

Curriculum Vitae

ADAM CLAY

Office Address: University of Manitoba
Department of Mathematics
473 Machray Hall
Winnipeg, R3T 2N2
Manitoba, Canada

Email Address: Adam.Clay@umanitoba.ca
Homepage: server.math.umanitoba.ca/~claya
Citizenship: Canadian
Date of CV: August 3, 2021

Education

- 2010 Ph.D. University of British Columbia, Mathematics (advisor: Dale Rolfsen)
- 2005 M.Sc. University of British Columbia, Mathematics (advisor: Dale Rolfsen)
- 2003 B.Sc. University of King's College, Halifax, Canada, Mathematics (with Honours).

Employment

- 2018 – Associate Professor, University of Manitoba
- 2013 – 2018 Assistant Professor, University of Manitoba
- 2012 – 2013 CIRGET postdoctoral fellow, Université du Québec à Montréal (advisor: Steve Boyer)
- 2010 – 2012 NSERC postdoctoral fellow, Université du Québec à Montréal (advisor: Steve Boyer)

Administrative positions

- 2020 – Associate Head (Grad Studies), Department of Mathematics, University of Manitoba

Research interests

Group theory, actions of groups on S^1 and \mathbb{R} , 3-manifolds, knot theory, left orderability of fundamental groups of 3-manifolds, Dehn surgery and foliations, algebraic properties of left- and circularly orderable groups.

Publications

Books

1. *Ordered groups and Topology*, (with Dale Rolfsen) Graduate Studies in Mathematics 176 (2016), American Mathematical Society, Providence RI, USA.

Articles in progress

2. *Order-detection of slopes on the boundaries of knot manifolds*, (with Steve Boyer), in preparation.
3. *Co-amenability and the space of relative locally invariant orderings*, (with Ian Thompson), under revision.
4. *Orderability and related properties of surface braid groups and their quotients up to link homotopy*, (with Juliana Theodoro de Lima), in preparation.
5. *Circular orderability of 3-manifold groups*, (with Idrissa Ba), submitted.
6. *Graph manifolds that admit arbitrarily many Anosov flows*, (with Tali Pinsky), 20 pages. Submitted.

7. *Semigroups and a theorem of Mumford and Ramanujam*, (with R. Padmanabhan), 9 pages. Submitted.

Peer-reviewed journal articles

8. *The space of circular orderings and semiconjugacy*, (with Idrissa Ba), to appear in the Journal of Algebra.
9. *Borel structures on the space of left-orderings*, (with Filippo Calderoni), to appear in Bulletin of the London Mathematical Society.
10. *Circular ordering direct products and the obstruction to left-orderability*, (with Tyrone Ghaswala), to appear in Pacific Journal of Mathematics.
11. *Promoting circular-orderability to left-orderability*, (with Jason Bell and Ty Ghaswala), Annales de L'Institut Fourier, 71 (2021), no. 1, 175–201.
12. *Generalizations of the Burns-Hale theorem*, Communications in Algebra, 48 (2020) no. 11, 4846–4858.
13. *Dense orderings in the space of left-orderings of a group*, (with Tessa Reimer) Canadian Mathematical Bulletin, 63 (2020), no. 2, 393–404.
14. *Free products of circularly ordered groups with amalgamated subgroup*, (with Ty Ghaswala) J. Lond. Math. Soc., 100 (2019), no. 3, 775–803.
15. *On the number of circular orders on a group*, (with Kathryn Mann and Cristobal Rivas) J. Algebra 504 (2018), 336–363.
16. *Automorphisms acting on the left-orderings of a bi-orderable group*, (with Sina Zabanfahm) New York J. Math. 23 (2017), 67–83.
17. *Foliations, orders, representations, L-spaces and graph manifolds*, (with Steve Boyer) Adv. Math. 310 (2017), 159–234.
18. *Testing bi-orderability of knot groups*, (with Colin Desmarais and Patrick Naylor) Canadian Mathematical Bulletin, 59 (2016), no. 3, 472–482.
19. *Graph manifolds, left-orderability and amalgamation*, (with Tye Lidman and Liam Watson) Algebr. Geom. Topol. 13 (2013), no. 4, 2347–2368.
20. *Left-orderability and exceptional Dehn surgery on two-bridge knots*, (with Masakazu Teragaito) Geometry and topology down under, 225–233, Contemp. Math., 597, Amer. Math. Soc., Providence, RI, 2013.
21. *Left-orderings and quotients of the braid groups*, J. Knot Theory Ramifications 21 (2012), no. 14, 125–130, 9 pp.
22. *Ordered groups, eigenvalues, knots, surgery and L-spaces*, (with Dale Rolfsen) Math. Proc. Cambridge Philos. Soc. 152 (2012), no. 1, 115–129.
23. *Left-orderable fundamental groups and Dehn surgery*, (with Liam Watson) Int. Math. Res. Not. IMRN 2013, no. 12, 2862–2890.
24. *Free lattice-ordered groups and the space of left-orderings*, Monatsh. Math. 167 (2012), no. 3-4, 417–430.
25. *On cabled knots, Dehn surgery, and left-orderable fundamental groups*, (with Liam Watson) Math. Res. Lett. 18 (2011), no. 6, 1085–1095.
26. *Exotic left orderings of the free groups from the Dehornoy ordering*, Bull. Aust. Math. Soc. 84 (2011), no. 1, 103–110.

27. *Isolated points in the space of left orderings of a group*, Groups Geom. Dyn. 4 (2010), no. 3, 517–532.
28. *A new characterization of Conrad’s property for group orderings, with applications*, (with Andrés Navas and Cristóbal Rivas, my contribution is the appendix) Algebr. Geom. Topol. 9 (2009) 2079–2100.
29. *Corrigendum to “On ordering free groups” [J. Symbolic Comput. 40 (2005) 1285–1290]*, (with Lawrence H. Smith) J. Symbolic Comput. 44 (2009), no. 10, 1529–1532.
30. *Densely ordered braid subgroups*, (with Dale Rolfsen) J. Knot Theory Ramifications 16 (2007), no. 7, 869–877.

Non-peer-reviewed work

31. *Left-orderability of 3-manifold fundamental groups*, CMS Notes 48 (2016) no. 2, 14–15.
32. *Orderable groups and bundles*, (with Mathieu Anel) (2012) 13 pages. arXiv:1208.5844
33. *Slope detection, foliations in graph manifolds, and L-spaces*, (with Steve Boyer) (2015), 30 pages. arXiv:1510.02378.

Lectures and presentations

Conferences

- 2020 Oct. El Paso, USA (AMS special session in topology): The L-space conjecture, left-orderability and circular orderability of fundamental groups.
- 2019 Dec. Toronto, Canada (CMS special session in topology): Creating actions on the line from actions on the circle
- 2018 Dec. Vancouver, Canada (CMS special session in topology): Circular orderings and amalgamation
- 2017 Aug. Quito, Ecuador (XXII Coloquio Latinoamericano de Álgebra): Automorphisms acting on the space of orderings
- July Montreal, Canada (Mathematical Congress of the Americas): The number of circular orderings of a group
- 2016 Apr. Fargo, USA (AMS sectional meeting): Orderability and Dehn fillings of knot complements
- 2015 July Vancouver, Canada (PIMS Symposium on the Geometry and Topology of Manifolds): Foliations of graph manifolds
- Apr. Victoria, Canada (The 54th Cascade Topology Seminar): Foliations, left-orderability and L-spaces
- 2014 Sept. Santiago, Chile (Orderable Groups): Ordered groups and topology (minicourse, three lectures)
- Aug. Dublin, Ireland (The 10th William Rowan Hamilton Geometry and Topology Workshop): Graph manifolds, left-orderability and L-spaces
- June Winnipeg, Canada (CMS special session on low-dimensional topology and geometric group theory): Bi-orderability of fundamental groups of 3-manifolds
- 2013 Dec. Ottawa, Canada (CMS special session on geometric group theory and low-dimensional topology): The Burns-Hale theorem and its generalizations
- 2012 Dec. Montreal, Canada (CMS special session on geometrical group theory): Graph manifolds, orderability, L-spaces and foliations
- June Regina, Canada (CMS special session on geometry and topology): Foliations of graph manifolds and left-orderability

- Feb. Banff, Canada (BIRS workshop “Ordered groups and topology”): Left-orderability and foliations
- 2010 Apr. Banff, Canada (Cascade topology seminar): Group orderings and knots
- 2009 Jan. Washington DC, USA (AMS special session on orderings and logic): Limit points in the space of left orderings of a group
- 2008 May Montreal, Canada (Colloque Panquébécois des Étudiants): Cofinal elements in orderable groups
- 2007 June Vancouver, Canada (Pure Math Graduate Student Conference): Densely ordered braid subgroups
- May Banff, Canada (BIRS workshop): Normal subgroups of the braid groups and the Dehornoy order

Seminars

- 2020 Oct. The University of British Columbia (Topology Seminar): Cohomological conditions for left-orderability.
- June Group actions seminar (Online): Towards a cohomological characterization of left-orderability
- Apr. University of Texas at Dallas (Geometry, Topology, Dynamical Systems seminar): Cancelled due to COVID-19
- 2019 Nov. University of Chicago at Illinois (Logic seminar): The structure of the space of left-orderings
- Oct. University of Manitoba (Learning seminar in geometry and topology): Groups of homeomorphisms of low-dimensional manifolds
- May Technion (Geometry and topology seminar): Promoting group actions on the circle to actions on the real line
- May University of British Columbia (Algebra and topology seminar): When does a group that acts on the circle also act on the line?
- 2018 Dec. Université du Québec à Montréal (CIRGET working group): Introduction to circular orderings
- Nov. University of Texas at Austin (Geometry and topology seminar): Circular orderings, amalgamation and 3-manifolds
- 2017 Nov. University of Manitoba (Learning seminar in geometry and topology): Free subgroups of groups of homeomorphisms
- Sept. University of Manitoba (Learning seminar in geometry and topology): The Ping-Pong Lemma
- Aug. Dalhousie University (Colloquium): An introduction to circular orderings and left orderings of groups
- Mar. The University of British Columbia (Topology seminar): The spaces of left and circular orderings of a group
- 2016 July Dalhousie University (Colloquium): Smooth Foliations of 3-Manifolds
- 2015 Nov. University of Manitoba (Learning seminar in geometry and topology): Introduction to the space of left-orderings (2 talks)
- Sept. University of Manitoba (Learning seminar in geometry and topology): Introduction to group growth
- Mar. University of British Columbia (Graduate class on orderable groups): Foliations and left-orderings of Seifert fibred manifolds (2 talks)
- 2014 Oct. University of Manitoba (Learning seminar in geometry and topology): Dehn surgery and fundamental groups of manifolds (2 talks)
- Mar. University of Manitoba (Colloquium): Knot groups and orderability

- Feb. University of Manitoba (Learning seminar in geometry and topology): Introduction to braids and knot theory (3 talks)
- 2013 May Dalhousie University (Colloquium): Ordered groups and 3-manifolds
- Mar. Université du Québec à Montréal (CIRGET geometry and topology seminar): Orderability and knots
- Feb. University of Manitoba (Colloquium): Ordered groups and 3-manifolds
- 2012 Oct. McMaster University (Geometry and topology seminar): Left-orderability, foliations, L-spaces and graph manifolds
- 2011 July University of British Columbia (Algebra and topology seminar): Left-orderability and Dehn surgery
- 2010 Nov. Université du Québec à Montréal (CIRGET geometry and topology seminar): Orderability and knots
- 2009 Nov. University of Tokyo (Topology seminar): An introduction to orderable groups
- Jan. Dalhousie University (Graduate student seminar): An introduction to orderable groups
- 2008 Nov. Universidad de Santiago de Chile (Dynamical systems seminar): Isolated points in the space of left orderings of a group
- Feb. University of British Columbia (Algebra and topology): The space of left orders of the braid groups
- 2007 Nov. Laboratoire de Mathématiques Nicolas Oresme (Special seminar): The space of orderings and the braids
- Nov. University of British Columbia (Algebra and topology seminar): Normal subgroups of the braid groups and the Dehornoy order

Organizing conferences, meetings and activities

- 2021 Co-organizer, CMS session in group theory and low dimensional topology, December 3–6 Vancouver, Canada.
- Co-organizer, CMS session in low dimensional topology, June 5–8 Ottawa, Canada.
- Co-chair of organizing committee, Nexus 2021: Bridging Academia and Industry, May 2021, Winnipeg, Canada.
- 2019 Co-organizer, 63rd Cascade Topology seminar, September 14–15 Winnipeg, Manitoba.
- Co-organizer, Ordered Groups and Rigidity in Dynamics and Topology (BIRS/CMO event 19w5044), June 16–21 Oaxaca, Mexico.
- 2017 Co-organizer, CMS session in low dimensional topology and geometric group theory, December 8–11 Waterloo, Canada.
- 2016 Co-organizer, CMS session in low dimensional topology and geometric group theory, December 3–5 Niagara Falls, Canada.
- 2015 Co-organizer, CMS session in low dimensional topology and geometric group theory, December 6–9 Montreal, Canada.
- 2014 Co-organizer, CMS session in low dimensional topology and geometric group theory, June 6–9 Winnipeg, Canada.
- 2013 Co-organizer, CMS session in geometric group theory and low dimensional topology, December 6–9 Ottawa, Canada.
- Co-organizer, Low dimensional topology, knots and orderable groups, July 1–5 Luminy, Marseille.

Referee and review activities

Journals refereed (many multiple times)

Canadian Mathematical Bulletin
 Topology and its Applications
 Algebra Universalis
 Order – A Journal on the Theory of Ordered Sets and its Applications
 Proceedings of Winterbraids
 Compositio Mathematica
 Journal of Knot theory and its Ramifications
 Communications in Analysis and Geometry
 Journal of Algebra
 Algebraic & Geometric Topology
 Communications in Algebra
 Proceedings of the American Mathematical Society
 Journal of the London Mathematical Society

Granting agencies refereed

Fonds de recherche du Québec - Nature et technologies (FRQNT)
 Natural Sciences and Engineering Research Council (NSERC)

Miscellaneous review activities

External reviewer for promotion and tenure applications outside the University of Manitoba.
 External reviewer for named chair applications outside the University of Manitoba.

Scientific/Academic honours and grants

2020 – 2025 NSERC Discovery grant (\$135000 over 5 years)
 2019 PI for PIMS conference grant (\$4500)
 2018 – 2019 University of Manitoba URGP (\$7500)
 2014 – 2015 University of Manitoba URGP (\$6000)
 2014 – 2019 NSERC Discovery grant (\$95000 over 5 years)
 2013 – 2016 University of Manitoba startup grant (\$45000)
 2013 Co-PI for NSF conference grant 1305741 (\$32000 USD)
 ——— PI for PIMS conference grant (\$4000)
 2010 – 2012 NSERC postdoctoral fellowship, Université du Québec à Montréal
 2008 University graduate fellowship, University of British Columbia
 2005 – 2007 NSERC PGS-D, University of British Columbia
 2003 – 2005 NSERC PGS-M, University of British Columbia
 2003 King's Medal

Teaching awards

2017 Faculty of Science Award for Innovation in Teaching (\$1000)
 2008 University of British Columbia graduate teaching award (departmental)

Teaching activities

2021 Summer Bass-Serre Theory (Reading course at the University of Manitoba)
 2021 Winter Advanced Galois Theory (Reading course at the University of Manitoba)
 2020 Fall Introduction to Topology (Math 3390 at the University of Manitoba)
 2020 Winter Introduction to Encryption (SCI 2000 at the University of Manitoba)

- 2019 Fall Introduction to Analysis (MATH 2080 at the University of Manitoba)
- 2018 Winter Algebra 3 (MATH 3322 at the University of Manitoba)
- 2017 Fall Introduction to Analysis (MATH 2080 at the University of Manitoba)
Differential Calculus (Math 1500 at the University of Manitoba)
- 2017 Winter Analysis 3 (MATH 3472 at the University of Manitoba)
Differential Calculus course coordinator (Math 1500 at the University of Manitoba)
- 2016 Fall Topics in Geometric group theory
Honours Differential Calculus (Math 1230 at the University of Manitoba)
- 2016 Winter Algebra 1 (MATH 2020 at the University of Manitoba)
Differential Calculus (Math 1500 at the University of Manitoba)
- 2015 Fall Introduction to Topology (Math 3390 at the University of Manitoba)
- 2015 Winter Engineering Analysis 1 (Math 2132 at the University of Manitoba)
Advanced Calculus (Math 3760 at the University of Manitoba)
- 2014 Fall Advanced Calculus (Math 3760 at the University of Manitoba)
- 2014 Winter Topology I (Math 3240 at the University of Manitoba)
Differential Calculus (Math 1500 at the University of Manitoba)
- 2012 Fall Enriched Linear Algebra and Geometry (Math 134 at McGill)
- 2011 Fall Linear Algebra and Geometry (Math 133 at McGill)
- 2010 Fall Linear Algebra and Geometry (Math 133 at McGill)
- 2009–2010 Organizer of nine calculus workshops (Math 110 at UBC)
- 2005–2008 Ordinary differential equations (Math 265 at UBC)
- 2005 Winter Integral calculus (Math 103 at UBC)

Postdocs mentored

- current Idrissa Ba (2019–present)
- completed Ty Ghaswala (2017–2019)
Juliana Theodoro de Lima (2015–2016, co-supervisor with Steve Boyer)

PhD students advised

- current Junyu Lu (2021-present)
Tommy Cai (2020-present)

MSc students advised

- current Vindya Lakshani (expected 2021)
- completed Irshad Ayoob (2017–2020)
Thesis: Ordered groups and a theorem of Farrell.
- Adriana Ciupeanu (2016–2019)
Thesis: Left-orderable groups and amenability.
- Serhii Dovhyi (2014–2017)
Thesis: Non-left-orderable surgeries of twisted torus knots.
- Ali Khardani (2013-2014, joint supervision with Steve Boyer at UQAM)
Thesis: Groupes ordonnés et les variétés de dimension 3.

Undergraduate students mentored

- 2021 USRA Waweru Kariuki *Bass-Serre theory and circular orderings*
- 2021 USRA Tjay Staruch *Left-orderability and fundamental groups of cyclic branched covers of knots*
- 2021 USRA Dana Kapoostinsky *Obstructing circular orderability*
- 2019 USRA Robert Harris *Circular orderability and obstructing left-orderability*
- 2019 USRA Mitchell Heron *Left-orderability and Dehn filling*
- 2019 USRA Mary-Elaine Herrera *Left-orderings and branched cyclic covers of knots*
- 2019 USRA Ian Thompson *Locally invariant orderings and amenability*
- 2018 USRA Jeremy Friesen *Groups and topological dynamics*
- 2018 USRA Robert Harris *Density of representations of the free group*
- 2018 USRA Tessa Reimer *Isolated points in spaces of orderings*
- 2018 Hons. Jeremy Friesen (honours project) *Topological groups in physics*
- 2017 USRA Tessa Reimer *Algebraic properties of ordered groups*
- 2016 USRA Sina Zabanfahm *Spaces of left-orderings of braid groups*
- 2015 USRA Patrick Naylor *Diffuse groups and locally invariant orderings*
- 2015 USRA Colin Desmarais *A brute force approach to knot group bi-orderability*
- 2014 USRA Patrick Naylor *Bi-orderability of two bridge knot groups*
- 2014 USRA Colin Desmarais *Testing bi-orderability of knot groups*

Seminars organized or co-organized

- 2017–2019 Learning seminar in geometry and topology (at University of Manitoba, co-organizer)
- 2014–2016 Learning seminar in geometry and topology (at University of Manitoba, co-organizer)
- 2013 Co-organizer, CIRGET-LaCIM seminar (at UQAM)
- 2011 Working group in low dimensional topology (at UQAM)

Committee work

Professional committees

- NSERC Mathematics and Statistics Evaluation Group (EG 1508) (2020-member, 2021-incoming chair)
- Canadian Mathematical Society board of directors (2019–present)
- Member of the Canadian Mathematical Society finance committee (2016–present)

Administrative committees

- Research committee (U of M departmental committee) (2021–present)
- Hiring (U of M departmental committee) (2021)
- Data Science M.Sc. program committee (U of M faculty committee) (2020–present)
- Faculty of Science Nucleus Tenure Committee (U of M faculty committee) (2020–present)
- Graduate studies (U of M departmental committee) (2018–present)
- Promotion and tenure (U of M departmental committee) (2018)
- Hiring (U of M departmental committee) (2017)
- Promotion (U of M departmental committee) (2016)
- Executive (U of M departmental committee) (2016–2019)
- Scholarships and awards (U of M departmental committee) (2016–2019)
- Hiring (U of M departmental committee) (2015)
- Research advisory team science (U of M faculty committee) (2014–2017)
- Hiring (U of M departmental committee) (2014)
- Strategic planning (U of M departmental committee) (2013–2016)
- Various comprehensive examination committees (14 committees between 2013–2021)
- Chair of various examination committees (7 committees between 2013–2021)

Examination and advisory committees

Dinamo Djounvouna (PhD internal examiner)

Md Ismail Hossain (MSc internal examiner, 2018)

Juliana Theodoro de Lima (PhD external examiner, 2014)