

Ciprian Manolescu

Curriculum Vitae

Stanford University
Department of Mathematics
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Research Interests

Low-dimensional topology, symplectic geometry, gauge theory. Particular interests: Floer homology and its applications to knots, 3-manifolds, and 4-manifolds; the Seiberg-Witten equations; Khovanov homology and categorification

Education

Ph.D. in Mathematics, Harvard University, June 2004
Thesis: *A spectrum valued TQFT from the Seiberg-Witten equations*
Advisor: Peter B. Kronheimer

B.A. *summa cum laude* in Mathematics, Harvard University, June 2001

Employment

Professor, Stanford University, 2019-Present
Professor, UCLA, 2012-2019
Associate Professor, UCLA, 2008-2012
Assistant Professor, Columbia University, 2005-2008
Research Fellow, Clay Mathematics Institute, 2004-2008
Veblen Research Instructor, Princeton University and IAS, 2004-2005

Visiting Positions

Chern Research Professor, SLMATH, Berkeley, August-December 2022
Aisenstadt Chair, CRM Montreal, September 2019
Visiting Researcher, KITP Santa Barbara, November 2018
Visiting Researcher, Simons Center for Geometry and Physics, April-May 2013
C.N.R.S. Visiting Researcher, University of Paris 7, June-August 2012
Visiting Research Professor, MSRI, March-April 2010
Royal Society University Research Fellow, University of Cambridge, Spring 2009

Selected Awards, Grants, and Honors

Frontiers of Science Award, ICBS, Beijing, 2024

Honorary Doctorate, University of Bucharest, Romania, 2023

Simons Collaboration Grant on New Structures in Low-Dimensional Topology, 2022-2026

Simons Investigator, 2020-2025

AMS E. H. Moore Research Article Prize, 2019

Invited speaker at the International Congress of Mathematicians, Rio de Janeiro, 2018

Honorary member of the Simion Stoilow Institute of Mathematics of the Romanian Academy, 2018

Honorary Doctorate, Babeş-Bolyai University, Cluj-Napoca, Romania, 2018

Fellow of the American Mathematical Society, 2017

FRG: Collaborative Research, NSF grant on “Floer Homotopy Theory,” 2016-2019

European Mathematical Society Prize, 2012

Robert Sorgenfrey Distinguished Teaching Award at UCLA, 2011

National Science Foundation grants, 2008-2024

Royal Society University Research Fellowship (UK), 2008

Clay Research Fellowship, 2004-2008

AMS/MAA/SIAM Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student, 2001

William Lowell Putnam Mathematical Competition, top five (Putnam Fellow): 1997, 1998, and 2000

Three Gold Medals with perfect scores (42 points) at the International Mathematical Olympiad: Toronto, Canada (1995); Bombay, India (1996); Mar del Plata, Argentina (1997)

Publications and Preprints

1. Triangulations and Floer homology, to appear in *Proceedings of the 2024 ICBS*
2. Searching for ribbons with machine learning (with S. Gukov, J. Halverson and F. Ruehle), preprint (2023), arXiv:2304.09304
3. A Rasmussen invariant for links in \mathbb{RP}^3 (with M. Willis), preprint (2023), arXiv:2301.09764
4. Skein lasagna modules and handle decompositions (with K. Walker and P. Wedrich), *Advances in Mathematics*, **425** (2023), Paper No. 109071
5. A knot Floer stable homotopy type (with S. Sarkar), preprint (2021), arXiv:2108.13566
6. Quantum Field Theory and Manifold Invariants (book co-edited with D. Freed, S. Gukov, C. Teleman, and U. Tillmann), *IAS/Park City Mathematics Series* **28** (2021)
7. Four-dimensional topology, *CMSA Math Science Lecture Proceedings*, to appear

8. From zero surgeries to candidates for exotic definite four-manifolds (with L. Piccirillo), *Journal of the London Mathematical Society*, **108** (2023), 2001–2036
9. Relative genus bounds in indefinite four-manifolds (with M. Marengon and L. Piccirillo), preprint (2020), to appear in *Mathematische Annalen*
10. Skein lasagna modules for 2-handlebodies (with I. Neithalath), *Journal für die Reine und Angewandte Mathematik*, **788** (2022), 37–76
11. A generalization of Rasmussen’s invariant, with applications to surfaces in some four-manifolds (with M. Marengon, S. Sarkar and M. Willis), *Duke Mathematical Journal* **172** (2023), 231–311
12. A two-variable series for knot complements (with S. Gukov), *Quantum Topology* **12** (2021), 1–109
13. A sheaf-theoretic $SL(2, \mathbb{C})$ Floer homology for knots (with L. Côté), *Proceedings of the London Mathematical Society* **119** (2019), 1336–1387
14. The Knight Move Conjecture is false (with M. Marengon), *Proceedings of the American Mathematical Society* **148** (2020), 435–439
15. Homology cobordism and triangulations, in *Proceedings of the International Congress of Mathematicians*, Rio de Janeiro (2018), Vol. 2, 1175–1192
16. A sheaf-theoretic model for $SL(2, \mathbb{C})$ Floer homology (with M. Abouzaid), *Journal of the European Mathematical Society* **22** (2020), 3641–3695
17. Involutive Heegaard Floer homology and plumbed three-manifolds (with I. Dai), *Journal of the Institute of Mathematics of Jussieu* **18** (2019), 1115–1155
18. A connected sum formula for involutive Heegaard Floer homology (with K. Hendricks and I. Zemke), *Selecta Mathematica* **24** (2018), 1183–1245
19. Floer homology and covering spaces (with T. Lidman), *Geometry & Topology*, **22** (2018), 2817–2838
20. The equivalence of two Seiberg-Witten Floer homologies (with T. Lidman), *Astérisque*, **399** (2018)
21. Lectures on the triangulation conjecture, in *Proceedings of the Gökova Geometry / Topology Conference 2015*, Gökova (2016), 1–38
22. Involutive Heegaard Floer homology (with K. Hendricks), *Duke Mathematical Journal*, **166** (2017), 1211–1299
23. Floer theory and its topological applications, *Japanese Journal of Mathematics*, **10** (2015), 105–133
24. Triangulations of manifolds, *Notices of the International Congress of Chinese Mathematicians*, **2** (2014), no. 2, 21–23
25. An introduction to knot Floer homology, in *Physics and mathematics of link homology*, Contemp. Math. **680**, AMS (2016), 99–135
26. Cornered Heegaard Floer homology (with C. Douglas and R. Lipshitz), *Memoirs of the American Mathematical Society*, **262** (2019), no. 1266
27. The Conley index, gauge theory, and triangulations, *Journal of Fixed Point Theory and Applications* **13** (2013), 431–457
28. On the intersection forms of spin four-manifolds with boundary, *Mathematische Annalen* **359** (2014), 695–728

29. A generalized asynchronous computability theorem (with E. Gafni and P. Kuznetsov), in *Proceedings of the 2014 ACM Symposium on Principles of Distributed Computing (PODC '14)*, ACM, New York (2014), 222–231
30. Pin(2)-equivariant Seiberg-Witten Floer homology and the Triangulation Conjecture, *Journal of the American Mathematical Society* **29** (2016), 147–176
31. Grid diagrams in Heegaard Floer theory, in *European Congress of Mathematics, Kraków, 2-7 July, 2012*, European Mathematical Society (2013), 643–657
32. An untwisted cube of resolutions for knot Floer homology, *Quantum Topology* **5** (2014), 185–223
33. On the algebra of cornered Floer homology (with C. Douglas), *Journal of Topology* **7** (2014), 1–68
34. Heegaard Floer homology and integer surgeries on links (with P. Ozsváth), preprint (2010), to appear in *Geometry & Topology*
35. Grid diagrams and Heegaard Floer invariants (with P. Ozsváth and D. Thurston), preprint (2009), to appear in *Annals of Mathematics*
36. Floer homology on the extended moduli space (with C. Woodward), in *Perspectives in Analysis, Geometry and Topology: On the Occasion of the 60th Birthday of Oleg Viro*, Progress in Mathematics **296**, Birkhäuser / Springer (2012), 283–329
37. A combinatorial description of knot Floer homology (with P. Ozsváth and S. Sarkar), *Annals of Mathematics* **169** (2009), 633–660
38. Combinatorial cobordism maps in Heegaard Floer theory (with R. Lipshitz and J. Wang), *Duke Mathematical Journal* **145** (2008), 207–247
39. On the Khovanov and knot Floer homologies of quasi-alternating links (with P. Ozsváth), in *Proceedings of the Gökova Geometry / Topology Conference 2007*, Gökova (2008), 60–81
40. On combinatorial link Floer homology (with P. Ozsváth, D. Thurston and Z. Szabó), *Geometry and Topology* **11** (2007), 2339–2412
41. An unoriented skein exact triangle for knot Floer homology, *Mathematical Research Letters* **14** (2007), 839–852
42. Link homology theories from symplectic geometry, *Advances in Mathematics* **211** (2007), 363–416
43. A concordance invariant from the Floer homology of double branched covers (with B. Owens), *International Mathematics Research Notices* **2007**, doi:10.193/imrn/rnm077
44. A gluing theorem for the relative Bauer-Furuta invariants, *Journal of Differential Geometry* **76** (2007), 117–153
45. Nilpotent slices, Hilbert schemes, and the Jones polynomial, *Duke Mathematical Journal* **132** (2006), 311–369
46. Periodic Floer pro-spectra from the Seiberg-Witten equations (with P.B. Kronheimer), eprint (2002), arXiv:math/0203243
47. Seiberg-Witten-Floer stable homotopy type of 3-manifolds with $b_1 = 0$, *Geometry and Topology* **7** (2003), 889–932

Selected Invited Lectures

Distinguished lectures

David Emmanuel Lecture, SSMR, Bucharest, Romania, July 2023
 British Mathematical Colloquium (virtually), LMS plenary lecture, April 2021
 Maryam Mirzakhani Lecture, AMS-MAA Joint Mathematics Meetings (virtually), January 2021
 Aisenstadt Chair lecture series, CRM Montreal, September 2019
 Myhill Lectures, University at Buffalo, April 2015
 Takagi Lectures, University of Tokyo, November 2014
 Perspectives in Geometry lecture series, University of Texas at Austin, December 2013

Lecture series and mini-courses

Workshop in Geometric Topology, University of Wisconsin-Milwaukee, May 2019
 Topologie, workshop in Oberwolfach, Germany, July 2018
 PIMS Symposium on the Geometry and Topology of Manifolds, Vancouver, Canada, July 2015
 Gökova Geometry / Topology Conference, Gökova, Turkey, May 2015
 Seminar series at Microsoft Station Q, Santa Barbara, September 2013
 Topology and Invariants of Smooth 4-Manifolds, University of Minnesota, August 2013
 Summer school on Homology theories of knots and links, University of Montreal, July 2013
 Seminar series at the Jussieu Mathematics Institute, June 2012
 Link homology and categorification, conference at Kyoto University, May 2007

Selected Conference Talks

International Congress of Basic Science, Beijing, China, July 2024
 The Tenth Congress of Romanian Mathematicians, Pitești, Romania, July 2023
 Mathematics & IT: Research and Education (MITRE-2023), Chișinău, Moldova, June 2023
 Pacific Rim Mathematical Association Congress, Vancouver, December 2022
 Math Science Literature Lecture Series (virtually), CMSA, Harvard University, May 2020
 Fukaya 60 Geometry and Everything, Kyoto University, Japan, February 2019
 Midwest Topology Seminar, University of Kentucky, September 2018
 Lecture for high school students at the International Mathematical Olympiad, Cluj-Napoca, Romania, July 2018
 International Congress of Mathematicians, geometry and topology sections, Rio de Janeiro, Brazil, August 2018

JDG Conference on Geometry and Topology, Harvard University, April 2017

Cornell Topology Festival, May 2016

Yamabe Memorial Symposium, University of Minnesota, October 2014

38th Congress of the American Romanian Academy of Arts and Sciences, TED-styled lecture, Pasadena, July 2014

6th European Congress of Mathematics, Krakow, Poland, July 2012

Colloquia

2024: University of Nevada at Reno

2023: University of Sydney, Turkish Mathematical Society, USC

2022: McMaster University, WHCGP

2021: Rutgers University, SUSTech, PIMS/UBC

2019: Peking University

2018: UC Davis

2017: Stanford University, University of Chicago, Chinese University of Hong Kong

2016: University of Oregon, SUNY Stony Brook

2015: Michigan State University

2014: Princeton University, Vanderbilt University, UC Irvine

2013: University of Texas at Austin

2012: IMAR Bucharest, Istanbul Center for Mathematical Sciences

2011: CSU Fullerton, Rice University

2010: University of Southern California

2007: UCLA, Bryn Mawr College, University of Bonn, Northwestern University, Rutgers University

2006: Rice University

2004: California Institute of Technology

Conferences and seminars organized

Workshop in Exotic 4-manifolds, Stanford, December 16-18, 2023

Gauge Theory and Topology, Clay Mathematics Institute, Oxford, July 24-28, 2023

Stanford Topology Celebration, May 20-21, 2023

MSRI program on “Floer Homotopy Theory,” Fall 2022

Special session “Low Dimensional Topology,” Joint Mathematics Meetings, Washington, DC, January 8, 2021

Stanford Department Colloquium, 2020-2021 and 2023

Stanford Topology Seminar, 2019-Present

Workshop on Floer Homotopy Theory and Low-Dimensional Topology at the University of Oregon, August 5-7, 2019

PCMI program on QFT and Manifold Invariants in Park City, Utah, July 1-20, 2019

Workshop on Hidden Algebraic Structures in Topology, Caltech, March 13-16, 2019

Workshop on Symplectic Geometry and Homotopy Theory at UCLA, December 12-14, 2018

UCLA Topology workshop, January 3-5, 2018

Summer school and conference "Floer Homology and Homotopy Theory," UCLA, July 10-21, 2017

IPAM workshop "Gauge Theory and Categorification," UCLA, March 6-10, 2017

"A Day of Triangulations," workshop at UCLA, November 16, 2013

Special session "Topology and Symplectic Geometry," AMS Western Section Meeting, UCLA, October 9-10, 2010

Joint LA Topology Seminar (2008-2019),

UCLA Topology Seminar (2008-2019)

UCLA Geometry Seminar (2009-2010),

Columbia Gauge Theory and Symplectic Geometry Seminar (2005-2008)

Service

Member of the editorial boards of *Journal of the European Mathematical Society*, *Geometry & Topology*, *Moduli*, *Fixed Point Theory*

Former member of the editorial boards of *Journal of the American Mathematical Society* (2016-2023), *Compositio Mathematica* (2016-2021) and *Selecta Mathematica* (2007-2020)

Chapter editor for *K3: A new problem list in low-dimensional topology* (2023-2024)

Grant reviewer for the *National Science Foundation (US)*, *American Mathematical Society*, *European Research Council*, *Research Grant Council of Hong Kong*, *National Science Center of Poland*, *Netherlands Organisation for Scientific Research*, *Swiss National Science Foundation*, *Hungarian Scientific Research Fund*, *New Zealand Marsden Fund*

Member of the ICM Topology Panel (2022)

Member of the ICCM Prize Committee (2022)

Referee for *Advances in Mathematics*, *Algebraic and Geometric Topology*, *Communications in Analysis and Geometry*, *Compositio Mathematica*, *Duke Mathematical Journal*, *Geometric and Functional Analysis*, *Geometry and Topology*, *International Mathematics Research Notices*, *Journal of the American Mathematical Society*, *Journal of Differential Geometry*, *Journal of the European Mathematical Society*, *Journal of Knot Theory and its Ramifications*, *Journal of Topology*, *Mathematical Research Letters*, *Mathematische Annalen*, *Memoirs of the American Mathematical Society*, *Notices of the American Mathematical Society*, *Proceedings of the National Academy of Sciences*, *Publications Mathématiques de l'IHES*, *Selecta Mathematica*, *Topology and its Applications*, and several conference proceedings

Supervision: 16 postdoctoral researchers, 19 Ph.D. students

Coach of the Stanford team for the Putnam Mathematical Competition (2019-Present)

Coach of the UCLA team for the Putnam Mathematical Competition (2009-2018)

Coach of the Columbia team for the Putnam Mathematical Competition (2005-2007)

Personal

Born on December 24, 1978 in Alexandria, Romania

Dual citizen: Romania and USA