

Christopher Kottke

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Education

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

Professional Appointments

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| 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. Biggerbes. (With R. Melrose)
[arXiv:1905.03081](#), 42 pages, 2019.
2. Monopoles and the Sen conjecture: Part I. (With K. Fritzsche and M. Singer).
[arXiv:1811.00601](#), 28 pages, 2018.
3. Functorial compactification of linear spaces.
Proceedings of the AMS, to appear.
[arXiv:1712.03902](#), 14 pages, 2017.
4. Partial compactification of monopoles and metric asymptotics. (With M. Singer).
[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

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|-----------|---|
| 2018–2021 | NSF Grant DMS-1811995 <i>RUI: Analysis on HyperKähler Moduli Spaces</i> , 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

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| 2019 | Jan | Seminar, Michigan State University |
| 2018 | Oct | Seminar, Purdue University |
| | Oct | <i>Index Theory: Interactions and Applications</i> , University of Toulouse |
| | Sep | <i>Geometric Analysis and Mathematical Physics</i> , University of Oldenburg |
| | Apr | <i>Workshop on Geometric Quantization</i> , BIRS |
| 2017 | Jun | <i>Analysis and topology in interaction</i> , Cortona |
| | Jan | Seminar, University of Waterloo |
| 2016 | Dec | <i>Geometric and spectral methods in PDE</i> , BIRS Oaxaca |
| | Oct | Seminar, MIT |
| | Mar | Seminar, Duke University |
| 2015 | Dec | <i>Analysis on singular manifolds</i> , CMS Winter Meeting, Montreal |
| | Oct | Seminar, Stanford University |
| | Sep | Seminar, MIT |
| | Jan | Seminar, Boston University |
| | Jul–Aug | <i>Metric and analytic aspects of moduli spaces</i> , visiting fellow, Newton Institute |
| 2014 | Dec | Seminar, Purdue University |
| | Nov | <i>Geometric scattering theory and applications</i> , BIRS |
| | Jul | <i>String geometry and loop spaces</i> , Greifswald University |
| | Jun | <i>Analysis and topology in interaction</i> , Cortona |
| | Apr | Seminar, Boston University |
| | Mar | Seminar, Worldwide Center of Mathematics |
| 2013 | Nov | Seminar, University of Montreal |
| | Oct | <i>Geometric and spectral analysis</i> , AMS Sectional, Temple University |
| | Sep | Seminar, Northeastern University |
| | May | Seminar, University College London |
| | Mar | <i>Geometric and singular analysis</i> , Potsdam University |
| | Mar | Seminar, Boston University |
| 2012 | Jun | <i>Spectral invariants on singular and non-compact spaces</i> , CRM |
| | May | <i>Analysis and geometric singularities</i> , Oberwolfach |
| | Apr | <i>Spring lecture series</i> , 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*.