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

2016–	Assistant Professor, New College of Florida
Fall 2019	Research Member, MSRI
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 and Preprints

1. Bigerbes. (With R. Melrose)
   arXiv:1905.03081, 42 pages, 2019.
2. Monopoles and the Sen conjecture: Part I. (With K. Fritzsch and M. Singer).
   arXiv:1811.00601, 28 pages, 2018.
3. Functorial compactification of linear spaces.
   Proceedings of the AMS, 147(9):4067–4081, 2019.
   arXiv:1712.03902.
4. Partial compactification of monopoles and metric asymptotics. (With M. Singer).
   Memoirs of the AMS, to appear.
   arXiv:1512.02979, 113 pages, 2015.
5. Blow-up in manifolds with generalized corners.
   International Mathematical Research Notices, 2018(8):2375–2415, 2018.
   arXiv:1509.03874.
6. Equivalence of string and fusion loop-spin structures. (With R. Melrose).
   arXiv:1309.0210, 48 pages, 2013.
7. Dimension of monopoles on asymptotically conic 3-manifolds.
   Bulletin of the LMS, 45(5):818–834, 2015.
   arXiv:1310.2974.
8. Loop-fusion cohomology and transgression. (With R. Melrose).
   Mathematical Research Letters, 22(4):1177–1192, 2015.
   arXiv:1309.7674.
9. A Callias-type index theorem with degenerate potentials.
   Communications in PDE, 40(2):219–264, 2015.
   arXiv:1210.3275.

10. Generalized blow-up of corners and fiber products. (With R. Melrose).
Transactions of the AMS, 367(1):651–705, 2015.
arXiv:1107.3320.

11. An index theorem of Callias type for pseudodifferential operators.
Journal of K-Theory, 8(3):387–417, 2011.
arXiv:0909.5661.

12. 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.

13. 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.

14. Vortex core identification in viscous hydrodynamics. (With L. Finn and B. Boghosian).
Philosophical Transactions of the Royal Society A, 386(1833):1937–1948, 2005.

Awards and Academic Honors

2018–2021	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

Academic Talks

Invited Talks: Conferences and Seminars

2019	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 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*, MIT
2008	Aug	*Second symposium on spectral and scattering theory*, Federal University of Pernambuco

Other Conferences Attended

2019	May	*Microlocal methods in analysis and geometry*, CIRM
2016	Jun	*Geometry and topology of stratified spaces*, CIRM
2013	May	*Control, index, traces and determinants, Conference for 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 Activities

Member:	American Mathematical Society, 2016–present
Reviewer:	*Journal of Geometric Analysis, Compositio Mathematica, Geometry and Topology, Annals of Global Analysis and Geometry, Advances in Mathematics, Communications in PDE, Springer Graduate Texts, American Mathematical Monthly.*
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.
Service:	Putnam exam supervisor: Northeastern University 2015, New College of Florida 2018.
	Scholarship Committee, New College of Florida, 2018–2019.

Teaching

New College of Florida

Writing in Mathematics (Spring 2019)
Distribution Theory (Spring 2019)
Partial Differential Equations (Spring 2018)
Real Analysis II (Spring 2018)
Real Analysis I (Fall 2017)
Complex Analysis (Fall 2018, Spring 2017)
Advanced Linear Algebra (Spring 2017)
Functional Analysis (Fall 2016)
Multivariable Calculus (Fall 2018, Fall 2017, Fall 2016)
Tutorial: Writing in Mathematics (Spring 2018)
Tutorial: Mathematical cryptography (Spring 2018)
Tutorial: Topology/Algebraic Topology (Fall 2018, Spring 2018, Fall 2017, Spring 2016)
Tutorial: Differential Topology and Geometry (Spring 2019, Fall 2017, Fall 2016)

Tutorial: Putnam exam preparation (Fall 2018, Fall 2017, Fall 2016)

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

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

2019 David (Bruce) Guild, *Disruptive Mathematicians.*
2019 Zachary Halladay, *Topological K-theory and Bott periodicity.*
2017 Jacob Price, *Knot Theory and the Alexander Polynomial.*