

Curriculum Vita

Ralph L. Cohen
Dept. of Mathematics
Stanford University

Date and place of birth

Born August 11, 1952 in Detroit, Michigan. Citizenship: USA

Education

- (1) B.S. in Mathematics, 1973, University of Michigan
- (2) M.A. in Mathematics, 1975, Brandeis University
- (3) Ph.D in Mathematics, 1978, Brandeis University, thesis advisor: E.H. Brown Jr.

Employment

- (1) Barbara Kimball Browning Professor in the Humanities and Sciences, Stanford University, 2009 -present
- (2) Senior Associate Dean for the Natural Sciences, College of Humanities and Sciences, Stanford University, 2010 - present
- (3) Professor of Mathematics, Stanford University, 1987 - present.
- (4) Associate Professor of Mathematics, Stanford University, 1983 - 1987.
- (5) Assistant Professor of Mathematics, Stanford University, 1980 - 1983.
- (6) L.E. Dickson Instructor of Mathematics, University of Chicago, 1978 - 1980.

Visiting professorships:

- Northwestern University (1982)
- Princeton University (1983-4),
- Nankai Institute, China (1987),
- Oxford University. (1988-9, 2002)
- Univ. of Paris 7(1989),
- Cambridge University (1997) ,
- “Professeur Invité” , Univ. of Lille, France 2003, Univ. of Paris 13, 2005.
- Trondheim University, Norway, 2004
- Distinguished Visiting Professor, University of Copenhagen, Denmark, September, 2009 - March, 2010

Fellowships, Grants, and Awards

- (1) Named Inaugural Fellow of the American Mathematical Society, 2013
- (2) Principal Investigator on National Science Foundation Research grants continuously from 1978 until present
- (3) Co-PI, NSF grant for the "West Coast Algebraic Topology Summer School", 2012 - 2015
- (4) PI on "Research Training Grant" for training of graduate students and postdocs in topology and geometry, 2006 - 2011.
- (5) "Focused Research Grant" from NSF, 2003 - 2006. This was a \$1.1 million group research grant in topology, headed by Cohen at Stanford, and D. Sullivan at SUNY-Stonybrook.
- (6) Named "Bass University Fellow in Undergraduate Education", 2005 - 2010
- (7) Dean's Award for Distinguished Teaching, 2002.
- (8) National Science Foundation International research award 1988-9
- (9) National Science Foundation *Presidential Young Investigator Award*, 1984 - 1989.
- (10) A.P. Sloan Foundation Fellowship in Mathematics, 1982 - 1984.

Editorships

- (1) Editor, *Journal of Geometry and Topology*, 1997 -present
- (2) Editor, *Homotopy, Homology, and its Applications*, 2004 - present
- (3) Chair, Editorial Board, *Mathematical Surveys and Monographs*, American Math. Society, 2007 - present
- (4) Editor of *Graduate Text Series*, Oxford University, Press, 1996 - present
- (5) Founding Editor, *Journal of Topology* 2007-2013
- (6) Editor, *Topology* 1988 - 2007.
- (7) Editor, *Proceedings of the American Mathematical Society*, 1997 - 2001
- (8) Editor, *Transactions of the American Mathematical Society*, and of *Memoirs of the American Mathematical Society*, 1985 - 1992.

Other Professional activities

- (1) Director, Stanford's "Mathematics Research Center", 2000 - 2009
- (2) Elected member American Math. Society Executive Committee
- (3) Scientific Advisory Board, Banff International Research Station , 2008- 2012
- (4) Member of American Mathematical Society since 1975.

Selected Invited Lectures (last 5 years)

- (1) Invited Plenary Speaker, Conference on Algebraic Topology, Colegio de Nacional, Mexico City, Mexico, 2013
- (2) Invited Plenary Speaker, Conference on Quantum Field Theory and Topology, University of Pittsburgh, 2013

- (3) Invited Principal Speaker, Newton Institute of Mathematical Sciences, Cambridge University, UK 2013
- (4) Invited Speaker, British Topology Symposium, University of Sheffield, 2012
- (5) Invited Principal Speaker, Simons Institute on Geometry and Theoretical Physics, April, 2012
- (6) Colloquium Speaker, University of Pittsburgh, 2012.
- (7) Keynote Speaker, National Graduate Student Conference on Geometry and Topology, Michigan State University, 2011
- (8) Invited Principal Speaker, Summer School on Loop Spaces, Nordfjordeid, Norway, 2011
- (9) Invited Speaker, Conference on Loop Spaces, Groups, and Algebras, Center for Mathematical Research, Luminy, France, 2011
- (10) Invited Principal Speaker, International Conference on Homotopy theory and Field theory, Fields Institute of Mathematics, Toronto, Canada 2010
- (11) Invited Principal Speaker, Midwest Topology Seminar, Wayne State University, 2010
- (12) Plenary Speaker, "Second Copenhagen Topology Conference", January, 2010
- (13) Invited Speaker, U.C. Berkeley Topology Seminar, May, 2010
- (14) Invited Speaker, Oxford Mathematics Colloquium, March, 2010
- (15) Invited Speaker, Colloquium of the University of Bonn, Germany, February, 2010
- (16) Invited Principal Speaker to the Danish Mathematical Society, December, 2009
- (17) Invited Principal Speaker, Swiss National Academy of Sciences, October, 2009
- (18) Invited Lecture Series, Notre Dame University, April, 2009
- (19) Plenary Speaker, "International Conference on Higher Order Structures in Mathematics and Physics", University of Zurich, October, 2009
- (20) Plenary Speaker, "International Conference on Topological Quantum Field Theories, Northwestern University, t May, 2009
- (21) Invited Speaker, Georgia International Topology Conference, Univ. of Georgia, May, 2009
- (22) "Celebratory lecture", opening of new Mathematics Center, Univ. of Manchester, England, June, 2008

University and Department Service

- (1) Senior Associate Dean for the Natural Sciences, School of Humanities of Sciences, 2010 - present
- (2) Director, Mathematics Research Center, Stanford University, 2000 - 2009
- (3) University Academic Senate, terms: 2000- 2002, 2005-2007, 2011- 2013
- (4) Chair, Academic Senate Committee on Committees, 2011- present
- (5) Chairman, Dept. of Mathematics, 1992 - 1995.

Community Service and Education

- (1) Keynote Speaker, National Conference for Graduate Students in Geometry and Topology, April, 2011, Michigan
- (2) Co-organizer (together with M. Schwarz) of workshop on “Morse theory, String Topology, and Floer theory” in San Giovanni, Italy, August, 2008. This workshop was part of the “Studienshriftung Academy”, an academic society for German graduate students.
- (3) Invited Keynote Speaker, National Convention of Mu Alpha Theta - a high school mathematics honors society, Sacramento, July, 2008.
- (4) Keynote speaker, *National Undergraduate Research Conference*, UC Berkeley, May 2007.
- (5) Speaker, Bay Area Mathematics Circles (an organization for gifted middle and high school mathematics students), February, 2008, November, 2008, April, 2010
- (6) Invited author of an article on ”Topology” for World Book Encyclopedia (appearing in the most recent volume).
- (7) Invited series of lectures on Morse theory and String topology to a summer school of South American graduate students entitled “Geometric and Topological methods in Quantum Field Theory”, Villa de Leyva, Colombia, June, 2007
- (8) Lead original design team for the Math 50 series, 1997-8.
- (9) Mathematics advisor to the Educational Program for Gifted Youth at Stanford, 1995 -2002
- (10) Organized and taught continuing education course on “Great Ideas of 20th Century Mathematics”, Fall, 2002. This was a night school course was attended by 70 people.
- (11) Consultant to State Board of Education on K-12 Mathematics Content Standards, 1997 - 2000
- (12) California State Mathematics Framework Committee, 1997
- (13) Co-founder, with R. Mazzeo, Stanford University Mathematics Camp, a summer program for mathematically talented high school students, 1995

Publications

- Author of over 60 published mathematics research articles.
- Author and editor of 4 graduate and research level books and lecture notes
- Author and Consultant of K-6 Mathematics Series, McGraw-Hill
- Author and Consultant, four textbook series at the middle and high school level, Glencoe, McGraw-Hill

PUBLICATION LIST

Ralph L. Cohen
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Research Articles

1. On Odd Primary Stable Homotopy Theory, *Ph.D Dissertation*, Brandeis University, 1978.
2. The Geometry of $\Omega^2 S^3$ and braid orientations, *Inventiones Mathematicae*. **54** (1979), 53-67.
3. Representations of Brown - Gitler spectra, Proceedings of Topology Symposium , Siegen *Springer Lecture Notes* **788** (1980), 399-417.
4. Stable proofs of stable splittings, *Math. Proceedings of the Cambridge Philosophical Society* **88** (1980), 149-151.
5. Odd primary infinite families in stable homotopy theory, *Memoirs of the American Mathematical Society* **242** (1981).
6. Immersions of manifolds, *Proceedings of the National Academy of Sciences, U.S.A* **79** (1982), 3390-3392.
7. Bundles over configuration spaces (coauthor with F. Cohen, N. Kuhn, and J. Neisendorfer), *Pacific Journal of Math.* **104** (1983), 47-54.
8. Secondary cohomology operations that detect homotopy classes, (coauthor with P. Goerss), *Topology* **23** (1984), 177-194.
9. The Kervaire invariant of immersions (coauthor with J. Jones and M. Mahowald), *Inventiones Mathematicae* **79** (1985), 95 - 123.
10. The homotopy theory of immersions, Proceedings of the International Congress of Mathematicians, Warsaw, 1983, *P.W.N. - Polish Scientific Publishers* (1985), 627 - 640.
11. The immersion conjecture for differentiable manifolds, *Annals of Math.* **122** (1985), 237 - 328.
12. Realizing Transfer Maps for Ramified Coverings, *Pacific Journal of Math.* **122** (1986), 347 - 356.
13. The free loop space and the cyclic groups (coauthor with G. Carlsson), *Commentari Math. Helvetici.* **62** (1987), 423 - 449.
14. The Adams spectral sequence of $\Omega^2 S^3$ and Brown - Gitler spectra, (coauthor with E.H. Brown), *Annals of Math. Studies* **113** (1987), 101 - 125.
15. A decomposition of the space of generalized Morse functions, *Annals of Math. Studies* **113** (1987), 365 - 391.
16. The free loop space of a suspension, *Springer Lecture Notes* **1286** (1987), 193 - 207.
17. The free loop space and the algebraic K - theory of spaces (coauthor with G. Carlsson, T. Goodwillie, and W.c. Hsiang), *K - theory*, **1** (1987), 53 - 82.

18. Pseudo - isotopies, algebraic K - theory, and homotopy theory, *London Mathematics Society Lecture Note Ser.* **117** (1987), 35 - 72.
19. On the Adams spectral sequence of the real projective spaces (coauthor with W.H. Lin and M. Mahowald), *Pacific Journal of Math.* **134** (1988), 27 - 55.
20. Lectures on Immersion Theory, (coauthor with U. Tillmann), Differential Geometry and Topology proceedings, Nankai University, *Springer Lecture Notes* **1369** (1989), 71-124
21. Generalized Tate homology, homotopy fixed points, and the transfer, (coauthor with A. Adem and W. Dwyer), Proceedings of the conference in Algebraic Topology, Northwestern Univ. 1988, *Contemporary Mathematics* **96** (1989), 1-13
22. Divisors and configurations on a surface, (coauthor with F. Cohen, B. Mann, and R.J. Milgram), Proceedings of the Conference in Algebraic Topology, Northwestern Univ. 1988, *Contemporary Mathematics* **96** (1989), 103-108
23. The algebraic K - theory of spaces and the Novikov conjecture, (coauthor with J.D.S. Jones), *Topology* **29** (1990), 317 - 344.
24. Representations of braid groups and operators coupled to monopoles, (coauthor with J.D.S. Jones), *London Math. Society Lecture Note Series* **150** (1990), 191 - 205.
25. The topology of rational functions and divisors of surfaces, (coauthor with F. Cohen, B. Mann, and R.J. Milgram), *Acta Mathematica* **166** (1991), 163 - 221.
26. Rational functions, labelled configurations, and Hilbert schemes,(coauthor with D. Shimamoto) *Journal of the London Math. Society* **43** (1991), 509 - 528.
27. Morse theory via moduli spaces, Proceedings of workshop on gauge theory, *Matematica Contemporanea, Soc. Brasileira de Matematica* (1992), 19 - 66.
28. The homotopy type of rational functions, (coauthor with F. Cohen, B. Mann, and R.J. Milgram), *Mathematische Zeitschrift* (**207**) (1993), 37 - 47.
29. Monopoles, Braid groups, and the Dirac operator (coauthor with J.D.S. Jones), *Communications in Mathematical Physics*, (**158**) (1993), 241 - 266.
30. Moduli spaces of graphs and cohomology operations (coauthor with M. Betz), *Turkish Journal of Math.* (**18**), (1994), 23 - 41.
31. The homotopy type of gauge theoretic moduli spaces, (coauthor with R.J. Milgram), *Algebraic Topology and its Applications* M.S.R.I publication series, **vol 27** (1994), 15 - 55.
32. Stabilizing moduli spaces of self dual connections, *Turkish Journal of Math.* (**19**), (1995), 179 - 187.
33. Floer's infinite dimensional Morse theory and homotopy theory (coauthor with J.D.S Jones and G.B. Segal), *Floer Memorial Volume*, Birkhauser Verlag Prog. in Math. **vol. 133** (1995), 287 - 325.
34. On the algebraic K -theory of simply connected spaces (coauthor with M. Bokstedt, G. Carlsson, T. Goodwillie, W.c. Hsiang, and I. Madsen), *Duke Jour. of Math.* **vol.84 no.3** (1996) 541 - 563.

35. Morse theory and classifying spaces (coauthor with J.D.S Jones and G.B. Segal), Warwick Univ. preprint (1997)
36. Holomorphic spheres in loop groups and Bott periodicity (coauthor with E. Lupercio and G.B. Segal), *Asian Jour. of Math.* **vol. 3 no. 4** (1999) 801 - 818.
37. Stability for holomorphic spheres and Morse theory, (coauthor with G. Segal, J.D.S Jones), *Contemporary Mathematics* **vol. 258** (2000) 87 - 106.
38. Holomorphic K - theory, algebraic co-cycles, and loop groups (coauthor with P. Lima-Filho), *K-theory*, (23) (2001), 345-376.
39. An algebraic geometric Realization of the Chern character (coauthor with P. Lima-Filho), preprint, math.AT/9912152
- 40., A homotopy theoretic realization of string topology , (coauthor with J.D.S Jones) *Math. Annalen*, **vol. 324**, 773-798 (2002). Published online : url: <http://dx.doi.org/10.1007/s00208-002-0362-0>
41. The loop homology algebra of spheres and projective spaces, (coauthor with J.D.S Jones and J. Yan), *Progress in Mathematics* **Vol. 215** (2003) 77-92.
42. Fourier decompositions of loop bundles , (coauthor with A. Stacey), *Contemporary Mathematics* . **346** (2004), 85 - 95.
43. A polarized view of string topology, (coauthor w. V. Godin), *Topology, Geometry, and Quantum Field Theory*, London Math. Soc. Lecture Notes **vol. 308** (2004), 127-154
44. Multiplicative properties of Atiyah duality, *Homology, Homotopy, and its Applications*, **vol 6 no. 1** (2004), 269-281.
45. The topology of the category of open and closed strings, (coauthors Nils A. Baas and Antonio Ramirez), *Contemporary Mathematics*, **407** (2005), 11 - 26.
preprint: math.AT/0411080
46. Morse theory, graphs, and string topology, proceedings of SMS/NATO Adv. Study Institute on Morse theoretic methods in non-linear analysis and symplectic topology, Nato Science Series II: Mathematics, Physics, and Chemistry **vol 217**, Springer, (2006), 149-184. preprint: math.GT/0411272
47. Notes on String Topology, (coauthor A. Voronov), in **String Topology and Cyclic Homology**, Adv. Courses in Math: CRM, Barcelona, Birkhauser (2006), 1-95. preprint: math.GT/0503625
48. String topology: homotopy and geometric perspectives, **Encyclopedia of Mathematical Physics**, eds. J.-P. Francoise, G.L. Naber and Tsou S.T. Oxford: Elsevier, (2006) volume 5, 111-114.
preprint:<http://math.stanford.edu/~ralph/papers.html>
49. String topology of Poincaré duality groups (coauthors H. Abbaspour and K. Gruher), *Geometry and Topology Monographs*, vol. 13, (2007), 1-10. preprint: math.AT/0511181

50. The homotopy invariance of the string topology loop product and string bracket (coauthor J. Klein and D. Sullivan), *Journal of Topology*, **vol. 1** part 2, (2008), 391-408. preprint: math.GT/0509667
51. Surfaces in a background space and the homology of mapping class groups, (coauthor I. Madsen) , *Proc. Symp. Pure Math.*, **vol. 80** no. 1(2009), 43 - 76. preprint: math.GT/0601750
52. Umkehr maps, (coauthor J.R. Klein), *Homology, Homotopy, and Applications*, **vol. 11** (1), (2009), 17-33. preprint: arXiv:0711.0540
53. Universal moduli spaces of surfaces with flat bundles and cobordism theory (joint authors S. Galatius and N. Kitchloo), *Advances in Math.*, **221**, (2009), 1227-1246. preprint: arXiv:0801.3296
54. Floer homotopy theory, realizing chain complexes by module spectra, and manifolds with corners, in *Proc. of Fourth Abel Symposium, Oslo, 2007*, ed. N. Baas, E.M. Friedlander, B. Jahren, P. Ostvaer, Springer Verlag (2009), 39-59. preprint: arXiv:0802.2752
55. A Morse theoretic description of string topology, (coauthor Matthias Schwarz), in "New Perspectives and Challenges in Symplectic Field theory, CRM Proceedings and Lecture Notes **49**: ed: M. Abreu, F. Lalonde, L. Polterovich (2009), 147-172. preprint: arXiv:0809.0868
56. Open-closed field theories, string topology, and Hochschild homology, (joint with A. Blumberg and C. Teleman), *Contemp. Math.*, AMS, **504** (2009), 53-76. preprint: arXiv:0906.5198
57. The Floer homotopy type of the cotangent bundle, *Pure and Applied Mathematics Quarterly*, **vol. 6** no. 2 (2010), 391-438 preprint : math.AT/0702852
58. Topological Hochschild homology of Thom spectra and the free loop space, (joint with A. Blumberg and C. Schlichtkrull), *Geometry and Topology*, **14** (2010) 1165-1242 preprint: arXiv:0811.0553
59. Stability phenomena in the topology of moduli spaces, *Surveys in Differential Geometry XIV* ed: L. Ji, S. Wolpert, and S-T Yau, International Press (2010), 23-56. preprint: arXiv:0908.1938
60. Stability for closed surfaces in a background space, (joint with Ib Madsen), *Homology, Homotopy, and Applications*, **vol. 13** (2), (2011), 301-313. preprint: arXiv:1002.2498
61. Morse Field Theory, (coauthor P. Norbury), *Asian Journal of Mathematics*, **vol. 16** (4), (2012), 661-712 preprint: math.GT/0509681
62. Gauge groups and string topology, (joint with J.D.S. Jones), preprint, (2013): <http://arxiv.org/abs/1304.0613>
63. Homotopy automorphisms of R -module bundles and the K -theory of string topology, (joint with J.D.S. Jones), preprint, (2013) <http://arxiv.org/abs/1310.4797>
64. The moduli space of topological B -fields, (joint with I. Madsen), *in preparation*.
65. Higher order string topology operations, (joint with N. Hingston and N. Wahl), *in preparation*

Books and Lecture Notes

1. Proceedings of the International Conference on Algebraic Topology, (coeditor with G. Carlsson, H. Miller, and D. Ravenel) *Springer Lecture Notes* **1370** (1989).

2. Algebraic Topology and its Applications, (coeditor with G. Carlsson, J.D.S. Jones, and W.c. Hsiang), M.S.R.I publication series, Springer Verlag, **vol 27**, (1994).
3. **Topics in Morse Theory**, (coauthor with K. Iga and P. Norbury), in preparation
4. **The Topology of Fiber Bundles**, Lecture Notes, Stanford University
5. **String Topology and Cyclic Homology** Adv. Courses in Math., CRM, Birkhauser, (2006).