

CURRICULUM VITAE

Name:

Efstratia (Effie) Kalfagianni

Education:

PhD, Mathematics, Columbia University, New York, 1995

MA, Mathematics, Columbia University, New York, 1991

MS, Mathematics, Fordham University, New York, 1990

BS, Aristotelian University of Thessaloniki, Greece, 1988

Research Interests: Low dimensional topology; knot theory, 3-manifolds, quantum topology, hyperbolic geometry, braid groups, combinatorics.

Faculty Appointments:

2008- / /, Professor, Michigan State University

2003-2008, Associate Professor, Michigan State University

1998-2003, Assistant Professor, Michigan State University

1995-1998, Hill Assistant Professor, Rutgers University

Visiting Appointments:

March-April 2020, Visiting Scientist, MPIM, Bonn, Germany

Fall 2019, Member, Institute for Advanced Study, Princeton

July 2014, Visiting Member, ESI, Vienna, Austria

June-July 2007, Visiting Scientist, MPI, Bonn, Germany

2004-2005, Member, Institute for Advanced Study, Princeton

1994-1995, Member, Institute for Advanced Study, Princeton

July-August 1999, Visiting Member, MPI, Bonn, Germany

Editorial Work:

2017- / /, Editorial Board, New York Journal of Mathematics

Interactions between Hyperbolic Geometry, Quantum Topology and Number Theory, **co-edited** with A. Champanerkar, O. Dasbach, I. Kofman, W. Neumann and N. Stoltzfus, **Contemporary Mathematics** (AMS), 2011; 257 pp; Volume: 541.

Fellowships/Honors:

2019, MSU W. J. Beal University Outstanding Faculty Award
2019, Fellow of the American Mathematical Society
2018, MSU College of Natural Sciences Outstanding Faculty Award
2013, Plenary Invited Address, AMS Central Section
2004-2005, Research Scholarship, Institute for Advanced Study
1996-1997, MSRI Postdoctoral Fellowship (declined)
1995, Sigma Chi Research Society, Columbia Chapter
1994-1995, Postdoctoral Fellow, Institute for Advanced Study
1990-1994, Columbia University Fellowship
1989-1990, Graduate Fellowship, Fordham University
1983-1988, Greek National Science Foundation undergraduate fellowship

Research Grants:

2020-2023, sole PI for NSF Grant, DMS-2004155
Total grant amount \$368,548
Fall 2019, IAS Research Scholarship
Spring 2020, MPIM-Bonn research grant
2017-2021, sole PI for NSF Grant, DMS-1708249
Total grant amount \$280,000
2014-2018, sole PI for NSF Grant, DMS-1404754
Total grant amount \$224,415
2011-2015, sole PI for NSF Grant, DMS-1105843
Total grant amount \$209,004
2008-2011, sole PI for NSF Grant, DMS-0805942
Total grant amount \$153,242
2005-2009, PI for NSF Focused Research Grant, DMS-0456155,
(collaborative with A. Champanerkar, O. Dasbach, I Kofman,
X.-S. Lin, W. Neumann and N. Stoltzfus)
Total grant amount \$915,137
2004-2005, Research Scholarship, IAS
2003-2006, sole PI for NSF grant DMS-0306995
Total grant amount \$95,879
2001-2007, sole PI for NSF grant DMS-010400
Total grant amount \$58,000

1999-2001, sole PI for NSF grant DMS-9996227
 Total grant amount \$24,000
 1996-1999, sole PI for NSF grant DMS-9626140
 Total grant amount \$71,000
 June-July 2007, visit grant, MPI-Bonn, Germany
 July-August 1999, visit grant, MPI-Bonn, Germany

Training Grants:

2004-2009, Co-PI for NSF/RTG Grant, DMS-0353717,
 (joint with Fintushel, Parker and Wolfson)
 Total grant amount \$640,000
 2008-2012, Co-PI for NSF/RTG Grant, DMS-0739208,
 (joint with R. Fintushel, T. Parker and J. Wolfson)
 Total grant amount \$583,870

Publications:

1. *On the G_2 Link invariant*,
J. of Knot Theory and Ramif., Vol. 2 no. 4 (1993), 431-451.
2. *Addendum to: On the G_2 link invariant*,
J. of Knot Theory Ramif., Vol 3 No. 3 (1994), 431-432.
3. *Finite type invariants for knots in 3-manifolds*,
 Ph.D Thesis (1995), Columbia University, NY.
4. *Homology spheres with the same finite type invariants of bounded orders*,
Mathematical Research Letters 4 (1997), 341-347.
5. *Finite type invariants for knots in 3-manifolds*,
Topology 37 (1998) no. 3, 673-707.
6. *Milnor and finite type invariants of plat-closures*, with X.-S. Lin,
Mathematical Research Letters, 5 (1998), 293-304.
7. *Vassiliev invariants and orientation of pretzel knots*,
J. of Knot Theory and Ramif., Vol. 7 no. 2 (1998), 173-185.
8. *The HOMFLY polynomial for links in rational homology 3-spheres*,
 with X.-S. Lin, **Topology** 38 (1999) no. 1, 95-115.
9. *Power series link invariants and the Thurston norm*,
Topology and Its Applications, Vol. 101 (2000), no. 2, 107-119.

10. *On knot adjacency*, with N. Askitas,
Topology and Its Applications, Vol. 126 (2002), no. 1-2, 63–81.
11. *Surgery n -triviality and companion tori*,
J. of Knot Theory and Ramif., Vol. 13 (2004), 441-456.
12. *Knot adjacency and satellites*, with X.-S. Lin,
Topology and its Applications, Vol. 138 (2004), 207-217.
13. *Alexander polynomial, finite type invariants and volume of hyperbolic knots*,
Algebraic and Geometric Topol., Vol. 4 (2004), 1111-1123.
14. *Knot adjacency, genus and essential tori*, with X.-S. Lin,
Pacific J. of Mathematics, Vol. 228, No. 2 (2006), 251-276.
15. *Seifert surfaces, Commutators and Vassiliev knot invariants*,
with X.-S. Lin, **J. of Knot Theory and Ramif.**, Vol. 16 No 10
(2007), 1295-1329. Volume in honor of L. Kauffman's 60th birthday.
16. *Knot adjacency and fibering*, with X.-S. Lin,
Transactions of the AMS, Vol. 360(2008), 3249-3261.
17. *The Jones polynomial and graphs on surfaces*,
with D. Futer, O. Dasbach, X.-S. Lin and N. Stoltzfus,
J. of Combinatorial Theory, Series B 98, Issue 2 (2008), 384-399 .
18. *Dehn Filling, volume and the Jones polynomial*,
with D. Futer and J. Purcell, **J. of Differential Geometry**, Vol 78, no 3
(2008), 429-464.
19. *Quantum 3-manifold invariants and hyperbolic volume*,
J. of Knot Theory and Ramif., Vol. 18, No 1 (2009), 1-7.
20. *Symmetric Links and Conway sums: Volume and Jones polynomial*,
with D. Futer and J. Purcell, **Mathematical Research Letters**, 16(2009),
no 2, 233-253.
21. *Alternating sum formulae for the determinant and other link invariants*,
with D. Futer, O. Dasbach, X.-S. Lin and N. Stoltzfus, **J. of Knot Theory
and Ramif.**, Vol. 19, No. 6 (2010), 765-782.
22. *Xiao-Song Lin: 1957-2007*, with O. Dasbach,
J. of Knot Theory and Ramif., Vol. 19, No. 6 (2010), 763-784.
23. *On diagrammatic bounds of knot volumes and spectral invariants*,
with D. Futer and J. Purcell, **Geometricae Dedicata**, Vol 147, No. 1
(2010), 115-130.
24. *Cusp areas of Farey manifolds and applications to knot theory*,
with D. Futer and J. Purcell, **Int.Math. Res. Notices**, Vol. 2010, Issue
23(2010), 4434-4497.

25. *Slopes and colored Jones polynomials of adequate links*,
with D. Futer and J. Purcell, **Proceedings of the AMS**, Vol. 139(5)(2011),
1879-1887.
26. *An intrinsic approach to invariants of framed links in 3-manifolds*,
Quantum Topology, Vol 2, Issue 1(2011), 71-96.
27. *Cosmetic crossing changes of fibered knots*,
J. Reine Angew. Math.(Crelle), Vol 2012, Issue 669, 151-164.
28. *Cosmetic crossings of genus one knots*, with C. Balm, S. Friedl and M.
Powell, **Comm. in Anal. and Geom.**, Vol 20, No 2 (2012), 235-254.
29. *Guts of surfaces and the colored Jones polynomial*,
with D. Futer and J. Purcell, (Research Monograph), **Lecture Notes in
Mathematics**, Vol. 2069, xii+ 175p., Berlin, Springer (2013)
30. *Jones polynomials, volume, and essential knot surfaces: A survey*,
with D. Futer and J. Purcell, *Proceedings of Knots in Poland III*,
Banach Center Pub., Vol. 100 (2013).
31. *Quasi-Fuchsian state surfaces*, with D. Futer and J. Purcell,
Transactions of the AMS, Vol 366, Issue 8, 4323-4343 (2014).
32. *On The degree of the colored Jones polynomials*, with C. Lee,
*Conference proceedings of Hyperbolic Geometry and Quantum Topology in
Nha Trang*, **Acta Math Vietnamica**, 39, no. 4, 549-560(2014).
33. *Semi-adequate hyperbolic links*, with D. Futer and J. Purcell,
Comm. in Anal. and Geom., Vol 23, No 5, 991-1028(2015).
34. *Knot Cabling and the Degree of the Colored Jones Polynomial*,
with A. Tran, **New York Journal of Math.**, Volume 21, 905-941(2015).
35. *Crosscap numbers and the Jones polynomial*, with C. Lee,
Advances in Mathematics, 286, 308-337(2016).
36. *Knots without cosmetic crossings*, with C. Balm,
Topology and Its Applications, Vol. 207, 33-42 (2016).
37. *Geometric estimates from spanning surfaces*, with S. D. Burton,
arXiv:1608.05035, **Bulletin of London Math. Society**, Vol. 49, Issue
4, 694-708 (2017).
38. *A Jones slopes characterization of adequate knots*, arXiv:1601.0330,
Indiana University Mathematics Journal, V. 67, No. 1, 205-219 (2018).
39. *Normal and Jones surfaces of knots*, with C. Lee, **J. of Knot Theory and
Ramif.**, Vol 27, Issue 6 (2018).
40. *Turaev-Viro invariants, colored Jones polynomial and volume*,
with R. Detcherry and T. Yang, **Quantum Topology**, Vol. 9, Issue 4,
775-813 (2018).

41. *A survey of hyperbolic knot theory*,
with D. Futer and J. Purcell, **Springer Proceedings in Mathematics & Statistics**, “Knots, Low-dimensional Topology and Applications”, Springer Proceedings in Mathematics & Statistics Vol. 284, 1-30 (2019).
42. *Quantum representations and monodromies of fibered links*,
with R. Detcherry, **Advances in Mathematics**, 351, 676–701 (2019).
43. *The Strong Slope Conjecture and torus knots*,
Journal of the Math. Society of Japan, 72 no. 1, 73–79 (2020) .
44. *State Surfaces of Links*,
A Concise Encyclopedia of Knot Theory, in press. (Invited)
- 45 *Gromov norm and Turaev-Viro invariants of 3-manifolds*,
with R. Detcherry, **Annales Scientifiques de l’ENS**, to appear.
46. *Growth of quantum 6j-symbols and applications to the Volume Conjecture*,
with G. Belletti, R. Detcherry and T. Yang, **J. of Differential Geom.**, to appear.
47. *Cosets of monodromies and quantum representation*,
with R. Detcherry, arXiv:2001.04518.
48. *Remarks on Jones slopes and surfaces of knots*, arXiv:2002.12367.
49. *Alternating links on surfaces and volume bounds*,
with J. Purcell, preprint 2020.

Postdoctoral associates mentored:

- 1999-2001, Hessam Hamidi-Tehrani (PhD Columbia University)
Assistant Professor (tenure-track) at BCC of CUNY – Currently in Finance.
- 2005-2008, David Futer (PhD Stanford University)
Currently: Full Professor, Temple University
- 2005-2009, Lawrence Roberts (PhD UCB)– Co-mentor with Fintushel
Currently: Associate Professor (tenured), University of Alabama
- 2007-2008, Teaching Mentor for Manish Kumar (Algebra postdoc)
- 2009–2010, Eric Shoenfield (PhD Stanford University)
Currently: Google, San Francisco
- 2010-2011, Matt Rathbun (PhD UC-Davis)
Currently: Assistant Professor (tenure-track), California State, Fullerton
- 2015–2018, Renaud Detcherry (PhD Paris VI)
Currently: Postdoctoral Fellow at MPI, Bonn, Germany
- 2019-// , Honghao Gao, joint with Algebra (primary mentor L. Shen)

Graduate students:

PhD students: advising

- Thomas Jaeger (PhD, 2011); Philip T Church Fellow at Syracuse University

Currently: Software engineer at Google, San Francisco

Thesis: “Topics in Link Homology”

- Chris Cornwell (PhD, 2011); 3-year postdoc at Duke University.

CIRGET Postdoctoral Fellow at McGill University, Ca

Currently: Fisher Endowed Chair Assistant Professor (tenure-track) at Townson University, MD

Thesis: “Invariants of Topological and Legendrian Links in Lens Spaces with a Universally Tight Contact Structure”

- Cheryl Balm (PhD, 2013); 3-year postdoc at Kansas State University

Currently: Assistant Professor (tenure-track) at DeAnza College, CA

Thesis: “Topics in Knot Theory: On generalized crossing changes and the additivity of the Turaev Genus”

- Adam Giambrone (PhD, 2014); 3-year Visiting Assistant Professor, University of Connecticut, Storrs, CT

Currently: Assistant Professor (tenure-track) at Elmira College, NY

Thesis: “A Combinatorial Approach to Knot Theory: Volume Bounds for Hyperbolic, Semi-Adequate Link Complements”

- Christine Lee (PhD, 2015); NSF Research Postdoctoral Fellow and Instructor at University of Texas, Austin.

Visiting Scholar at MPI, Bonn, Germany.

Currently: Assistant Professor (tenure-track) at the University of South Alabama

Thesis: “Jones type link invariants and applications to 3-manifold topology”

- Stephen Burton (PhD, 2017)

Currently: Data Analyst at NSA, Washington DC.

Thesis: “Volumes, determinants and meridian lengths of hyperbolic links”

- Michael Shultz (PhD, expected 2021)

Thesis Topic: Braid Groups and representations

- Brandon Bavier (PhD, expected 2021)

Thesis Topic: Hyperbolic Knot Theory

- Sanjay Kumar (PhD, expected 2021)

Thesis Topic: Quantum Topology

- Joe Melby (PhD, expected 2023)

- Robert McConkey (PhD, expected 2024)

Selected Conference Talks/Invitations:

- 2020, Quantum Topology and Geometry, 65 birthday conference of V. Tuarev, CIRM, Marseille, France, May 11-15
- 2020, Connections for Women: Quantum Symmetries, MSRI, Berkeley, January 23
- 2019, AMS Southeastern Sectional meeting, University of Florida, Gainesville, FL, November 2-3 (45 minute talk)
- 2019, "New Developments in Quantum Topology", June 3-7, 2019 University of California, Berkeley
- 2019, "Quantum Topology and hyperbolic geometry", Hanoi Mathematical Institute, Vietnam, May 25-31
- 2019, Session on Knot theory, AMS Sectional Meeting, Hartford, CT, April 13-14 (45 minute talk)
- 2018, "Classical and Quantum 3-Manifold Topology", Monash University, Melbourne, Australia, December 17-21
- 2018, Redbud Topology Conference, Oklahoma State University, April 27-29
- 2018, 6th Annual WIMS, Purdue University, April 7 (Plenary)**
- 2018, BIRS workshop on Modular Forms and Quantum Knot Invariants, March 11-16, BANFF, CA
- 2017, Women in Geometry and Topology, ETH-Zurich, June 12-16 (Plenary)**
- 2017, Session at Sectional Meeting at Hunter College, New York, NY, May 6-7, 2017
- 2016, Knots in Hellas 2016, Olympic Academy, Olympia, Greece, July 16-23 (Keynote)**
- 2016, Knots in the Triangle, NCSU, Raleigh, NC on April 29-May 1 (Plenary)**
- 2016, "Advances in Quantum and Low-Dimensional Topology", University of Iowa, Iowa City, March 11-13
- 2016, Session on Topological Representation Theory, JMM, Seattle, January 6-7
- 2015, Invariants in Low Dimensional Geometry, Gazi University, Ankara, Turkey, August 10-14
- 2015, Redbud Topology Conference, Oklahoma State University, April 2-5 (2 talks)
- 2015, 3rd Annual WIMS, Dominican University, Chicago, March 7
- 2014, Workshop on Random Tensors, Erwin Schrodinger International Institute for Mathematical Physics, Vienna, July 14-18 (Opening talk)**
- 2013, Invited Address, AMS Central Section, Washington University, St. Louis, MO, October 18-20 (Plenary)**
- 2013, Geometric Topology in Cortona (in honor of Riccardo Benedetti for his 60th birthday), Cortona, Italy, June 3-7
- 2013, Quantum Topology and Hyperbolic Geometry in Nha Trang, Vietnam May 13-17 (Plenary)**

2012, Knots in Washington, December 7-9.
 2012, Special Session, AMS National meeting, Boston
 2010, “Knots in Poland III”, Banach Center (Warsaw and Beldewo) Poland, July 18-August 4 (Plenary)**
 2010, MSRI Workshop Connections for Women: Homology Theories of Knots and Links January 21-22(Plenary)**
 2009, Moab topology conference, Utah, May 13-15 (Plenary talk)**
 2009, Conference on the Geometry and Topology of Knots, Oklahoma State University, March 20-21 (Plenary)**
 2008, Special Session AMS Sectional meeting, Baton Rouge, LA
 2007, Special Session, AMS National meeting, New Orleans
 2005, AIM Workshop on Moduli spaces of Knots
 2005, Quantum Topology Conference, Snowbird Resort, Utah
 2004, Cascade Topology Conference, Boise State University
 2003, Workshop on Quantum Topology, Oberwolfach, Germany
 2002, ICM Satellite Geometric Topology, Xian, China
 2002, Special Session in Topology, AMS meeting, Ann-Arbor
 2001, Special Session, AMS meeting , Las Vegas
 2000, “Knots 2000”, KAIST, Korea
 1998, “Knots in Hellas ’98”, Delphi-Greece
 1998, Special Session at AMS meeting, Philadelphia
 1997, Special session at AMS Meeting, Baltimore
 1996, Special session at AMS Meeting, Lawrenceville NJ
 1995, Workshop in Knot Theory, Oberwolfach, Germany
 1994, Geometry Festival, Bethlehem, PA
 1994, Conference in low dimensional topology, Luminy, France

Selected Seminar Talks/Invitations:

2019, Mathematics Colloquium, Rutgers University, Newark, December 11, 2019
 2019, Geometry-Topology seminar, Rutgers University, N. Brunswick, December 10
 2019, Topology/Geometry Seminar, CUNY, Graduate Center, N. York, December 3
 2019, Mathematics Colloquium, University of Virginia, Charlottesville, November 7
 2019, Geometry-Topology seminar, UPenn, Philadelphia, PA, October 24, 2019
 2017 Geometric Topology Seminar, Columbia University, December 8

2017, Mathematics colloquium, APTh- Thessaloniki, Greece, June 13
 2017, Mathematics colloquium, EKPA-Athens, Greece, June 19
 2015, Philadelphia area “PATCH” seminar (UPenn, Temple, Bryn Mawr, Haverford)
 2015, 3-manifold seminar, IAS Princeton (2 talks)
 2014, Topology seminar, Ohio State University
 2013, Topology seminar, University of Iowa
 2012, Geometry seminar, Indiana University
 2011, Topology seminar (LSU, Rice, U. of Iowa)
 2011, Mathematics Department colloquium, LSU
 2011, Mathematics Department colloquium, Dartmouth College
 2007, Geometric Topology seminar, Columbia University
 2007, Mathematics colloquium, University of South Alabama
 2007, Topology seminar, University of South Alabama
 2005, Bryn-Mawr-Haverford bi-college Mathematics colloquium
 2005, Topology Seminar, Princeton University
 2004, Geometric Topology seminar, Columbia University
 2003, Topology seminar, University of Michigan
 1999, Poincare Seminar, Rutgers at Newark
 1999, Oberseminar, Max-Planck-Institut für Mathematik
 1998, Math Department Colloquium, University of Crete, Greece
 1998, Mathematics colloquium, Oklahoma State University
 1997, Geometry/Topology seminar, Rutgers University
 1996, Topology seminar, Rutgers University
 1996 and 1997, Topology Seminar, Columbia University
 1995, Gauge theory seminar, Harvard University
 1995, Mathematics colloquium, Indiana University
 1995, Topology seminar, Princeton University
 1994, Topology-Geometry seminar, University of Pennsylvania

Conference/seminar organization:

2015, co-organizer of Special Session “Invariants and Geometry of 3-manifolds 3-Manifold”, AMS Central Section, East Lansing, March 14-15
 2015, Leader organizer of Topology Session at the 3rd annual Midwest Women in Mathematics Symposium (WIMS) March 7, Dominican University (Funded by NSF)

2013, co-organizer of Special Session “Geometric Aspects 3-Manifold Invariants”, AMS Central Section, St Louis, October 18-20

2010, co-organizer of Special Session “Geometric Aspects of Link and 3-Manifold Invariants, Joint AMS Meeting, San Francisco, January 11-16

2009, co-organizer of a workshop and conference on “Interactions between Hyperbolic Geometry, Quantum Topology and Number Theory”, June 3-19, Columbia University, New York (Funded by NSF)

2007, co-organizer of the conference “A second time around the Volume Conjecture”, May 28-June 3, LSU, Baton Rouge (Funded by NSF)

2006, co-organizer of the conference “Around the Volume Conjecture”, March 13-19, Columbia University, New York (Funded by NSF)

2005-2011, co-organizer of the Research and Training in Geometry/Topology lectures at MSU (Funded by NSF)

Other Professional Service:

2017-2021, AWM-Joan & Joseph Birman Research Prize in Topology and Geometry Selection Committee (Chair)

2005-2020, served on numerous NSF panels for programs in Topology and Geometric Analysis, CAREER, RTG, FRG, Postdoctoral Research Fellowships and Mathematical Sciences Research Institutes

2010, Scientific committee of “Knots in Poland III” (workshop and summer school) Banach Center (Warsaw and Beldewo) Poland, July 18-August 4

2008, Chair of NSF site visit committee at MSRI

Research proposal reviewer for: CUNY-Internal Grants, Israel Binational Science Foundation, NWO Vidi IRIS (Holland), (AAAS) Research Competitiveness Program, Nebraska EPSCoR program, Polish NSF and NSERC (Canada).

Referee for: Inventiones Mathematicae, Advances in Mathematics, Journal of Differential Geometry, Com. Math. Helvec., Comm. Math. Physics, Crelle’s Journal, IMRN, Topology, Geometry & Topology, Pacific Journal of Mathematics, Topology and its Applications, Journal of Knot Theory and its Ramifications, Proceedings of the AMS, Quantum Topology Transactions of the AMS, Bulletin etc of the London Mathematics Society, Algebraic and Geometric Topology, Journal of the Australian Mathematics Society, Experimental Mathematics, Israel Journal of Mathematics, Communications in Contemporary Mathematics, International Journal of Mathematics, Lecture Notes of Mathematics (Research Monographs).

Professional Memberships:

Sigma Xi, Scientific Honors Society (Columbia Chapter)

American Mathematical Society (AMS)

Association for Women in Mathematics (AWM)