Steven Patrick Flynn

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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

June 2020 **Ph.D.** Advisors: François Monard, Richard Montgomery.
University of California, Santa Cruz.
June 2015 **M.A.**, Mathematics
University of California, Santa Cruz.
June 2014 **B.A.** Pure Mathematics (with honors), Physics minor
University of California, Santa Cruz.

Research Interest

Harmonic analysis on Lie groups. Semi-classical analysis. Sub-Riemannian geometry. Inverse problems.

Publications & Preprints

1. 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).
2. 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).
3. S. Flynn. "Injectivity of the Heisenberg X-ray transform." *Journal of Functional Analysis 280.5* (2021): 108886.
4. S. Flynn. Unraveling Geodesic X-ray Transforms on the Heisenberg group. University of California, Santa Cruz, 2020. (Ph.D. Thesis.)

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

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 ≈ $5000.

Service

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.

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.

Invited Talks

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

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).

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.

Other Talks

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.

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
GSI: Independently taught one lower and three upper division mathematics classes, and distributed grades.
Summer 2019 Math 105A Real Analysis
Spring 2019 Math 105B Real Analysis
Summer 2018 Math 105A Real Analysis
Summer 2017 Math 3 Precalculus

TA: Conducted teaching duties for 20 hours per week for six years during my graduate program. These included axillary lectures, review sessions, grading work/exams and holding office hours.
Math 2 CL (Collaborative Learning), College Algebra (Funded by Title V HSI grant)*
Math 3, Precalculus
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)**
Physics 5, 5L, Intro to Physics
*For Math 2 CL, I revived additional training to address the needs of students from disadvantaged background.
**I taught students to use Python (in Jupyter) to visualize, formulate and test number-theoretic conjectures, such as the Collatz conjecture.

Awards June 2015 - UC Santa Cruz Mathematics Early Academic Achievement Award ($500 grant for early completion of Preliminary Exams).

Relevant Skills Programming Experience: Python, C++, MATLAB.