

Christopher Kottke

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Education and Employment

- 2016– Assistant Professor, New College of Florida
- 2013–2016 Research Instructor, Northeastern University
- 2010–2013 Tamarkin Assistant Professor, Brown University
- 2010 Ph.D. Mathematics, Massachusetts Institute of Technology
Thesis: *Index theorems and magnetic monopoles on asymptotically conic manifolds*
(supervised by Richard Melrose)
- 2004 B.A. Mathematics, B.A. Physics, Tufts University.

Research Interests

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

Publications and Preprints

1. Monopoles and the Sen conjecture: Part I. (With K. Fritzsche and M. Singer).
[arXiv:1811.00601](#), (2018), 28 pages.
2. Functorial compactification of linear spaces.
Proceedings of the AMS, to appear.
[arXiv:1712.03902](#), (2017), 14 pages.
3. Partial compactification of monopoles and metric asymptotics. (With M. Singer).
[arXiv:1512.02979](#), (2015), 113 pages.
4. Blow-up in manifolds with generalized corners.
International Mathematical Research Notices, vol. 2018, no. 8, (2018), pp. 2375–2415.
[arXiv:1509.03874](#).
5. Equivalence of string and fusion loop-spin structures. (With R. Melrose).
[arXiv:1309.0210](#), (2013), 48 pages.
6. Dimension of monopoles on asymptotically conic 3-manifolds.
Bulletin of the LMS, vol. 45, no. 5, (2015), pp. 818–834.
[arXiv:1310.2974](#).
7. Loop-fusion cohomology and transgression. (With R. Melrose).
Mathematical Research Letters, vol. 22, no. 4, (2015), pp. 1177–1192.
[arXiv:1309.7674](#).
8. A Callias-type index theorem with degenerate potentials.
Communications in PDE, vol. 40, no. 2, (2015), pp. 219–264.
[arXiv:1210.3275](#).
9. Generalized blow-up of corners and fiber products. (With R. Melrose).
Transactions of the AMS, vol. 367, no. 1, (2015), pp. 651–705.
[arXiv:1107.3320](#).
10. An index theorem of Callias type for pseudodifferential operators.
Journal of K-Theory, vol. 8, no. 3, (2011), pp. 387–417.
[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, vol. 34, no. 18, (2009), pp. 2778–2780.
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, vol. 77, no. 3, (2008), pp. 6611–6621.
13. Vortex core identification in viscous hydrodynamics. (With L. Finn and B. Boghosian).
Philosophical Transactions of the Royal Society A, vol. 386, no. 1833, (2005), pp. 1937–1948.

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*, Toulouse.
 Sep *Geometric Analysis and Mathematical Physics*, Oldenburg.
 Apr *Workshop on Geometric Quantization*, BIRS.
 2017 Jun *Analysis and topology in interaction*, Cortona, Italy.
 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, Italy.
 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*, Universität 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, CO.
 2009 Dec Seminar, Brown University.
 Oct *Microlocal analysis and spectral theory on singular spaces*, AMS Sectional, Penn State.
 Apr *Singularities at MIT*.
 2008 Aug *Second symposium on spectral and scattering theory*, Federal University of Pernambuco.

Other Conferences Attended

- 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

- Reviewer: *Compositio Mathematica, Geometry and Topology, Annals of Global Analysis and Geometry, Advances in Mathematics, Communications in PDE, Springer Graduate Texts, American Mathematical Monthly*.
 Organizer: *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.
 Freshman Advisor: Brown University, 2010–2013.

Teaching

New College of Florida

- 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*: 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

2018 Zachary Halladay, NCF

2017 Jacob Price, NCF