

Sam Nariman

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RESEARCH I am interested in homological stability, diffeomorphism groups of manifolds, foliation theory, étale homotopy theory, and in general applications of homotopy theory in geometry.

EMPLOYMENT

- Purdue University, from August 2024, Associate Professor
- Purdue University, from August 2020 to August 2024, Assistant Professor
- University of Copenhagen, September 2019- August 2020
- Northwestern University, September 2016 –September 2019, Boas Assistant professor
- the University of Muenster, September 2015 –September 2016, Postdoctoral Fellow, Mentor: Michael Weiss

EDUCATION

- Stanford University, September 2010 – June 2015
PhD program in Mathematics
Ph.D. Thesis: Homological stability and stable moduli of flat manifold bundles
Advisor: Søren Galatius
 - Visiting student at MIT in Fall 2013
 - Visiting student at University of Copenhagen for 3 months, Spring 2012
- Sharif University of Technology, Tehran, Iran, September 2007 – January 2009
Graduate program in Mathematics (GPA 19.56/20)
Master Thesis: On the structure of real and complex cobordism ring
Advisors: Siavash Shahshahani, Mehrdad Shahshahani
 - Visiting student at the University of Muenster for six months under the supervision of Wolfgang Lueck, 2010
 - Visiting student Max Planck Institute and University of Bonn for two months, 2009
- Sharif University of Technology, Tehran, Iran, September 2004 – June 2007
B.S. in Mathematics (GPA 18.78/20)

AWARDS AND HONORS

- Research award from Purdue University, \$1500, Feb 2024.
- NSF CAREER award 2239106, “New directions in foliation theory and diffeomorphism groups”, \$547,372, 2023-2028.
- Simons Collaboration Grant award 855209 “Homotopy theory of foliations and diffeomorphisms groups”. 2021- 2026.
- NSF Grant DMS - 2113828 (transferred from NSF Grant DMS - 1810644 to Purdue) “Homotopy theory of foliations and diffeomorphism groups”. 2020-2022.

- NSF Grant DMS - 1810644 “Homotopy theory of foliations and diffeomorphism groups”. 2018-2020.
- Awarded AMS Simons Travel Grant 2017-2019.
- Selected as a talented student to enter the Ph.D. program at Sharif University without an entrance exam.
- Awarded Khayam Prize as an outstanding student, by the President of Sharif University, 2008.
- Third Prize, International Mathematical Competition for University Students (IMC), Blagoevgrad, Bulgaria, 2007.
- 4th Rank, International Scientific Mathematics Olympiad, 2007, Tehran, Iran.
- Silver medal, National Mathematical Olympiad, Summer 2003.

RESEARCH PAPER

Submitted

- The bounded cohomology of transformation groups of Euclidean spaces and discs, with Francesco Fournier-Facio, Nicolas Monod, and an appendix by Sander Kupers.

Accepted

- On the finiteness of the classifying space of diffeomorphisms of reducible three-manifolds. *to appear in* **Forum of Mathematics, Sigma**.
- On invariants of foliated sphere bundles, *to appear in* **Commentarii Mathematici Helvetici**.
- Foliations and diffeomorphism groups. **Notices of AMS**, December 2024.
- PL homeomorphisms of surfaces and codimension 2 PL foliations. **Compositio Mathematica**, 160 (2024), 2684–2703.
- On flat manifold bundles and the connectivity of Haefliger’s classifying spaces. **Proceedings of the AMS**, 152 (2024), no. 11, 4943–4957.
- On C^0 -stability of compact leaves with amenable fundamental groups. with Mehdi Yazdi. *to appear in* **Mathematical Research Letters**.
- Thurston’s fragmentation and c-principles. **Forum of Mathematics, Sigma**. volume 11, 2023.
- Bounded and unbounded cohomology of homeomorphism and diffeomorphism groups. with Nicolas Monod. **Inventiones mathematicae** volume 232, pages 1439-1475 (2023).
- The free factor complex and the dualizing module for the automorphism group of a free group. with Zachary Himes, Jeremy Miller, and Andrew Putman. **Int. Math. Res. Not.** Volume 2023, Issue 22, November 2023,
- Topological aspects of the dynamical moduli space of rational maps, with Khashayar Filom and Maxime Bergeron. **Adv. Math.** 397 (2022), Paper No. 108209.
- On the bordism group for group actions on the torus. with Kathryn Mann. **Annales de l’Institut Fourier** Volume 72 (2022) no. 3, 989-1009.

- Dynamical and topological obstructions to extending group actions, with Kathryn Mann. **Math. Ann.** 377 (2020), no. 3-4, 1313-1338.
- A local to global argument on low dimensional manifolds, **Trans. Amer. Math. Soc.** 373 (2020), no. 2, 1307-1342.
- On the moduli space of flat symplectic surface bundles, **J. Differential Geom.** 116 (2020), no. 2, 349-391.
- On powers of the Euler class for flat circle bundles. **J. Topol. Anal.** 10 (2018), no. 1, 47-52.
- Braid groups and discrete diffeomorphisms of the punctured disk. **Math. Z.** 288 (2018), no. 3-4, 1255-1271.
- Stable homology of surface diffeomorphism groups made discrete. **Geom. Topol.**, 21 (2017), no. 5, 3047-3092.
- Homological stability and stable moduli of flat manifold bundles, **Adv. Math.** vol 320, November 2017, page 1227-1268.

OTHER PUBLICATIONS AND BOOKS

- A New Interpretation of Dictatorship with Applications in Social Choice Theory, with Mohammad Akbarpour, *available at SSRN 2713921*.
- Oberwolfach report for the homotopy theory meeting, August 2019.
- Expository article on analytic cycles on complex manifolds (in Persian), Farhang va Andisheie Riazi, April 2009.
- Solution manual for Calculus 1 (written by S.Shahshahani)(with E. Salavati and O. Mirsadeghi), Fatemi Publisher, 2009.
- Solution manual for Calculus 2 (written by S.Shahshahani)(with E. Salavati and O. Mirsadeghi) Fatemi Publisher, 2008.
- Translation of “Canadian Mathematical Olympiad from 1994-2002”, Mehr Publishers, Tehran, Iran, 2002.

COLLOQUIUM TALKS & CONFERENCE TALKS

- Semi-plenary talk in 58th Spring Topology and Dynamics Conference, Virginia, March 6-8 2025.
- Colloquium talk at University of Pittsburgh, January 17th, 2025.
- “Unboundedness of Pontryagin classes for group actions on \mathbb{R}^n ” in the conference “Algebraic structures in topology”, San Juan, PR, June 5-14, 2024.
- Lecture series on “bounded and unbounded cohomology of diffeomorphism groups”, Korea Institute of Advanced Study, South Korea, May 12-18, 2024.
- Lecture series on Haefliger-Thurston’s conjecture, BF-school, Chuo University, Tokyo, September 2023.
- “Foliation and diffeomorphism groups”, May 5th, 2023, in Washington St Louis
- “Equivariant bordism theory and applications” June 18 - June 23, 2023, in Oaxaca, Mexico.
- The workshop “Recent advances in bounded cohomology”, University of Regensburg, September 26-30, 2022.
- Oberwolfach, Topologie, July 24-30, 2022.
- 36 Summer Topology Conference, the University of Vienna, July 18-22,2022.
- The workshop “The h-principle and beyond” at IAS, Nov 1-5, 2021.
- The VI Congreso Latinoamericano de Matemáticas (CLAM), September 13-17, 2021.

- Colloquium talk on Mather-Thurston's theory via Zoom at Korea Institute of Advanced Study, October 2020.
- Oberwolfach, homotopy theory, August 4-10, 2019.
- Four Manifolds: Confluence of High and Low Dimensions, the Fields Institute, July 8-12, 2019.
- SYM 10 Years Old, University of Copenhagen, June 24-28, 2019.
- On a question of Ghys about bordism of diffeomorphism groups, NRW Topology Meeting, Münster, November 2018.
- On the homology of diffeomorphism groups made discrete. Colloquium talk at Technische Universität München. July 2018.
- On the homology of diffeomorphism groups made discrete, Colloquium talk at University of Hawaii, March 2018.
- Lecture series on flat manifold bundles, BF-school, Chuo University, Tokyo, March 2018.
- Milnor-Friedlander's problem for diffeomorphism groups, Midwest Topology seminar, Notre Dame, February 2017.
- Braid groups and diffeomorphisms of the punctured disks, at CAN workshop on the dynamical system and group actions, UIC, February 2017.
- Invited to give a talk at the "Surface bundle" meeting in Oberwolfach. December 2016.
- On Milnor-Friedlander problem for diffeomorphism group, Lisbon, Michael Weiss birthday conference, June 29, 2016.
- On flat surface bundles, University of California, Berkeley, Diffeomorphism groups workshop, June 2015
- Homological stability of diffeomorphism groups made discrete, Topology Conference on homological stability in Copenhagen, August 2013.

INVITED TALKS

- Zoom talk in International Young Seminar on Bounded Cohomology and Simplicial Volume, June 3rd, 2024.
- Online seminar in Cohomology in algebra, geometry, physics, and statistics at the Institute of Mathematics of the Czech Academy of Sciences, April 26th, 2023.
- Topology seminar at Northeastern University, Feb 7th, 2023.
- Topology and Geometric Group Theory Seminars at the Ohio State University, October 11, 2022.
- Virtual talk at "Geometry and Topology Seminar" at Korea Institute of Advanced Study, Feb 16th, 2022.
- Virtual talk at "Moduli and Friends", the Mathematical Institute of the Romanian Academy, Jan 25th, 2022.
- The virtual topology and dynamics seminar at IPM, Tehran, October 11th, 2021.
- The topology and geometry seminar at the University of Toronto, September 20th, 2021.
- The topology seminar in Copenhagen, June 4th, 2021.
- A new approach to generalized Smale's conjecture, Topology seminar Iowa, March 18th, 2021.

- Thurston's fragmentation, non-abelian Poincare duality, and c-principles, UNAM Mexico, March 4th, 2021.
- Diffeomorphisms of reducible three manifolds and bordism of group actions, Online group actions seminar at KIAS, September 10th, 2020.
- Invariants of flat symplectic surface bundles, Zoomfest, online talk in the Higher school of economics, May 31st.
- Topology seminar, Stockholm University, April 9th, 2020.
- Topology seminar at CUNY, New York, 29th Jan 2020.
- Invariants of flat symplectic surface bundles, University of Rochester, March 1st, 2019.
- Bordism of diffeomorphism groups, University of Chicago, Geometry and Topology Seminar, April 2019.
- Bordism of diffeomorphism groups, Caltech, Geometry and Topology Seminar, April 2019.
- On characteristic classes in symplectic topology, Aberdeen Topology Seminar, October 2018.
- On characteristic classes in symplectic topology, Columbia Symplectic Geometry Seminar, Columbia University, September 2018.
- On the moduli space of flat bundles, CU Topology seminar, Colorado, September 2018.
- On the moduli space of symplectic surface bundles, University of Tokyo, July 2018.
- On characteristic classes of flat surface bundles, Topology Seminar, Free University of Berlin, April 2018.
- On the moduli space of symplectic surface bundles, MIT topology seminar, April 2018.
- A local to global argument on low dimensional manifolds, Topology Seminar, Oklahoma State University, November 2017.
- On characteristic classes of flat surface bundles, Topology Seminar, Minnesota, September 2017.
- A local to global argument on low dimensional manifolds, short talk at UIUC, homotopy theory: tools and applications, July 2017.
- A local to global argument on low dimensional manifolds, at Stanford, May 2017.
- Milnor-Friedlander's problem for diffeomorphism groups, Topology seminar at Purdue, April 2017.
- Milnor-Friedlander's problem for diffeomorphism groups, Geometry and Topology seminar UIC, March 2017.
- Milnor-Friedlander's problem for diffeomorphism groups, University of Chicago, Geometry and Topology seminar, January 2017.
- Milnor-Friedlander's problem for diffeomorphism groups, Ohio State University, Topology seminar, November 15th.
- Milnor-Friedlander's problem for diffeomorphism groups, Northwestern, Topology seminar, October 3rd.
- On the moduli space of flat surface bundles, Regensburg, Topology oberseminar, June 2nd, 2016.

- On the homology of diffeomorphism groups made discrete, Bonn, Topology oberseminar, May 3rd, 2016.
- On the moduli space of flat surface bundles, Copenhagen, Topology seminar, Feb 29th, 2016.
- 1) On discrete surface diffeomorphism groups, 2) Braid groups and diffeomorphism of the punctured disk, two talks at Universite de Nantes, February 2016.
- Moduli space of flat surface bundles, LMU Munich University, Geometry and topology oberseminar, October 2015.
- Characteristic classes of flat surface bundles, Münster, Topology oberseminar, October 2015.
- On characteristic classes of flat manifold bundles, UC Riverside, Winter 2015.
- Homological stability of diffeomorphism groups made discrete, Joint Mathematics Meeting, Winter 2015.
- Homological stability and stable moduli of flat manifold bundles, Topology Seminar in UIUC, Fall 2014.
- On stable moduli space of flat manifold bundles, Topology Seminar in Berkeley, Fall 2014.
- Homological stability of diffeomorphism groups made discrete, Geometry and Topology Seminar, IPM in Tehran, July 2013.
- Topology of conjugate varieties, Young Topologist Seminar, 10min talk in YTM, Copenhagen 2012.

TEACHING EXPERIENCE

- Math 695, Topics course on “Mapping class group”, Purdue University, Spring 2025.
- Math 695, Topics course on “Bounded cohomology”, Purdue University, Fall 2024.
- Math 595, Topics course on “Geometry of characteristic classes”, Purdue University, Spring 2024.
- Math 495-595, Topics course for undergraduate on “From groups to geometry and back”, Purdue University, Fall 2023.
- Math 265, Linear Algebra and its Applications, Purdue University, Fall 2023.
- Math 353, Advanced linear algebra, Purdue University, Spring 2023.
- Math 362, Topics in Multivariable Calculus, Purdue University, Fall 2021.
- Math 490, Collaborative Problem Solving, Purdue University, Spring 2021.
- Math 265, Linear Algebra and its Applications, Purdue University, Fall 2020.
- Algebraic Topology 1.5, University of Copenhagen, Winter 2020.
- Topics in algebraic topology (Diffeomorphism groups and foliations), Northwestern, Spring 2019.
- Math 230, Multivariable Calculus, Northwestern, Winter 2018.
- Math 234, Multivariable integral, Northwestern, Fall 2017.
- Math 224, Integral Calculus, Northwestern, Winter 2016.
- Math 220, One variable calculus, Northwestern, Fall 2016.
- Taught the following courses in the Young Scholar Club (YSC) which is the official olympiad training school in Iran:
 - Probabilistic methods in Combinatorics, Fall 2007.

- Linear Algebra in Combinatorics, Summer 2006.
- Network and Graph Theory, Summer 2005.
- Combinatorial Nullstellensatz, Winter 2005.

SERVICE

- Committee work:
 - Adviser of the Math Club at Purdue, 2023-now.
 - Undergraduate committee, Fall 2024-now.
- Panel:
 - Serving on the Geometry and Topology panel of NSF, 2025.
 - Intercollegiate Math Social Panelist at Purdue, March 2025.
- Biweekly colloquium talks at local high schools, with Uli Walther. Fall 2022, Spring 2023, and Fall 2024.
- Co-organizing
 - the conference on “Foliation and Diffeomorphism groups” at CIRM, Dec 9-13, 2024.
 - the geometric topology session in the 57th annual Spring Topology and Dynamics Conference 2024, March 6- 9, 2024.
 - the learning seminar “Groups, Geometry, Topology, Dynamics, and Beyond” with Ben McReynolds and Lvzhou Chen, Spring 2024, Fall 2024.
 - AMS sectional meeting on “Topics in algebraic and geometric topology” at Purdue, March 2022.
 - the topology seminar at Purdue.
 - topology seminar at Northwestern.
 - the Midwest topology seminar at Northwestern, Winter 2018.
 - seminars on Diffeomorphism Groups, Joint with Kathryn Mann in Berkeley, Fall 2014
 - Student Topology Seminar at Stanford University 2014-2015
- Invited to write a survey article on “Foliations and diffeomorphism groups” for *Notices* of AMS.
- Referee work:
 - Reviewer of NSF proposals for Geometric Topology.
 - Reviewer of Simons collaboration grants 2022.
 - Reviewing applications for Cofund MathPhdInFrance, Feb 26-March 2, 2024.
 - Referee for Annals of Mathematics, Advances in Mathematics, G&T, Transaction AMS, AGT, Mathematische Annalen, EMS Surveys, Journal of Topology, Geometriae Dedicata, Annales de l’institut Fourier and Homotopy and related topics.
 - Reviewed papers in MathSciNet and zbMATH.
- Area examiner: Fabio Capovilla-Searle (Purdue 2023), Sarah Anderson (Purdue 2024), Liam Ashton (Purdue 2024).
- REU for Runze Yu from UCLA over the summer of 2022 on PL homeomorphisms. He is now a student at Harvard.

- Ph.D. committee members of Sofia Martínez Alberga (Purdue 2025), Milana D Golich (Purdue 2024), Seongjun Choi (Purdue 2022), Zachary Himes (Purdue, 2022), and Lauren Bandklayder (Northwestern University, 2018).
- TA at the research school organized by MSRI at Tambara Institute.
- Demonstrator in the “Algebraic Topology of Manifolds” summer school at Oxford for the moduli space course. September 2017
- Mentor in Graduate Research Opportunities for Women (GROW), Fall 2017
- Peer observation for teaching in Northwestern, Fall 2016
- Teaching AIME class in communication academy, Cupertino, CA Winter 2015
- Stanford “SUMO” speaker (colloquium talk for undergraduates at Stanford University): *on applications of algebraic topology in combinatorics*.
- Member of the “Karsough” group at Sharif University whose goal was to teach math to underrepresented groups in Iran.
- Observer B in Mathematical olympiad for students in Madrid (IMO 2008), July 2008