participation	• 2022 - Inverse Problems in Analysis and Geometry University of Helsinki
	• 2022 - AMS-SMF-EMS Joint International Meeting 2022, Special Session in Sub-Riemannian Geometry Université Grenoble Alpes
	• 2022 - Conformal Geometry, Analysis and Physics University of Washington
	• 2022 - Winter School: Foliations, Pseudodifferential Operators and Groupoids Mathematical Institute of the University of Göttingen.
	• 2021 - Pauda Paris Sub-Riemannian Seminar Università di Padova.
	• 2021 - The Unity of Mathematics: A conference in honor of Sir Michael Atiyah Isaac Newton Institute.
	• 2019 - Holomorphic Differentials in Mathematical Physics MSRI, UC Berkeley.
	• 2019 - Recent Developments in Microlocal Analysis MSRI, UC Berkeley.
	• 2019 - Subriemannian Geometry and Beyond II University Jyvaskyla (Invited to give a poster presentation).
	• 2018 - Hamiltonian Systems from Topology to Applications through Analysis MSRI, UC Berkeley.
	• 2018 - Subriemannian Geometry and Beyond University of Jyvaskyla.
	• 2017 - Seminaire de Mathematiques Superieures: Contemporary Dynamical Systems, University of Montreal.
	• July 2015 - Seminaire de Mathematiques Superieures: Geometric and Computational Spectral Theory, University of Montreal.
Relevant Skills	Programming Experience: Python, C++, MATLAB.