Christopher Lang, Ph.D.

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Education

2020 – 2024 **Ph.D., University of Waterloo**
Pure Mathematics - Thesis title: *Solitons with continuous symmetries*

2019 – 2020 **Master of Advanced Study, University of Cambridge (Queens' College)**
Mathematics

2014 – 2019 **BMath, Co-op, University of Waterloo**
Mathematical Physics and Pure Mathematics

Research

Journal Articles

1. **C. J. Lang**, "Hyperbolic monopoles with continuous symmetries," *Journal of Geometry and Physics*, vol. 203, p. 105 258, 2024, ISSN: 0393-0440. DOI: 10.1016/j.geomphys.2024.105258. arXiv: 2310.10626.
2. B. Charbonneau, A. Dayaprema, **C. J. Lang**, Á. Nagy, and H. Yu, "Construction of Nahm data and BPS monopoles with continuous symmetries," *Journal of Mathematical Physics*, vol. 63, no. 1, p. 013 507, 2022, **Editor's Pick**, ISSN: 0022-2488. DOI: 10.1063/5.0055913. arXiv: 2102.01657.
3. **C. J. Lang** and M. L. Waite, "Scale-dependent anisotropy in forced stratified turbulence," *Physical Review Fluids*, vol. 4, p. 044 801, 4 2019. DOI: 10.1103/PhysRevFluids.4.044801.

Invited Talks

1. *An introduction to monopoles, instantons, and more*, Colloquium talk, Memorial University of Newfoundland, Oct. 2024.
2. *Instantons with continuous symmetries*, Geometric Models of Matter, University of Leeds, Aug. 2024. URL: https://www.youtube.com/watch?v=a5dZKpBPkxQ&.
3. *Spherically symmetric hyperbolic monopoles*, CMS Winter Meeting, Dec. 2023.
4. *Spherically symmetric hyperbolic monopoles*, Colloquium talk, Memorial University of Newfoundland, Oct. 2023.
5. *Revisiting symmetric hyperbolic monopoles*, Differential Geometry Working Seminar, University of Waterloo, Jul. 2023.
6. *Hyperbolic monopoles with continuous symmetries (Part 2)*, Differential Geometry Working Seminar, University of Waterloo, Mar. 2023.
7. *Hyperbolic monopoles with continuous symmetries*, Differential Geometry Working Seminar, University of Waterloo, Nov. 2022.
8. *Understanding and mitigating student resistance to active learning*, Graduate Students in Teaching Conference, University of British Columbia, May 2022.
9. *The spectral curve of a SU(2) monopole (Part 2): Identifying subbundles*, Differential Geometry Working Seminar, University of Waterloo, Apr. 2022.

10. *Understanding and mitigating student resistance to active learning*, Teaching and Learning Conference, University of Waterloo, Apr. 2022.
11. *The spectral curve of a SU(2) monopole (Part 1): A holomorphic vector bundle*, Differential Geometry Working Seminar, University of Waterloo, Mar. 2022.
12. *Constructing BPS monopoles with spherical symmetry*, Oxford–London Gauge Assembly, University College London, Jun. 2021.
13. *Constructing Nahm data and BPS monopoles with continuous symmetries*, Ottawa Mathematics Conference, University of Ottawa, May 2021.
14. *Constructing BPS monopoles with spherical symmetry*, GSTGC, Indiana University, Apr. 2021.
15. *On the charge density and asymptotic tail of a monopole*, Differential Geometry Working Seminar, University of Waterloo, Mar. 2021.
16. *The many faces of monopoles*, Differential Geometry Working Seminar, University of Waterloo, Feb. 2021.
17. *Using group actions to simplify differential equations*, Part III Seminar Series, University of Cambridge, Dec. 2019.
18. *Simplifying Nahm data with group actions*, CUMC, Queen's University, Jul. 2019.
19. *The ADHM–Nahm procedure*, Geometry Seminar, University of Waterloo, Jun. 2019.
20. *Simplifying Nahm data with group actions*, Geometry Seminar, University of Waterloo, May 2019.
21. *Local isotropy in stratified turbulence*, USRA Mini-Conference, University of Waterloo, Aug. 2018.

Thesis

1. **C. J. Lang**, "Solitons with continuous symmetries," Ph.D. Thesis, University of Waterloo, Waterloo, Canada, 2024. URL: https://hdl.handle.net/10012/20906.

Teaching

Certifications

Mar. 2022 — Certificate in University Teaching
Dec. 2020 — Fundamentals of University Teaching
Nov. 2020 — Certificate in Online Course Facilitation

Lecturing

Fall, 2022 — MATH 137 - Calculus I for Honours Mathematics, University of Waterloo

Programming Skills

Fortran, Maple, Git, LaTeX

Awards

2023–2024 — Rai Mathematics Graduate Scholarship

Awards (continued)

	Ontario Graduate Scholarship
2022	Outstanding Teaching Assistant Award
2020–2023	Alexander Graham Bell CGS - Doctoral
2020–2024	President's Graduate Scholarship
2019	Jessie Zou Excellence in Research (Finalist)
	NSERC CGS - Masters (Declined)
2016, 2018 & 2019	NSERC Undergraduate Student Research Award

Areas of Interest

Lie theory, representation theory, moduli spaces, and gauge theory—specifically instantons and monopoles

References

Research

Dr. Benoit Charbonneau
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Dr. Derek Harland
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Teaching

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