Andrew J. Blumberg

Curriculum Vitae
September 2024

Irving Institute for Cancer Dynamics
Department of Mathematics
Department of Computer Science
New York, NY 10027
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Personal
Born: 1976
Citizenship: US

Education

2001–2005 **The University of Chicago**, Chicago, IL
Ph.D. in Mathematics, June 2005.
Thesis title : Progress towards the calculation of the K-theory of Thom spectra
Thesis advisors : J. Peter May and Michael A. Mandell
M.S. in Mathematics, Dec 2001.

1994–1998 **Harvard College**, Cambridge, MA
A.B in Mathematics, May 1998.
Awards: Magna cum laude with highest honors in mathematics

Employment

2021-present **Herbert and Florence Irving Professor**, Columbia University

2019-2021 **Professor**, University of Texas at Austin (on leave 2019-2021)

2014-2019 **Associate Professor (with tenure)**, University of Texas at Austin (on leave 2018-2019)

2008-2014 **Assistant Professor**, University of Texas at Austin (on leave 2008-2009, 2013-2014)

2007-2009 **Hans Samelson Postdoctoral Fellow**, Stanford University

2006-2007 **Member**, Institute for Advanced Study

2005-2006 **Hans Samelson Postdoctoral Fellow**, Stanford University

1999-2001 **Chief technology officer and founder**, HotDispatch Inc.

1995–1999 **Research scientist**, MIT Artificial Intelligence Laboratory

Visiting positions

2022	**Organizer**, MSRI program on Floer homotopy theory, September-December
2018–2021	**Visiting Professor**, Columbia University
2017	**Member**, Hausdorff Institute for Mathematics, June
2016	**Senior member**, ICERM Program "Topology in motion", October (1 week)
2015	**Member**, Hausdorff Institute for Mathematics, June-July
2014	**Organizer**, MSRI program on algebraic topology, January-May
2013	**Organizer**, IMA program on topological data analysis, September-December
2013	**Visitor**, University of Copenhagen, August (2 weeks)
2013	**Visiting Scholar**, MIT, June-August
2012	**Visiting Scholar**, MIT, June-August
2011	**Visiting Scholar-in-Residence**, Indiana University, May (1 week)
2010	**Visitor**, University of Copenhagen, February (1 week)
2009	**Visiting Scholar**, University of Chicago, May-June
2008	**Visiting Scholar**, University of Chicago, May-June
2007	**Visiting Scholar**, MIT, November-December
2007	**Visiting Scholar**, University of Chicago, May-June
2006	**Member**, Mittag-Leffler Institute, February

Honors

2022	Fellow of the AMS
2022	AMS Lecture at the SIAM Annual Meeting (postponed from 2020)
2013	Invited participant, Microsoft Faculty Summit.
2012-2017	NSF CAREER Award
2012	Plenary speaker, birthday conference for Gunnar Carlsson, Ralph Cohen, and Ib Madsen.
2010-2012	DARPA Young Faculty Award
2005-2009	NSF Postdoctoral Fellowship
2005	Clay Mathematics Institute Liftoff Fellowship
1998–1999	McCormick Fellowship, University of Chicago (deferred)
1998	NSF Graduate Fellowship, Honorable mention

Grants

2024-2027 Principal investigator, Collaborative Research: Algebraic K-theory and equivariant stable homotopy theory: applications to geometry and arithmetic, NSF (National Science Foundation) Division of Mathematical Sciences grant DMS #2405029, $158,168.

2023-2026 Principal investigator, Collaborative proposal: A statistical framework for the analysis of the evolution in shape and topological structure of random objects, NSF (National Science Foundation) Division of Mathematical Sciences grant DMS #2311338, $329,639.

2022-2025 Principal investigator, Collaborative proposal: Geometric methods for optimal matching and feature identification in data sets, ONR (Office of Naval Research) research grant, N00014-22-1-2679, $480,493.

2021-2024 Principal investigator, Collaborative Research: Algebraic K-Theory, Arithmetic, and Equivariant Stable Homotopy Theory, NSF (National Science Foundation) Division of Mathematical Sciences grant DMS #2104420, $311,729.

2021-2024 Co-principal investigator (with A. Bohmann, T. Gerhardt, M. Hill, C. Malkiewich, M. Mandell, M. Merling, K. Ponto, I. Zakharevich) FRG: Collaborative Research: Trace Methods and Applications for Cut-and-Paste K-Theory, NSF (National Science Foundation) Division of Mathematical Sciences grant DMS #2052970, $180,836 (out of $1,342,962)

2020-2024 Co-principal investigator (with S. Angel, J. Bonneau, P. Cousot, J. Thaler, M. Walfish, and T. Wies), Scaling zero-knowledge proofs with the power of abstraction, DARPA (Defense Advanced Research Project Agency) research grant, HR001119S0076-SIEVE-FP-014, $500000 (out of $6.1M)

2019-2022 Co-principal investigator (with O. Hobert, L. Paninski, and R. Rabadan), CRCNS Research Proposal:Topological and Dynamical Structures of Brain Development and Sexual-Dimorphism in C. Elegans, NSF (National Science Foundation) Division of Mathematical Sciences grant DMS #1912194, $250000 (out of $999993)

2018-2021 Principal investigator, New frontiers in execution integrity, AFOSR (Air Force Office of Scientific Research) research grant, FA9550-18-1-0415, $450202

2018-2021 Principal investigator, Collaborative Research: Algebraic K-Theory, Topological Periodic Cyclic Homology, and Noncommutative Algebraic Geometry, NSF (National Science Foundation) Division of Mathematical Sciences grant DMS #1812064, $275315

2016-2019 Co-principal investigator (with M. Abouzaid, M. Hill, R. Lipshitz, T. Lawson, C. Manolescu, and S. Sarkar), FRG: Floer homotopy theory, NSF (National Science Foundation) Division of Mathematical Sciences grant DMS #1564289, $199293 (out of $1058411)

2015-2020 Co-principal investigator (with R. Rabadan, A. Iavarone, A. Lasorella, B. Mishra, M. Shen, C. Wiggins, G. Carlsson, P. Sims), Topology of cancer evolution and heterogeneity, NIH (National Institutes of Health) grant 5U54CA193313, $250000 (out of approximately $12M)

2015-2020 Co-principal investigator (with R. Rabadan and D. Rosenbloom, Columbia Medical School), Uncovering evolutionary history using the topology of genomic data, with applications to HIV, NIH (National Institutes of Health) grant GG010211-R01-HIV, $350000 (out of approximately $1.2M)

2015-2020 Co-principal investigator (with M. Walfish and T. Wies, NYU), TWC: Medium: Scaling proof-based verifiable computation, NSF (National Science Foundation) Division of Computer and Network systems, CNS #1514422, $220000 (out of $1151830)

2015-2018 Co-principal investigator (with M. Walfish, NYU), Realizing the promise of proof-based verifiable computation, AFOSR (Air Force Office of Scientific Research) research grant, FA9550-15-1-0302, $450000 (out of $900000).

2012-2017 Principal investigator, CAREER: Algebraic K-theory, trace methods, and non-commutative geometry, NSF (National Science Foundation) CAREER grant, DMS #1151577, $425874.

2010-2012 Principal investigator, Applied algebraic topology: categorical foundations, topological statistics, and practical implementations, DARPA (Defense Advanced Research Project Agency) YFA grant #N66001-10-1-4043, $300000.

2009-2012 Principal investigator, Algebraic invariants of structured ring spectra, arithmetic, and geometry, NSF (National Science Foundation) Division of Mathematical Sciences grant #0906105, $146595.

Classroom teaching

2020–2024 **Professor** in Computer Science, Columbia University
COMS 4995 : Geometric data analysis

2020–2024 **Professor** in Mathematics, Columbia University
6307 : Algebraic topology

2017–2018 **Associate Professor** in Mathematics, University of Texas at Austin
Mathematics 343 : Applied number theory
Mathematics 380 : Algebra

2016–2017 **Associate Professor** in Mathematics, University of Texas at Austin
Mathematics 343 : Applied number theory
Mathematics 392 : Equivariant stable homotopy theory

2015–2016 **Associate Professor** in Mathematics, University of Texas at Austin
Mathematics 343 : Applied number theory
Mathematics 341 : Linear algebra

2014–2015 **Associate Professor** in Mathematics, University of Texas at Austin
Mathematics 342 : Homotopy type theory
Mathematics 341 : Linear algebra

2012–2013 **Assistant Professor** in Mathematics, University of Texas at Austin
Mathematics 392 : Homological algebra
Mathematics 362 : Probability
Mathematics 367 : Algebraic topology II

2011–2012 **Assistant Professor** in Mathematics, University of Texas at Austin
Mathematics 408C : Calculus
Mathematics 341 : Linear algebra

2010–2011 **Assistant Professor** in Mathematics, University of Texas at Austin
Mathematics 378 : Mathematical statistics
Mathematics 392 : Topics in algebraic topology

2009–2010 **Assistant Professor** in Mathematics, University of Texas at Austin
Mathematics 365 : Real analysis
Mathematics 341 : Linear algebra

2005–2006 **Lecturer** in Mathematics, Stanford University
Mathematics 51 : Linear algebra and differential calculus of several variables

2002–2005 **Lecturer in the college** in Mathematics, University of Chicago
Mathematics 195-196 : Mathematical methods for biological or social sciences
Mathematics 131-132 : Calculus

2001–2002 **College Fellow** in Mathematics, University of Chicago
Mathematics 203-205: Analysis in $\mathbb{R}^n$, mentors: N. Monod, A. Kiselev

Additional teaching

2010–2024 **Research supervision**, five regular research students (Bergam, (co-advised, Columbia CS), Galanti (Columbia CS), Liu (co-advised, Columbia CS), Magen (co-advised, Columbia math), Sang (Columbia math), Saunders (co-advised, Columbia math)), sixteen graduated (Campbell, Clough, Fontes, Franklin, Gregoric, Grindstaff (NSF postdoctoral fellowship), Leeman, McGuirl, Meth (terminal masters), Miyagi, Pancia, Reyes, Royer (NSF postdoctoral fellowship), Sulyma, Wu, Zhu (terminal masters))

2015–2017 **Research supervision**, four graduate student RAs, AFOSR and NIH grants, (Grindstaff, Kennedy, Villar, Wu)

2011–2013 **Research supervision**, jointly with M. Walfish (CS department), supervising undergraduate students V. Vu and B. Braun (senior thesis for Braun). Braun and Vu are Dean's Honored Graduates, and Vu was a co-winner of the first prize Mitchell award.

2010–2017 **Undergraduate reading courses**, including theoretical computer science, analysis, privacy, representation theory, and genomic analysis of flu.

2010–2012 **Research supervision**, three graduate student RAs, DARPA grant, (Gal, Pancia, Orem)

2009–2011 **Co-advisor**, Master's thesis in CS (Raluca Popa, MIT). Won prize, best master's thesis.

2002–2004 **Undergraduate mentor**, Directed research program (University of Chicago)

2001–2004 **Course assistant**, Summer research experience for undergraduates (REU)

2001–2003 **Lecturer**, Warm-up program for entering graduate students

Editorial positions

2021–present **Editor**, International Math Research Notices

2018–present **Editor**, Journal of Applied and Computational Topology

2015–present **Associate Editor**, Advances in Mathematics

2013–present **Editor**, Journal of Topology

Service

2022 **Co-organizer**, MSRI emphasis semester on Floer homotopy theory.

2022 **Co-organizer**, AIM workshop on equivariant techniques in stable homotopy theory.

2020 **Co-organizer**, Banff workshop on equivariant stable homotopy theory and p-adic Hodge theory.

2019 **Co-organizer**, 80th birthday conference in honor of J. Peter May.

2018 **Co-organizer**, Symplectic Geometry and Homotopy Theory.

2018 **Co-organizer**, Homotopy theory summer: Berlin, equivariant homotopy theory and K-theory workshop.

2018 **Co-organizer**, Austin gerrymandering workshop.

2017 **Co-organizer**, FRG summer school and workshop on Floer homotopy theory.

2016 **Co-organizer**, AIM workshop on equivariant derived algebraic geometry.

2016 **Co-organizer**, BIRS workshop on equivariant derived algebraic geometry.

2015-2016 **Organizer**, Texas undergraduate topology and geometry conference.

2014 **Co-organizer**, West coast algebraic topology summer school: Topological field theories.

2014 **Co-organizer**, Algebraic Topology: Methods, Computation, and Science (ATMCS) 6.

2014 **Co-organizer**, MSRI emphasis semester on algebraic topology

2013–2014 **Co-organizer**, IMA emphasis year on computational and applied algebraic topology

2013– present **Organizer**, Directed research program (UT Austin)

2012 **Co-organizer**, West coast algebraic topology summer school: Advances in algebraic K-theory

2012 **Co-organizer**, BIRS Workshop on Algebraic K-theory and equivariant homotopy theory

2011-2012 **Organizer**, Student seminars on algebraic topology and computational topoogy

2010– present **Technical advisor**, Patient privacy rights

2010 **Co-organizer**, Workshop at Indiana University on algebraic K-theory and fixed point theory

2009 **Co-organizer**, 70th birthday conference in honor of J. Peter May

2008–2009 **Organizer**, "Infinity categories" reading group and lecture series

2007–2009 **Co-organizer**, Stanford topology progress seminar

2005–2006 **Co-organizer**, Stanford topology progress seminar

2003–2005 **Committee member**, Directed research program

2004 **Co-organizer**, Summer research experience for undergraduates (REU)

Peer-review

Referee Over one hundred articles, for top journals including Algebraic and Geometric Topology, International Math Research Notices, Advances in Mathematics, Journal of Topology, Math Zeitschrift, Journal of K-theory, Journal of Pure and Applied Algebra, Journal of the AMS, "Homotopy, Homology, and Applications", Compositio Mathematica, Proceedings of the London Mathematics Society, Transactions of the American Mathematical Society, Geometry and Topology, Acta Mathematica, Annals of Mathematics, Nature, Science, PNAS.

Grant review NSF regular grants (five times, in-person), NASA (by mail), ESPRC (by mail).

Invited Lectures

Conference talks :

1. A panorama of homotopy theory – a conference in honor of Mike Hopkins, Oxford, June 2023
2. AMS Lecture at the SIAM Annual Meeting, Pittsburgh, July 2022
3. ATMCS 10, Plenary talk, Oxford, June 2022
4. Derived geometry workshop, CRM Barcelona, June 2021
5. Symposium on random matrices in biology, November 2019

6. Equivariant topology and derived algebra, University of Trondheim, August 2019
7. Symplectic Geometry and Homotopy Theory, UCLA, December 2018
8. Midwest topology seminar, University of Kentucky, September 2018
9. Higher structures in homotopy theory, Newton Institute, Cambridge, UK, July 2018
10. Abel Symposium 2018: topological data analysis, Geiranger, Norway, June 2018
11. Cancer Genomics and Mathematical Data Analysis Symposium, Columbia University, February 2018
12. Triangulated Categories and Geometry – a conference in honour of Amnon Neeman, Bielefeld, May 2017
13. Cornell Topology Festival, Cornell University, May 2017
14. Algebraic topology: Manifolds unlocking higher structures, Oxford, October 2015
15. Johns Hopkins-University of Maryland Algebra and Number Theory Day, March 2015
16. Oberwolfach meeting on homotopy theory, March 2015
17. ICM Satellite Conference on Algebraic K-theory, Beijing, August 2014
18. Midwest Topology Seminar, IUPUI, April 2014
19. Workshop on order in complex systems, Rutgers University, November 2013
20. Workshop on group actions in homotopy theory, University of Copenhagen, August 2013
21. Northwestern workshop on equivariant, chromatic, and motivic homotopy theory, March 2013
22. AMS Sectional meeting, Special session of computational algebraic topology, University of Akron, October 2012
23. Birthday conference for Gunnar Carlsson, Ralph Cohen, and Ib Madsen, plenary speaker, July 2012
24. Graduate student topology conference, young faculty speaker, March 2012
25. BIRS Workshop on Algebraic K-theory and equivariant homotopy theory, February 2012
26. Conference on applied algebraic topology, Fields Institute, November 2011
27. Conference on structured ring spectra, Hamburg, August 2011 (cancelled)
28. Oberwolfach workshop, Algebraic K-theory, May 2011

29. AMS Sectional meeting, Special session on algebraic K-theory, University of Iowa, March 2011
30. Conference on homotopy theory and derived algebraic geometry, Fields Institute, August 2010
31. Computers, Freedom, and Privacy, San Jose State University, June 2010
32. Georgia Topology Conference, University of Georgia, May 2010
33. AMS Sectional meeting, Special session on topological quantum field theory, Western Michigan University, October 2008
34. Midwest Topology Seminar, Wayne State, Detroit, May 2007
35. Conference on the arithmetic of structured ring spectra, Rosendal, Norway, August 2005
36. Norwegian Topology Symposium, Trondheim, Norway, November 2004
37. AMS Sectional meeting, Special session on homotopy theory, Northwestern, October 2004

Seminar talks :

- 2022 : Berkeley, UCLA, MSRI
- 2021 : Michigan, Texas, Princeton
- 2020 : Harvard, SUSTech
- 2019 : Columbia, UPenn, Broad Institute
- 2018 : Columbia, Brown, NYU, UCLA
- 2017 : Brown, Rice
- 2016 : Northwestern, Northeastern, Samsung National Hospital
- 2015 : Columbia, University of Chicago, UIC, Hausdorff Institute for Mathematics
- 2014 : UCSD, Johns Hopkins
- 2013 : University of Minnesota
- 2011 : University of Chicago, UIUC, Stanford, Indiana University, Nagoya University, MIT
- 2010 : University of Copenhagen, Notre Dame, University of Minnesota
- 2009 : University of Chicago, MIT, Stanford
- 2008 : University of Chicago, Berkeley, MIT, Stanford, Rutgers, University of Texas at Austin

- 2007 : Johns Hopkins, Purdue, University of Chicago, Northwestern, Stanford
- 2006 : Mittag-Leffler Institute, Johns Hopkins, University of Chicago, IAS, MIT
- 2005 : Stanford
- 2004 : Purdue, Northwestern, UIUC, Stanford, Brown