Mathematics & Statistics
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Hans U. Boden

Research Interests

Gauge theory; low-dimensional topology; invariants of knots, links, and 3-manifolds; character varieties; moduli spaces of holomorphic bundles

Employment

2006 – **Professor**, *McMaster University*, Hamilton, Ontario Canada.

2009 – 2018 **Chair**, *Mathematics & Statistics, McMaster University*, Hamilton, Ontario Canada.
Introduced new undergraduate and graduate programs: *Honours Program in Actuarial and Financial Mathematics*, *Professional Masters in Financial Mathematics (M-Phimac),* and *Ph.D. in Statistics*

2000 – 2006 **Associate Professor**, *McMaster University*, Hamilton, Ontario Canada.

2000 – 2001 **Associate Professor**, *Ohio State University*, Mansfield, Ohio USA.

1997 – 2000 **Assistant Professor**, *Ohio State University*, Mansfield, Ohio USA.

1995 – 1997 **Postdoctoral Fellow**, *McMaster University*, Hamilton, Ontario Canada.

1993 – 1995 **Research Mathematician**, *Max Planck Institute for Mathematics*, Bonn, Germany.

1990 – 1993 **Assistant Professor**, *University of Michigan*, Ann Arbor, Michigan USA.

Visiting Positions

5/23–6/2023 **Visiting Researcher**, *School of Mathematics and Statistics, University of Sydney*, Australia.

5/22–6/2022 **International Visitor**, *Mathematical Research Institute, University of Sydney*, Australia.

7/14–6/2015 **Visiting Mathematician**, *Fields Institute*, Toronto, Canada.

1/12–6/2012 **Visiting Researcher**, *Max Planck Institute for Mathematics*, Bonn, Germany.

7/2006 **Participant**, *Park City Mathematics Institute*, Park City, Utah USA.

4/05–6/2005 **Visiting Researcher**, *Max Planck Institute for Mathematics*, Bonn, Germany.

9/04–4/2005 **Visiting Mathematician**, *Fields Institute*, Toronto, Canada.

6/02–7/2002 **Visiting Researcher**, *Max Planck Institute for Mathematics*, Bonn, Germany.

5/01–7/2001 **Visitor**, *Institut des Hautes Études Scientifiques*, Bures-sur-Yvette, France.

9/98–12/1998 **Visiting Professor**, *Indiana University*, Bloomington, Indiana USA.

7/1994 **Participant**, *Park City Mathematics Institute*, Park City, Utah USA.

4/1994 **Visitor**, *Institut des Hautes Études Scientifiques*, Bures-sur-Yvette, France.

Education

1991 **PhD Mathematics**, *Brandeis University*.
Thesis: *Representations of orbifold groups and parabolic bundles*
Advisor: *Daniel Ruberman*

1984 **BS Mathematics**, *University of New Hampshire*.

Grants & Awards

2001 – **Discovery Grant**, *Knot theory and low-dimensional topology*, Natural Sciences and Engineering Research Council of Canada, Ottawa, Canada.

2003 – 2005 **Infrastructure Grant**, *Computational algebra in logic and geometry*, Canada Foundation for Innovation/Ontario Innovation Trust, Ottawa, Canada.

1999 – 2001 **Research Grant**, *Moduli spaces, SU(n) gauge theory and 3-dimensional topology*, National Science Foundation, Washington DC, United States.

Books Edited

3. ***Gauge Theory and Low-Dimensional Topology: Progress and Interactions,*** Edited by J. A. Baldwin, H. U. Boden, J. Etnyre, and L. Watson, Open Book Series **5**, Mathematical Sciences Publishers, 2022
2. ***Chern Simons Gauge Theory: 20 Years After,*** Edited by J. E. Anderson, H. U. Boden, A. Hahn, and B. Himpel, AMS/IP Studies in Advanced Mathematics **50**, American Mathematical Society & International Press, 2011
1. ***Geometry and Topology of Manifolds,*** Edited by H. U. Boden, I. Hambleton, A. J. Nicas and B. D. Park, Fields Institute Communications **47**, American Mathematical Society, 2005

Preprints

50. ***Mutation, surface graphs, and alternating links in surfaces,*** H. U. Boden, Z. Dancso, **D. Lin**[1], and T. Wilkinson-Finch, 2023 preprint, under submission, ArXiv 2306.08971
49. ***Mock Seifert matrices and unoriented algebraic concordance,*** H. U. Boden and **H. Karimi**, 2023 preprint, under submission, ArXiv 2301.05946
48. ***Examples of homology 3-spheres whose Chern-Simons function is not Morse-Bott,*** H. U. Boden, C. Herald, and P. Kirk, 2023 preprint, under submission, ArXiv 2301.03676
47. ***On knots that divide ribbon knotted surfaces,*** H. U. Boden, **C. Elmacioglu** , **A. Guha**, **H. Karimi**, **W. Rushworth**, **Y. Tang**, **B. Wang Peng Jun**, 2022 preprint, under submission, ArXiv 2209.15577

Publications

46. ***Concordance invariants of null-homologous knots in thickened surfaces,*** H. U. Boden and **H. Karimi**, 2021 preprint, ArXiv 2111.07409 Accepted in final form, Communications in Analysis and Geometry
45. ***Adequate links in thickened surfaces and the generalized Tait conjectures,*** H. U. Boden, **H. Karimi** and A. Sikora, Algebraic and Geometric Topology **23** (2023), no. 5, 2271–2380
44. ***A characterization of alternating links in thickened surfaces,*** H. U. Boden and **H. Karimi**, Proceedings of the Royal Society Edinburgh Section A **153** (2023), no. 1, 177–195
43. ***Braid representatives minimizing the number of simple walks,*** H. U. Boden and **M. Shimoda**, Ars Mathematica Contemporanea **23** (2023), no. 1, paper no. 10, 27 pp.
42. ***The Gordon-Litherland pairing for links in thickened surfaces,*** H. U. Boden, M. Chrisman, and **H. Karimi**, International Journal of Mathematics **33** (2022), no. 10-11, paper no. 225078, 47 pp.
41. ***Classical results for alternating virtual links***, H. U. Boden and **H. Karimi**, New York Journal of Mathematics **28** (2022) 1372–1398.
40. ***The Jones-Krushkal polynomial and minimal diagrams of surface links,*** H. U. Boden and **H. Karimi**, Annales de l'Institut Fourier (Grenoble) **72** (2022), no. 4, 1437–1475.
39. ***Virtual concordance and the generalized Alexander polynomial,*** H. U. Boden and M. Chrisman, Journal of Knot Theory and Its Ramifications **30** (2021), no. 5, paper no. 2150030, 35 pp.
38. ***Minimal crossing diagrams have minimal supporting genus,*** H. U. Boden and **W. Rushworth**, Bulletin of the London Mathematical Society **53** (2021), no. 4, 1174–1184
37. ***Generalized Fishburn numbers and torus knots,*** **C. Bijaoui**, H. U. Boden, **B. Myers**, R. Osburn, **W. Rushworth**, **A. Tronsgard**, **S. Zhou**, Journal of Combinatorial Theory, Series A **178** (2021), paper no. 105355, 15 pp.
36. ***Signature and concordance of virtual knots,*** H. U. Boden, M. Chrisman, and **R. Gaudreau**, Indiana University Mathematics Journal **69** (2020), no. 7, 2395–2459

[1]Names of (co-)supervised student and postdoc coauthors are in boldface

35. ***Virtual and welded periods of classical knots,*** H. U. Boden and A. J. Nicas, Breadth in Topology, 29–42, Proceedings of Symposia in Pure Mathematics **102**, American Mathematical Society, Providence, RI, 2019
34. ***Virtual knot cobordism and bounding the slice genus,*** H. U. Boden, M. Chrisman, and **R. Gaudreau**, Experimental Mathematics **28** (2019), no. 4, 475–491
33. ***Alexander invariants of periodic virtual knots,*** H. U. Boden, A. J. Nicas, and **L. White**, Dissertationes Mathematicae **530** (2018) 1–59
32. ***Concordance group of virtual knots,*** H. U. Boden and **M. Nagel**, Proceedings of the American Mathematical Society **145** (2017), no. 12, 5451–5461
31. ***Virtual knot groups and almost classical knots,*** H. U. Boden, **R. Gaudreau**, **E. Harper**, A. J. Nicas, and **L. White**, Fundamenta Mathematicae **138** (2017), no. 2, 101–142
30. ***The SU(2) Casson-Lin invariant of the Hopf link,*** H. U. Boden and C. M. Herald, Pacific Journal of Mathematics **285** (2016), no. 2, 283–288
29. ***The SU(N) Casson-Lin invariants for links,*** H. U. Boden and **E. Harper**, Pacific Journal of Mathematics **285** (2016), no. 2, 257–282
28. ***The SL(2,C) Casson invariant for knots and the $\widehat{A}$-polynomial,*** H. U. Boden and C. L. Curtis, Canadian Journal of Mathematics **68** (2016), no. 1, 3–23
27. ***Alexander invariants for virtual knots,*** H. U. Boden, **E. Dies**, **A. I. Gaudreau**, **A. Gerlings**, **E. Harper**, and A. J. Nicas, Journal of Knot Theory and Its Ramifications, **24** (2015), no. 3, paper no. 1550009, 62 pp.
26. ***Bridge numbers for virtual and welded knots,*** H. U. Boden and **A. I. Gaudreau**, Journal of Knot Theory and Its Ramifications, **24** (2015), no. 2, paper no. 1550008, 15 pp.
25. ***Metabelian SL(n,C) representations of knot groups IV: twisted Alexander polynomials,*** H. U. Boden and S. Friedl, Mathematical Proceedings of the Cambridge Philosophical Society **156** (2014), no. 1, 81–97
24. ***Metabelian SL(n,C) representations of knot groups III: deformations,*** H. U. Boden and S. Friedl, Quarterly Journal of Mathematics **65** (2014), no. 3, 817–840
23. ***Nontriviality of the M-degree of the A-polynomial,*** H. U. Boden, Proceedings of the American Mathematical Society **142** (2014), no. 6, 2173–2177
22. ***The SL(2,C) Casson invariant for Dehn surgeries on two-bridge knots,*** H. U. Boden and C. Curtis, Algebraic and Geometric Topology **12** (2012), no. 4, 2095–2126
21. ***Metabelian SL(n,C) representations of knot groups II: fixed points,*** H. U. Boden and S. Friedl, Pacific Journal of Mathematics **249** (2011), no. 1, 1–10
20. ***Splitting the spectral flow and the SU(3) Casson invariant for spliced sums,*** H. U. Boden and B. Himpel, Algebraic and Geometric Topology **9** (2009), no. 2, 865–902
19. ***Metabelian SL(n,C) representations of knot groups,*** H. U. Boden and S. Friedl, Pacific Journal of Mathematics **238** (2008), no. 1, 7–25
18. ***Splicing and the $SL_2(C)$ Casson invariant,*** H. U. Boden and C. L. Curtis, Proceedings of the American Mathematical Society **136** (2008), no. 7, 2615–2623
17. ***The $SL_2(C)$ Casson invariant for Seifert fibered homology spheres and surgeries on twist knots,*** H. U. Boden and C. L. Curtis, Journal of Knot Theory and Its Ramifications **15** (2006), no. 7, 813–837
16. ***The integer valued SU(3) Casson invariant for Brieskorn spheres,*** H. U. Boden, C. M. Herald and P. A. Kirk, Journal of Differential Geometry **71** (2005), no. 1, 23–83
15. ***The Calderón Projector for the Odd Signature Operator and Spectral Flow Calculations in 3-Dimensional Topology,*** H. U. Boden, C. M. Herald and P. Kirk, Contemporary Mathematics **366** (2005) 125–150
14. ***On the integer valued SU(3) Casson invariant,*** H. U. Boden, C. Herald and P. Kirk, 2001 Georgia International Topology Conference, AMS Proceedings of Symposia in Pure Mathematics **71** (2003) 209–236
13. ***The SU(3) Casson invariant for 3-Manifolds split along a 2-sphere or a 2-torus,*** H. U. Boden and C. Herald, Topology and Its Applications **124** (2002), no. 2, 187–204

12. ***An integer valued SU(3) Casson invariant,*** H. U. Boden, C. Herald and P. Kirk, Mathematical Research Letters **8** (2001), no. 5-6, 589–603
11. ***Gauge theoretic invariants of Dehn surgeries on knots,*** H. U. Boden, C. Herald, P. Kirk, and E. Klassen, Geometry and Topology **5** (2001) 143–226
10. ***Universal formulae for SU(n) Casson invariants of knots,*** H. U. Boden and A. Nicas, Transactions of the American Mathematical Society **352** (2000), no. 7, 3149–3187
9. ***A connected sum formula for the SU(3) Casson invariant,*** H. U. Boden and C. Herald, Journal of Differential Geometry **53** (1999), no. 3, 443–464
8. ***Rationality of moduli spaces of parabolic bundles,*** H. U. Boden and K. Yokogawa, Journal of the London Mathematical Society (2) **59** (1999), no. 2, 461–478
7. ***The SU(3) Casson invariant for integral homology 3-spheres,*** H. U. Boden and C. Herald, Journal of Differential Geometry **50** (1998), no. 1, 147–206
6. ***Invariants of fibred knots from moduli,*** H. U. Boden, in Geometric Topology, Ed. W. Kazez, AMS/IP Studies in Advanced Mathematics, vol. 2, (1997) 259–267
5. ***Integrality of the averaged Jones polynomial of algebraically split links,*** H. U. Boden, Journal of Knot Theory and Its Ramifications **6** (1997), no. 3, 303–307
4. ***Moduli spaces of parabolic Higgs bundles and parabolic K(D) pairs over smooth curves,*** H. U. Boden and K. Yokogawa, International Journal of Mathematics **7** (1996), no. 5, 573–598
3. ***Variations of moduli of parabolic bundles,*** H. U. Boden and Y. Hu, Mathematische Annalen **301** (1995), no. 3, 539–559
2. ***Unitary representations of Brieskorn spheres,*** H. U. Boden, Duke Mathematical Journal **75** (1994), no. 1, 193–220
1. ***Representations of orbifold groups and parabolic bundles,*** H. U. Boden, Commentarii Mathematici Helvetici **66** (1991), no. 3, 389–447

Supervision

Doctoral Students

2023 **Jie Chen,** PhD thesis: *Flat Knots and Invariants*
2018 **Homayun Karimi,** PhD thesis: *Alternating Virtual Knots*
2016 **Lindsay White,** PhD thesis: *Alexander Invariants of Periodic Virtual Knots*
2011 **George Dragomir,** PhD thesis: *Closed Geodesics on Compact Developable Orbifolds*

Masters Students

2021 **Lindsay White,** MSc thesis: *A Privacy Score for Anonymous Databases*
2019 **Jie Chen,** MSc thesis: *Unknotting Operations for Classical, Virtual and Welded Knots*
2016 **Robin Gaudreau,** MSc thesis: *Parities of Virtual Braids and String Links*
2014 **Chris Gatopoulos,** MSc thesis: *Braid Group Cryptography*
2013 **Homayun Karimi,** MSc thesis: *The Ribbon-Slice Conjecture*
2012 **Chris Henry,** MSc thesis: *The (Nested) Word Problem*
2011 **Michael Parchimowicz,** MSc thesis: *An Examination of Four Knot Classes*
2010 **Lokman Tsui,** MSc thesis: *Chern-Simons Gauge Theory and the Jones Polynomial*
2006 **David Lorne,** MSc project: *Jones Polynomial, Knot Cohomology and Torus Knots*
2005 **George Dragomir,** MSc thesis: *Orbifolds of Nonpositive Curvature and Their Loop Space*
2003 **Richard Smeltzer,** MSc thesis: *Linear Representations of Braid Groups*

Undergraduate Students

2023 **Jessie Meanwell,** USRA project: *Groups Acting on Trees*
2022 **Ceyhun Elmacioglu,** FUSRP (Fields): *Knot Theory in Four Dimensions*
2022 **Anshul Guha,** FUSRP (Fields): *Knot Theory in Four Dimensions*
2022 **Yun-chi Tang,** FUSRP (Fields): *Knot Theory in Four Dimensions*
2022 **Bryan Wang Peng Ju,** FUSRP (Fields): *Knot Theory in Four Dimensions*
2021 **Matthew Shimoda,** Stewart award: *Simple Walks and the Colored Jones Polynomial*

2020 **Matthew Shimoda,** USRA project: *Knots and Quantum Topology*
2020 **Matthew How-Chun-Lun,** Stewart award: *Algebraic and Geometric Topology*
2020 **Johanna Schwartzentruber,** Honours thesis: *To Four Colours and Beyond*
2020 **Ke Liang Xiao,** Honours thesis: *Morse Theory and Applications*
2019 **Colin Bijaoui,** FUSRP (Fields): *Quantum Invariants of Knots and Modularity*
2019 **Beckham Myers,** FUSRP (Fields): *Quantum Invariants of Knots and Modularity*
2019 **Aaron Tronsgard,** FUSRP (Fields): *Quantum Invariants of Knots and Modularity*
2019 **Shaoyang Zhou,** FUSRP (Fields): *Quantum Invariants of Knots and Modularity*
2018 **Jiakai Li,** Research project: *Yang Mills Equations on Riemann Surfaces*
2018 **Colin Bijaoui,** USRA project: *Invariants of Virtual Knot Concordance*
2018 **Marco Handa,** USRA project: *Invariants of Virtual Knot Concordance*
2017 **Matthew Jordan,** Research project: *Mathematics of cognition*
2016 **Guillian Ballisi,** USRA project: *Geometry of Infinite Groups*
2014 **Anne Isabel Gaudreau,** Research project: *Invariants of Almost Classical Knots*
2014 **Emily Dies,** USRA project: *Invariants of Welded Knots*
2014 **Ervin Thiagalingam,** USRA project: *Algebraic Curves and Knot Theory*
2014 **Jamal Kawach,** Honours thesis: *Khovanov Homology, Slice Invariants, and Exotic* $\mathbb{R}^4$
2013 **Emily Dies,** USRA project: *The Virtual and Welded Braid Groups*
2013 **Anne Isabel Gaudreau,** USRA project: *Alexander Invariants of Virtual Knots*
2013 **Adam Gerlings,** USRA project: *Alexander Invariants of Virtual Knots*
2011 **Christopher Lam,** USRA project: *The Volume Conjecture*
2010 **Vanessa Foster,** USRA project: *Knots, Links, and Braids*
2009 **Chris Henry,** USRA project: *Research in Geometric Group Theory*
2008 **Chris Henry,** USRA project: *Groups via Topology, Combinatorics, and Geometry*
2007 **Sylvia Andreae,** ArtSci thesis: *Explorations in Braid Theory*
2007 **Chris Henry,** USRA project: *Automatic Structures and Combinatorial Group Theory*
2006 **Steffen Marcus,** ArtSci thesis: *Mathematical Logic and Point-Set Topology*
2006 **Steffen Marcus,** USRA project: *Algebraic Curves and Algebraic Geometry*

Doctoral Examining Committees

2018 **Michael Clemens,** *Framing Nature and Nation: The Environmental Cinema of the National Film Board, 1939–1974*, McMaster University

2016 **Lauren DeDieu,** *Newton-Okounkov Bodies of Bott-Samelson and Peterson Varieties*, McMaster University

2015 **Oleg Chterental,** *Virtual Braids and Virtual Curve Diagrams*, University of Toronto

2013 **Nima Anvari,** *Equivariant Gauge Theory and Four-Manifolds*, McMaster University

2012 **Reza Taleb,** *Equivariant Iwasawa theory and the Coates-Sinnott Conjecture*, McMaster University

2009 **Liam Watson,** *Involutions on 3-manifolds and Khovanov homology*, Université du Québec à Montréal

2007 **Jian Xu,** *Mei – A Module System for Mechanized Mathematics*, McMaster University

Postdoctoral Fellows

Homayun Karimi
William Rushworth
Eric Harper
Ben Mares
Hee Jung Kim
Tolga Etgü
Brendan Owens
Sašo Strle
Bruno Roso
George Dragomir
Matthias Nagel
David Duncan
Prayat Poudel
Jonathan Yazinski
Tom Klein
Ke Zhu
Kürşat Sözer
Alyson Hildum
Özgün Ünlü
Eduardo Martinez Pedroza
Martin Niepel
Jaime Cuadros
Vincent Bonini
Brad Safnuk

Doctoral Supervisory Committee

Subhajit Mishra	**Lauren DeDieu**	**Mehmetcik Pamuk**
Nima Anvari	**Semra Pamuk**	**Lucian Savin**

Masters Examining Committee

Nima Anvari	**Praphat Fernandes**	**Darren Gray**
Nathan Heisz	**Piotr Jagiello**	**Carolyn Junkins**
Qun Li	**Qiuping Lu**	**Wangshan Lu**
Ami Mamolo		

Conference Organization (since 2017)

12/2022 *Low-dimensional topology,* 2022 Winter Meeting of the CMS, Toronto, Ontario

3/2022 *Interactions of Gauge Theory with Contact and Symplectic Topology,* Banff International Research Station, Banff, Alberta

11/2020 *Workshop on Link Homology and Concordance,* Fields Institute, Toronto, Ontario

6/2020 *Interactions of Gauge Theory with Contact and Symplectic Topology,* Banff International Research Station, Banff, Alberta

12/2019 *Topology,* 2019 Winter Meeting of the CMS, Toronto, Ontario

9/2017 *Infinite Groups and Geometric Structures,* 1132nd Meeting of the AMS, University of Buffalo, Buffalo, NY USA

Invited Conference Talks (since 2017)

9/2023 *From classical to quantum low-dimensional topology,* Fall Eastern Sectional AMS Meeting, University of Buffalo, Buffalo, NY USA

9/2023 *Gauge theory and low-dimensional topology,* Fall Eastern Sectional AMS Meeting, University of Buffalo, Buffalo, NY USA

5/2022 *Q-series, Number Theory and Quantum Topology,* AMS Spring Western Virtual Sectional Meeting, University of Denver, Denver, Co USA

7/2021 *Knots, surfaces, and 3-manifolds,* Mathematical Congress of the Americas, Buenos Aires, Argentina

6/2021 *Low-dimensional topology,* 2021 Summer Meeting of the CMS, Ottawa, Ontario

~~4/2020 *Knots and Links in 3-Manifolds,* 1157th Meeting of the AMS, Purdue University, West Lafayette, IN USA~~

11/2019 *Unifying 4-dimensional knot theory,* Banff International Research Station, Banff, Alberta

3/2019 *International conference on Graph Theory and Combinatorics,* Beijing Jiaotong University, Beijing, China

12/2018 *Topology,* 2018 Winter Meeting of the CMS, Vancouver, British Columbia

3/2018 *Algebraic, Combinatorial, and Quantum Invariants of Knots and Manifolds,* 1136th Meeting of the AMS, Ohio State University, Columbus, OH USA

2/2018 *CNRS–McMaster Joint Workshop,* McMaster Innovation Park, Hamilton, Ontario

12/2017 *Low dimensional topology and geometric group theory,* 2017 Winter Meeting of the CMS, Waterloo, Ontario

9/2017 *Knots, 3-manifolds and their invariants,* 1132nd Meeting of the AMS, University of Buffalo, Buffalo, NY USA

8/2017 *Low-dimensional topology and gauge theory,* Casa Matemática Oaxaca (CMO), Oaxaca, Mexico

7/2017 *Interactions between geometric group theory, topology and geometry, and dynamics,* Mathematical Congress of the Americas 2017, Montréal, Quebec

Invited Seminars and Colloquia (since 2017)

5/2023 *Knots at Lunch*, University of Sydney, Sydney, Australia

4/2023 *IMSA Topology Seminar*, Institute of the Mathematical Sciences of the Americas, University of Miami, Coral Gables, Florida, USA

2/2023 *Topology Seminar*, University of Victoria, Victoria, BC

11/2022 *Undergraduate Colloquium*, McMaster University, Hamilton, Ontario

6/2022 *Geometry and Topology Seminar*, University of Sydney, Sydney, Australia

5/2022 *What is? ... Seminar*, Sydney Mathematical Research Institute, Sydney, Australia

5/2022 *Knots at Lunch*, University of Sydney, Sydney, Australia (Zoom)

3/2021 *Topology Seminar*, University of Nevada, Reno, Nevada (Zoom)

2/2021 *Colloquium*, Beijing Normal University, Beijing, China (Zoom)

2/2021 *Topology Seminar*, Brandeis University, Waltham, Massachusetts (Zoom)

12/2020 *Geometry and Topology Seminar*, City University of New York, New York, New York (Zoom)

11/2020 *CKVK* Seminar*, Ohio State University, Columbus, Ohio (YouTube)

9/2020 *Knots and Representation Theory*, Moscow State Technical University, Moscow, Russia (Skype)

5/2020 *Knots and Representation Theory*, Moscow State Technical University, Moscow, Russia (Skype)

~~5/2020 *Geometry and Topology Seminar*, Columbia University, New York, NY, USA~~

2/2020 *Topology Seminar*, University at Buffalo, Buffalo, NY, USA

4/2019 *Geometry and Physics Seminar*, University of Miami, Coral Gables, Florida, USA

10/2018 *Knot Theory Seminar*, Moscow State Technical University, Moscow, Russia (Skype)

Teaching Experience

2000 – **Instructor**, *Mathematics & Statistics, McMaster University*, Hamilton, Ontario Canada.

Math 1AA3 (2 sections)	**Math 1K03**	**Math 1M03**
Math 1N03	**Math 1X03**	**Math 1ZB3**
Math 2R03 (4 sections)	**Math 2S03** (2 sections)	**Math 2X03** (2 sections)
Math 3EE3 (2 sections)	**Math 3T03** (4 sections)	**Math 3V03**
Math 4BB3 (2 sections)	**Math 4E03**	**Math 4B03** (3 sections)
Math 4T03 (2 sections)	**Math 4TT3** (2 sections)	**Math 4SF3**
Math 762	**Math 795**	**Math 731** (3 sections)
ArtSci 1D06	**iSci 2A18** (math, 2 sections)	**Math 761** (2 sections)

University Service (since 2010)

2018– **Member**, *Advisory Committee, McMaster Museum of Art*, McMaster University, Hamilton, Ontario.

2023– **Member**, *Intercession Curriculum Committee, Vice Provost, Teaching and Learning*, McMaster University, Hamilton, Ontario.

2022–2024 **Elected Member**, *Appointments Committee, Mathematics & Statistics*, McMaster University, Hamilton, Ontario.

2022–2024 **Elected Member**, *Tenure and Promotion Committee, Mathematics & Statistics*, McMaster University, Hamilton, Ontario.

2022–2023 **Member**, *Search Committee, Associate Dean Academic, Faculty of Science*, McMaster University, Hamilton, Ontario.

2018–2021 **Member**, *Senate*, McMaster University, Hamilton, Ontario.

2009–2018 **Department Chair**, *Mathematics & Statistics*, McMaster University, Hamilton, Ontario.

2009–2018 **Member**, *Faculty Council, Faculty of Science*, McMaster University, Hamilton, Ontario.

2009–2018 **Chair**, *Tenure and Promotion Committee, Mathematics & Statistics*, McMaster University, Hamilton, Ontario.

2009–2018 **Chair**, *Appointments Committee, Mathematics & Statistics*, McMaster University, Hamilton, Ontario.

Activities & External Service (since 2010)

2019– **Member**, *Board of Directors, Canadian Mathematical Society*.

2023– **Member**, *Research Committee, Canadian Mathematical Society*.

2016– **Associate Editor**, *Canadian Journal of Mathematics*.

2016– **Associate Editor**, *Canadian Mathematical Bulletin*.

2020 **Member**, *NSF Review Panel in Low Dimensional Topology*, Division of Mathematical Sciences, National Science Foundation.

2018 **Member**, *IQAP Site Visit Team*, Department of Mathematical Sciences, Lakehead University.

2009–2018 **Member**, *Committee of Academic Sponsors*, Mathematical Research Sciences Institute (MSRI), Berkeley, CA USA.

2015– **Referee**, *Proposed Workshops*, Banff International Research Station.

2001– **Referee**, *Grants in Pure Mathematics*, Natural Sciences and Engineering Research Council of Canada.

1994– **Referee**, *Math Journals*.

- *Advances in Mathematics*
- *Algebraic and Geometric Topology*
- *American Journal of Mathematics*
- *Bulletin of the London Mathematical Society*
- *Canadian Journal of Mathematics*
- *Canadian Math Bulletin*
- *Communications in Contemporary Mathematics*
- *Communications in Analysis and Geometry*
- *Compositio Mathematica*
- *European Journal of Combinatorics*
- *Experimental Mathematics*
- *Geometry and Topology*
- *Geometriae Dedicata*
- *Illinois Journal of Mathematics*
- *Indiana University Mathematics Journal*
- *International Journal of Mathematics*
- *Journal of Differential Geometry*
- *Journal of the European Mathematical Society*
- *Journal of Knot Theory and Its Ramifications*
- *Journal of Mathematical Sciences*
- *Journal of the Mathematical Society of Japan*
- *Journal of Pure and Applied Algebra*
- *Journal of Topology*
- *Mathematische Annalen*
- *Mathematische Zeitschrift*
- *Memoirs of the American Mathematical Society*
- *Michigan Mathematical Journal*
- *New York Journal of Mathematics*
- *Pacific Journal of Mathematics*
- *Proceedings of the American Mathematical Society*
- *Proceedings of the London Mathematical Society*
- *Publicacions Matemàtiques*
- *Quantum Topology*
- *Quarterly Journal of Mathematics*
- *Rocky Mountain Journal of Mathematics*
- *Tbilisi Mathematical Journal*
- *Topology*

- *Topology and Its Applications*
- *Transactions of the American Mathematical Society*
- *Transformation Groups*