Christopher Kottke

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Education

2010	Ph.D. Mathematics, Massachusetts Institute of Technology
2004	B.A. Mathematics, B.A. Physics, Tufts University

Professional Appointments

2021–	Associate Professor, New College of Florida
2016–2021	Assistant Professor, New College of Florida
Fall 2019	Research Member, Mathematical Sciences Research Institute
2013–2016	Research Instructor, Northeastern University
2010–2013	Tamarkin Assistant Professor, Brown University

Research Interests

Global analysis and topology of moduli spaces, geometric microlocal analysis, mathematical physics.

Publications

1. Partial compactification of monopoles and metric asymptotics. (With M. Singer).
   Memoirs of the AMS, 280(1383):1–124, (2022).
   arXiv:1512.02979.
2. Low energy limit of the resolvent of some fibered boundary operators. (With F. Rochon).
   Communications in Mathematical Physics, 390:231–307, (2022).
   arXiv:2009.10108.
3. Bigerbes. (With R. Melrose).
   Algebraic and Geometric Topology, 21(7):3335–3399, (2021).
   arXiv:1905.03081.
4. Functorial compactification of linear spaces.
   Proceedings of the AMS, 147(9):4067–4081, (2019).
   arXiv:1712.03902.
5. Blow-up in manifolds with generalized corners.
   International Mathematical Research Notices, 2018(8):2375–2415, (2018).
   arXiv:1509.03874.
6. Dimension of monopoles on asymptotically conic 3-manifolds.
   Bulletin of the LMS, 45(5):818–834, (2015).
   arXiv:1310.2974.
7. Loop-fusion cohomology and transgression. (With R. Melrose).
   Mathematical Research Letters, 22(4):1177–1192, (2015).
   arXiv:1309.7674.
8. A Callias-type index theorem with degenerate potentials.
   Communications in PDE, 40(2):219–264, (2015).
   arXiv:1210.3275.

9. Generalized blow-up of corners and fiber products. (With R. Melrose).
   Transactions of the AMS, 367(1):651–705, (2015).
   `arXiv:1107.3320`.
10. An index theorem of Callias type for pseudodifferential operators.
    Journal of K-Theory, 8(3):387–417, (2011).
    `arXiv:0909.5661`.
11. Accurate finite-difference and time-domain simulation of anisotropic media by subpixel smoothing. (With A.F. Oskooi and S. Johnson).
    Optics Letters, 34(18):2778–2780, (2009).
12. Perturbation theory for anisotropic dielectric interfaces, and application to sub-pixel smoothing of discretized numerical methods. (With A.F. Oskooi and S. Johnson).
    Physical Review E, 77(3):6611–6621, (2008).
13. Vortex core identification in viscous hydrodynamics. (With L. Finn and B. Boghosian).
    Philosophical Transactions of the Royal Society A, 386(1833):1937–1948, (2005).

Preprints

1. Products of manifolds with fibered corners. (With F. Rochon).
   `arXiv:2206.07262`, 54 pages, (2022).
2. L^2-cohomology of quasi-fibered boundary metrics. (With F. Rochon).
   `arXiv:2103.16655`, 31 pages, (2021).
3. Quasi-fibered boundary pseudodifferential operators. (With F. Rochon).
   `arXiv:2103.16650`, 127 pages, (2021).
4. Monopoles and the Sen conjecture: Part I. (With K. Fritzsch and M. Singer).
   `arXiv:1811.00601`, 28 pages, (2018).

Grants and Awards

2018–2023	NSF Grant DMS-1811995 *RUI: Analysis on HyperKähler Moduli Spaces*, PI
2017–2018	Simons Foundation Collaboration Grant for Mathematicians, Award ID: 524260
2011–2012	AMS-Simons Postdoctoral Travel Grant
2009	Charles and Holly Housman Award for Excellence in Undergraduate Teaching, MIT
2005	Presidential Fellowship, MIT

Invited Talks

2022	Aug	*Introductory workshop: analytic and geometric aspects of gauge theory*, MSRI
	Jul	*Geometry and physics of ALX metrics in gauge theory*, AIM
2021	Nov	Seminar, Purdue University
	Jun	*Analysis, geometry and topology of singular PDE*, Oberwolfach, online
	Feb	Seminar, University of Quebec at Montreal, online
	Feb	*Geometry, analysis, and quantum physics of monopoles*, BIRS, online
2020	Oct	*Recent developments in gauge theory*, AMS sectional, online
2019	Nov	Colloquium, University of California Santa Cruz
	Oct	Seminar, MSRI
	Jan	Seminar, Michigan State University
2018	Oct	Seminar, Purdue University
	Oct	*Index theory: interactions and applications*, University of Toulouse
	Sep	*Geometric analysis and mathematical physics*, University of Oldenburg
	Apr	*Workshop on geometric quantization*, BIRS
2017	Jun	*Analysis and topology in interaction*, Cortona
	Jan	Seminar, University of Waterloo

2016	Dec	*Geometric and spectral methods in PDE*, BIRS Oaxaca
	Oct	Seminar, MIT
	Mar	Seminar, Duke University
2015	Dec	*Analysis on singular manifolds*, CMS Winter Meeting, Montreal
	Oct	Seminar, Stanford University
	Sep	Seminar, MIT
	Jan	Seminar, Boston University
	Jul–Aug	*Metric and analytic aspects of moduli spaces*, visiting fellow, Newton Institute
2014	Dec	Seminar, Purdue University
	Nov	*Geometric scattering theory and applications*, BIRS
	Jul	*String geometry and loop spaces*, Greifswald University
	Jun	*Analysis and topology in interaction*, Cortona
	Apr	Seminar, Boston University
	Mar	Seminar, Worldwide Center of Mathematics
2013	Nov	Seminar, University of Quebec at Montreal
	Oct	*Geometric and spectral analysis*, AMS Sectional, Temple University
	Sep	Seminar, Northeastern University
	May	Seminar, University College London
	Mar	*Geometric and singular analysis*, Potsdam University
	Mar	Seminar, Boston University
2012	Jun	*Spectral invariants on singular and non-compact spaces*, CRM
	May	*Analysis and geometric singularities*, Oberwolfach
	Apr	*Spring lecture series*, University of Arkansas
	Mar	Seminar, Purdue University
2011	Jun	*Microlocal methods in mathematical physics and global analysis*, University of Tübingen
	Mar	Seminar, Temple University
	Mar	Seminar, Northeastern University
2010	Aug	*Topics in spectral and scattering theory*, Penn State University
	Jun	*Talbot workshop on loop groups and twisted K-theory*, Breckenridge
2009	Dec	Seminar, Brown University
	Oct	*Microlocal analysis and spectral theory on singular spaces*, AMS Sectional, Penn State
	Apr	*Singularities at MIT, in honor of Richard Melrose*, MIT
2008	Aug	*Second symposium on spectral and scattering theory*, Federal University of Pernambuco

Other Conferences Attended

2022	Sep	*Geometric applications of microlocal analysis, in honor of Rafe Mazzeo*, Stanford University
	Mar	*Geometry and analysis on non-compact manifolds*, CIRM
2021	May	*Analysis on singular spaces*, BIRS Oaxaca, online
2019	Oct	*Recent developments in microlocal analysis*, MSRI
	May	*Microlocal methods in analysis and geometry, in honor of Richard Melrose*, CIRM
2016	Jun	*Geometry and topology of stratified spaces*, CIRM
2013	May	*Control, index, traces and determinants, in honor of Jean-Michel Bismut*, Orsay
2011	Oct	*Microlocal methods in spectral and scattering theory*, Northwestern University
	Jan	*Geometric analysis*, CIRM
2010	Mar	*Geometric scattering theory and applications*, BIRS
2009	Jul	*Spectral theory and geometric analysis*, Northeastern University
2008	Jun	*Geometric applications of microlocal analysis*, CIRM

Professional and Collegiate Service

Member: American Mathematical Society, 2016–present

Reviewer: *Advances in Mathematics, American Mathematical Monthly, Annales Henri Poincaré, Annals of Global Analysis and Geometry, Communications in PDE, Compositio Mathematica, Geometry*

and Topology, Journal de l'École Polytechnique: Mathématiques, Journal of Geometric Analysis, Springer Graduate Texts, Transactions of the AMS.

Organizer: *Geometry of Gauge Theoretic Moduli Spaces*, AMS Sectional, U. Florida, November 2019

The Sen Conjecture and Beyond, University College London, June 2017

Geometry and Topology Seminar, Brown University, 2011–2013

Committees: Mathematics Pathway Committee, Florida State College and University System, 2021–2022

Faculty Planning and Budget Committee, New College of Florida, Fall 2022–present

Provost Advisory (T&P) Committee, New College of Florida, 2021–2022

Campus Climate and Community (DEI) Committee, New College of Florida, Fall 2020–present

Scholarship Committee, New College of Florida, 2018–2021

Other: Treasurer, United Faculty of Florida, New College Chapter, Fall 2022–present

Putnam exam supervisor: New College of Florida 2020, 2018, Northeastern University 2015

Author and maintainer of `ncfthesis`, open source LaTeX class for New College of Florida theses

Teaching

New College of Florida

Advanced Linear Algebra (Spring 2017)
Calculus with Theory I (Fall 2022)
Complex Analysis (Spring 2021, Fall 2018, Spring 2017)
Discrete Mathematics (Spring 2022)
Distribution Theory (Spring 2019)
First year seminar: Mathematical Thinking (Fall 2022, Fall 2021, Fall 2020)
Functional Analysis (Fall 2016)
Multivariable Calculus (Fall 2020, Fall 2018, Fall 2017, Fall 2016)
Partial Differential Equations (Spring 2020, Spring 2018)
Real Analysis I (Fall 2021, Fall 2017)
Real Analysis II (Spring 2022, Spring 2018)
Writing in Mathematics (Spring 2021, Spring 2020, Spring 2019)
Tutorial: Category Theory (Spring 2020, Spring 2019)
Tutorial: Differential Topology and Geometry (Spring 2021, Spring 2019, Fall 2017, Fall 2016)
Tutorial: Geometry and Topology for Physics (Spring 2022, Fall 2021)
Tutorial: Mathematical cryptography (Spring 2018)
Tutorial: Math GRE preparation (Fall 2018, Fall 2017)
Tutorial: Putnam exam preparation (Fall 2020, Fall 2018, Fall 2017, Fall 2016)
Tutorial: Riemann Surfaces (Spring 2019)
Tutorial: Topology/Algebraic Topology (Fall 2020, Spring 2020, Fall 2018, Spring 2018, Fall 2017, Spring 2016)
Tutorial: Writing in Mathematics (Spring 2018)

Northeastern University

Graduate Topics in Differential Geometry (Spring 2016)
Multivariable Calculus (Fall 2015, Spring 2015, Spring 2014)
Real Analysis (Fall 2015, Fall 2014, Fall 2013)
Undergraduate Directed Study: Differential Topology (Spring 2014)

Brown University

Abstract Algebra (Spring 2013)
Differential Equations and Nonlinear Dynamics (Fall 2012)
Graduate Algebraic Topology II (Spring 2012)

Honors Linear Algebra (Spring 2013, Spring 2011)
Honors Vector Calculus (Fall 2010)
Intermediate Calculus (Fall 2011)
Introduction to Mathematical Cryptography (Fall 2011)

Massachusetts Institute of Technology

TA: Differential Equations (Spring 2010, Spring 2009, Spring 2007)
TA: Multivariable Calculus (January 2010, January 2009, January 2008)

Mentoring

Undergraduate theses supervised

2021 Samuel Herman, *Abstract Synecdoche in Finite Semigroups*
2019 David (Bruce) Guild, *Disruptive Mathematicians*
2019 Zachary Halladay, *Topological K-theory and Bott periodicity*
2017 Jacob Price, *Knot Theory and the Alexander Polynomial*