

Michael Brandenbursky

PERSONAL DETAILS

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Ben Gurion University, Beer Sheva, 8410501 , Israel
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ACADEMIC APPOINTMENTS

Associated Professor November 2023-present
Ben-Gurion University, Beer Sheva, Israel

Senior Lecturer with tenure May 2018-October 2023
Ben-Gurion University, Beer Sheva, Israel

Senior Lecturer May 2017-April 2018
Ben-Gurion University, Beer Sheva, Israel

Lecturer October 2015 - April 2017
Ben-Gurion University, Beer Sheva, Israel

Researcher, CRM/ISM Fellowship January 2014 - October 2015
CRM, Montreal, Canada

Visiting Professor May 2013 - January 2014
Max Planck Institute for Mathematics, Bonn, Germany

Assistant Professor (NTT) August 2010 - August 2013
Vanderbilt University, Nashville TN, USA

SHORT TERM RESEARCH POSITIONS

- CRM, Canada (July-September 2024)
- University of Regensburg, Germany (July-September 2023)
- University of Regensburg, Germany (July-September 2022)
- CRM, Canada (July-September 2019)
- University of Regensburg, Germany (August-September 2018)
- University of Regensburg, Germany (July-August 2017)
- University of Regensburg, Germany (August-September 2016)
- MFO, Germany (June-July 2015)
- IHES, France (May-June 2015)
- MFO, Germany (June 2014)

- MFO, Germany (April 2013)
- MFO, Germany (June-August 2012)
- University of Aberdeen, UK (May-August 2011)

RESEARCH VISITS

- IMPA, Brazil (April 2024)
- University of Pisa, Italy (April 2024)
- IMPA, Brazil (March 2023)
- IMPA, Brazil (May 2022)
- IMPA, Brazil (March 2022)
- University of Aberdeen, UK (October 2021)
- University of Wroclaw, Poland (September 2021)
- IMPA, Brazil (August 2019)
- University of Ceara, Brazil (June 2019)
- University of Wroclaw, Poland (April 2019)
- University of Ceara, Brazil (February 2019)
- University of Aberdeen, UK (June 2018)
- University of Bochum, Germany (May 2018)
- University of Bonn, Germany (October 2017)
- IMPA, Brazil (September 2017)
- Universidad Nacional de Colombia, Medellin, Colombia (August 2016)
- University of Regensburg, Germany (February 2016)
- IMPA, Brazil (March 2015)
- Seoul National University, South Korea (October 2014)
- University of Nantes, France (November 2013)
- University of Aberdeen, UK (June 2013)
- University of Aberdeen, UK (May 2012)
- University of Chicago, USA (November 2011)
- University of Chicago, USA (April 2011)
- University of Chicago, USA (October 2009)
- MPI, Bonn, Germany (July 2008)

EDUCATION

- Ph.D. in Mathematics** 2006-2010
Technion-Israel Institute of Technology, Haifa, Israel
Supervisors: Prof. Michael Entov and Prof. Michael Polyak
Thesis Title: Knot invariants and their applications
- M.Sc. in Mathematics** 2003-2005
Hebrew University, Jerusalem, Israel
Supervisor: Prof. Emmanuel Farjoun
Thesis Title: Compact Lie groups
- B.A. in Mathematics & Economics** 1999-2003
Hebrew University, Jerusalem, Israel

RESEARCH INTERESTS

Knot theory

Finite-type invariants, concordance group, knot Floer and Khovanov homologies

Symplectic geometry and low-dimensional topology

Groups of symplectic and Hamiltonian diffeomorphisms, Hamiltonian dynamics

Braid groups, mapping class groups, groups of diffeomorphisms

Entropy, quasi-morphisms, group cohomology, norms, metrics, distortion, orders

Geometric group theory

Quasi-isometric embeddings of groups, invariant word metrics

Algebraic geometry

Lipschitz geometry of singularities

GRANTS

- **ISF Individual Research Grant 823/23**, Annual amount: 220,000 NIS (60,000 USD), Total amount: 880,000 NIS (240,000 USD), Period of grant: 2023-2027
- **Co-PI, Leverhulme Trust Grant RPG-2017-159**, Total amount: 232793 GBP, Period of grant: 2017-2021
- **PI, GIF-Young Grant I-2419-304.6/2016**, Total amount: 26000 Euro, Period of grant: 2017
- **PI, ESF Grant #4824**, Total amount: 2000 Euro, Period of grant: 2012

ACADEMIC AWARDS

- **Simons Professorship**, Canada, July 2024-September 2024
- **Humboldt research fellowship**, Germany, May 2021-October 2023
- **Simons CRM Scholar**, Canada, July 2019-September 2019
- **Mittag-Leffler fellowship**, Sweden, November 2015 (declined)

- CRM-ISM fellowship, Canada, January 2014–October 2015
- Oberwolfach Leibniz fellowship (twice), Germany, June–August 2012, April 2013, May 2014, June–July 2015
- Coleman-Cohen fellowship, UK, May–August 2011

OTHER AWARDS

- Second prize, Moscow mathematical Olympiad 1989

PUBLICATIONS

1. Michael Brandenbursky and Michal Marcinkowski. Volume classes in bounded cohomology of transformation groups. *To appear in Glasgow Mathematical Journal*, 2024
2. Michael Brandenbursky and Misha Verbitsky. Non-commutative Barge-Ghys quasimorphisms. *To appear in IMRN*, 2024
3. Michael Brandenbursky and Michael Khanevsky. C^0 -gap between entropy-zero Hamiltonians and autonomous diffeomorphisms of surfaces. *Israel J. Math.*, 255(1):311–324, 2023
4. Lev Birbrair, Michael Brandenbursky, and Andrei Gabrielov. Lipschitz geometry of surface germs in \mathbb{R}^4 : metric knots. *Selecta Math. (N.S.)*, 29(3):Paper No. 43, 20, 2023
5. Michael Brandenbursky, Michał Marcinkowski, and Egor Shelukhin. The Schwarz-Milnor lemma for braids and area-preserving diffeomorphisms. *Selecta Math. (N.S.)*, 28(4):Paper No. 74, 20, 2022
6. Michael Brandenbursky and Michał Marcinkowski. Bounded cohomology of transformation groups. *Math. Ann.*, 382(3-4):1181–1197, 2022
7. Michael Brandenbursky and Jarek Kędra. Fragmentation norm and relative quasimorphisms. *Proc. Amer. Math. Soc.*, 150(10):4519–4531, 2022
8. Michael Brandenbursky and Egor Shelukhin. On the entropy norm on $\text{Ham}(S^2)$. *Ann. Math. Qué.*, 45(1):231–237, 2021
9. Michael Brandenbursky and Arpan Kabiraj. On the entropy norm on the group of diffeomorphisms of closed oriented surface. *J. Topol. Anal.*, 12(1):105–111, 2020
10. Michael Brandenbursky and Michał Marcinkowski. Entropy and quasimorphisms. *J. Mod. Dyn.*, 15:143–163, 2019
11. Michael Brandenbursky and Michał Marcinkowski. Aut-invariant norms and Aut-invariant quasimorphisms on free and surface groups. *Comment. Math. Helv.*, 94(4):661–687, 2019
12. Michael Brandenbursky, Jarek Kedra, and Egor Shelukhin. On the autonomous norm on the group of Hamiltonian diffeomorphisms of the torus. *Commun. Contemp. Math.*, 20(2):1750042, 27, 2018
13. Michael Brandenbursky and Egor Shelukhin. The L^p -diameter of the group of area-preserving diffeomorphisms of S^2 . *Geom. Topol.*, 21(6):3785–3810, 2017

14. Michael Brandenbursky and Jarek Kędra. The autonomous norm on $Ham(\mathbf{R}^{2n})$ is bounded. *Ann. Math. Québec*, 41:63–65, 2017
15. Michael Brandenbursky. Concordance of certain 3-braids and Gauss diagrams. *Topology Appl.*, 214:180–185, 2016
16. Michael Brandenbursky, Światosław R. Gal, Jarek Kędra, and Michał Marcinkowski. The cancellation norm and the geometry of bi-invariant word metrics. *Glasg. Math. J.*, 58(1):153–176, 2016
17. Michael Brandenbursky and Egor Shelukhin. On the L^p -geometry of autonomous Hamiltonian diffeomorphisms of surfaces. *Math. Res. Lett.*, 22(5):1275–1294, 2015
18. Michael Brandenbursky and Jarek Kędra. Concordance group and stable commutator length in braid groups. *Algebr. Geom. Topol.*, 15(5):2861–2886, 2015
19. Michael Brandenbursky. Bi-invariant metrics and quasi-morphisms on groups of Hamiltonian diffeomorphisms of surfaces. *Internat. J. Math.*, 26(9):1550066, 29 pages, 2015
20. Michael Brandenbursky. Link invariants via counting surfaces. *Geom. Dedicata*, 173:243–270, 2014
21. Michael Brandenbursky. Coloring link diagrams and Conway-type polynomial of braids. *Topology Appl.*, 161:141–158, 2014
22. Michael Brandenbursky and Jarek Kedra. Quasi-isometric embeddings into diffeomorphism groups. *Groups Geom. Dyn.*, 7(3):523–534, 2013
23. Michael Brandenbursky. Invariants of closed braids via counting surfaces. *J. Knot Theory Ramifications*, 22(3):1350011, 21 pages, 2013
24. Michael Brandenbursky and Jarek Kedra. On the autonomous metric on the group of area-preserving diffeomorphisms of the 2-disc. *Algebr. Geom. Topol.*, 13(2):795–816, 2013
25. Michael Brandenbursky. Quasi-morphisms and L^p -metrics on groups of volume-preserving diffeomorphisms. *J. Topol. Anal.*, 4(2):255–270, 2012
26. Michael Brandenbursky. On quasi-morphisms from knot and braid invariants. *J. Knot Theory Ramifications*, 20(10):1397–1417, 2011

Papers in conference proceedings

1. Michael Brandenbursky and Egor Shelukhin. On the large scale geometry of the L^p -metric on the symplectomorphism group of the two-sphere. *IHES Preprints*, IHES/M/15/09
2. Michael Brandenbursky. On the autonomous metric on groups of Hamiltonian diffeomorphisms of closed hyperbolic surfaces. *Oberwolfach Preprints*, OWP 2013-18

TEACHING EXPERIENCE

Instructor, Ben-Gurion University

- Multi-variable calculus for CS , BGU, Fall 2023
- Single-variable calculus for electrical engineering, BGU, Fall 2023
- Multi-variable calculus for CS, BGU, Spring 2023

- Single-variable calculus for electrical engineering, Fall 2022
- Multi-variable calculus for CS, Fall 2022.
- Single-variable calculus for electrical engineering, Fall 2021
- Single-variable calculus for CS, Summer 2021
- Topics in geometry and topology, Fall 2020
- Single-variable calculus for electrical engineering, Fall 2020
- Single-variable calculus for electrical engineering, Fall 2019
- Workshop for math majors, Fall 2019
- Reading course on "Cohomology theories", Spring 2019
- Single-variable calculus for electrical engineering, Fall 2018
- Workshop for math majors, Fall 2018
- Topics in geometry and topology, Fall 2017
- Single-variable calculus for electrical engineering, Fall 2017
- Differential geometry, Spring 2017
- Single-variable calculus for electrical engineering, Fall 2016
- Linear algebra for mechanical engineering, Fall 2016
- Multi-variable calculus for mechanical engineering, Spring 2016
- Algebraic structures, Fall 2015

Instructor, McGill University

- Linear algebra and geometry, Fall 2014
- Multi-variable calculus 3, Fall 2014
- Single-variable calculus 2, Fall and Summer 2014

Instructor, Vanderbilt University

- Single-variable calculus, Fall 2011 and Spring 2012
- Multi-variable calculus, Spring 2011 and Spring 2013
- Advanced multi-variable calculus, Fall 2012

SUPERVISION OF POSTDOCTORAL FELLOWS

- Dr. Arpan Kabiraj, 2017-2018
- Dr. Michal Marcinkowski, 2017

M.SC. STUDENTS

- Amit Levinson-Sela, 2023-present
- Lior Menashe, 2023-present
- Rishi Kumar, 2019-2020

LECTURE SERIES

- **Quasi-morphisms and bi-invariant metrics in algebra and geometry**-3 lectures, Sde Boker, Israel, February 2019
- **Entropy, metrics and quasi-morphisms**-3 lectures, Aberdeen University, UK, June 2018
- **Knots, braids and quasi-morphisms**-3 lectures, University of Regensburg, Germany, July 2017
- **Quasi-morphisms in algebra and geometry**-3 lectures, McGill University, Canada, March 2015
- **Quasi-morphisms and applications**-3 lectures, Seoul National University, South Korea, October 2014

TALKS IN CONFERENCES AND COLLOQUIUMS

- Colloquium, Hebrew University, Israel, May 2024
- Colloquium, Tel Aviv University, Israel, May 2024
- Conservative Dynamics and Symplectic Geometry, Brazil, August 2023
- Geometry and Singularities, Poland, July 2023
- Colloquium, Technion, Israel, May 2023
- DMV meeting, Germany, September 2022
- 36th Summer Topology Conference, Austria, July 2022
- Workshop on Symplectic Dynamics, Portugal, June 2022
- IMU meeting, Israel, July 2021
- Spring Topology and Dynamics Conference, USA, May 2021
- Simplicial volumes and bounded cohomology, Germany, September 2020
- Manifolds and groups, Germany, February 2020
- Conservative Dynamics and Symplectic Geometry, Brazil, August 2019
- Cohomological methods, Poland, April 2019
- IMU-PMS Meeting, Poland, September 2018
- Bochum-Cologne-Munster seminar, Germany, May 2018

- Colloquium, Hebrew University, Israel, November 2017
- IMU Meeting, Israel, May 2017
- Colloquium, Universidad Nacional de Colombia, Medellin, August 2016
- Colloquium, Universidad de los Andes, Colombia, August 2016
- Encuentro de Topologia, Geometria y Teoria de Representaciones, Colombia, July 2016
- Joint International Meeting of MMS and IMU, Mexico, September 2015
- Joint International Meeting of AMS and IMU, Israel, June 2014
- Algebraic Structures in Low-dimensional Topology, Germany, May 2014
- AMS Sectional Meeting, USA, March 2014
- Colloquium, University of Hawaii, USA, February 2014
- Colloquium, University of Iowa, USA, January 2014
- Colloquium, University of Haifa, Israel, December 2013
- Colloquium, Ben-Gurion University, Israel, December 2013
- Colloquium, University of Cologne, Germany, November 2013
- Colloquium, Gottingen University, Germany, November 2013
- Colloquium, Groningen University, Netherlands, September 2013
- Knots, Manifolds, and Group Actions, Poland, September 2013.
- Rolfsenfest-Low Dimensional Topology, Knots, and Orderable Groups, CIRM, France, July 2013
- Colloquium, Heriot-Watt University, UK, May 2013
- Mapping Class Groups and Categorification, Canada, April 2013
- Colloquium, University of Manitoba, Canada, February 2013
- Geometric Groups on the Gulf Coast, USA, April 2012
- Spring Topology and Dynamics Conference, Mexico, March 2012
- Knots in Washington, USA, December 2011
- Research School and Workshop on Braids, Vietnam, January 2011
- Knots in Washington, USA, December 2010
- Geometric Group Theory, Hyperbolic Dynamics and Symplectic Geometry, Germany, July 2010
- Summer school on link homology, France, July 2009

TALKS IN SEMINARS

- University of Pisa, Italy, April 2024
- University of Regensburg, Germany, July 2022
- Tel Aviv University, Israel, April 2022
- IMPA, Brazil, March 2022
- Aberdeen University, UK, October 2021
- Wroclaw University, Poland, September 2021
- University of Regensburg, Germany, June 2021
- University of Illinois at Chicago, USA, September 2019
- University of Toronto, Canada, September 2019
- McGill University, Canada, September 2019
- UQAM, Canada, September 2019
- University of Ceara, Brazil, June 2019
- Wroclaw University, Poland, April 2019
- Tel Aviv University, Israel, March 2019
- Aberdeen University, UK, June 2018
- Tel Aviv University, Israel, May 2018
- Technion, Israel, December 2017
- BGU, Israel, November 2017
- IMPA, Brazil, September 2017
- University of Haifa, Israel, June 2017
- University of Regensburg, Germany, September 2016
- Tel Aviv University, Israel, April 2016
- Technion, Israel, November 2015
- Lille University, France, May 2015
- MIT, USA, May 2015
- Tulane University, USA, April 2015
- IMPA, Brazil, March 2015
- McGill University, Canada, November 2014 and February 2014
- CAIST, South Korea, October 2014
- Syracuse University, USA, April 2014

- Universite du Quebec a Montreal, Canada, mini-course, March 2014
- Universite de Montreal, March 2014
- MPIM, Bonn, January 2014
- University of Nantes, France, mini-course, November 2013
- Universite Paris 7, France, November 2013
- University of Cologne, Germany, October 2013
- University of Virginia, USA, April 2013
- University of Haifa, Israel, December 2012 and May 2012
- Universite du Quebec a Montreal, Canada, November 2012
- University of Illinois at Chicago, USA, October 2012 and October 2009
- Vanderbilt University, USA, October 2012, September 2011 and September 2010
- Aberdeen University, UK, May 2012
- Hebrew University, Israel, May 2012
- University of Chicago, USA, November 2011, April 2011 and October 2009
- Vanderbilt University, USA, mini-course, October 2011
- Caltech, USA, October 2009
- University of Indiana at Bloomington, USA, October 2009
- Columbia University, USA, October 2009
- SUNY at Stony Brook, USA, September 2009
- Technion, Israel, mini-course, July 2008

ORGANIZATION OF CONFERENCES

- Workshop on Complex and Symplectic geometry, BGU, May 2018
- Geometry and Topology section of the Israeli Mathematical Union annual meeting, June 2016

ACADEMIC SERVICES

- Member of BGU Senate, 2022-2024
- Member of departmental prize committee, 2020-2021
- Member of departmental hiring committee, 2018-2019
- Colloquium organizer in BGU, 2017-present
- Organization of Geometry and Topology section of the Israeli Mathematical Union annual meeting, June 2016

- Member of Israeli mathematical union, 2015-present
- Ph.D. proposal evaluation of Mr. Adi Dikovsky-Tel Aviv University, May 2022
- Ph.D. thesis evaluation of Mr. Roque Marqueza-doctoral student at Cinvestav, Mexico, November 2017
- M.Sc. thesis evaluation of Mr. Leonid Vishnevsky-Tel Aviv University, December 2021
- Referee for JEMS, Geometry & Topology, International Journal of Algebra and Computation, Journal of Topology and Analysis, Annales mathématiques du Québec, Journal of Modern Dynamics, International Journal of Mathematics, Forum Mathematicum, Journal of Symplectic Geometry, Communications in Contemporary Mathematics, Proceedings of AMS, Boletín de la Sociedad Matemática Mexicana, 2012-present

MISCELLANEOUS

- **Languages:** Russian (Native), Hebrew (Native), English (fluent), Spanish (fluent), Portuguese (basic), German (basic)