Maggie Miller: Curriculum Vitae

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Research Interests

I am interested in questions about geometric topology and knotting in dimensions 3 and 4. In particular, I think about knotted surfaces smoothly or locally flatly embedded in 4-manifolds.

Professional Positions

2021 –	**Stanford Science Fellow / Visiting Clay Fellow, Stanford University** *STEM postdoctoral fellowship at Stanford / research fellowship from CMI* Faculty mentor: Ciprian Manolescu
2020 – 2021	**NSF Postdoctoral Fellow, Massachusetts Institute of Technology** Scientific sponsor: Tomasz Mrowka

I am beginning an assistant professorship at the University of Texas at Austin in Fall 2023.

Education

2015 – 2020	**Ph.D. in Mathematics, Princeton University** NSF Graduate Fellow, Charlotte Elizabeth Procter Fellow Dissertation: "Extending fibrations of knot complements to ribbon disk complements" Advised by David Gabai
2011 – 2015	**Bachelor of Science: Mathematics Honors Option,** **University of Texas at Austin** High Honors, Special Honors in Mathematics, Dean's Honored Graduate Senior Thesis: "Fiberedness of almost-Montesinos knots" Advised by Cameron Gordon

Selected Awards/Fellowships

2023	Maryam Mirzakhani New Frontiers Prize
2021 – 2025	Clay Research Fellowship
2021 – 2024	Stanford Science Fellowship
2020 – 2021	National Science Foundation Mathematical Sciences Postdoc Research Fellowship
2019 – 2020	Charlotte Elizabeth Procter Fellowship, Princeton University
2018	Princeton Mathematics Graduate Teaching Award
2016 – 2020	National Science Foundation Graduate Research Fellowship
2015 – 2016	Princeton University President's Fellowship
2015	College of Natural Sciences Dean's Honored Graduate, UT Austin

Papers and Preprints

[22] K. Hayden, S. Kim, M. Miller, JH. Park, and Isaac Sundberg, *Seifert surfaces in the 4-ball*, arXiv:2205.15283 [math.GT], May 2022.

[21] J. Joseph, J. Meier, M. Miller, A. Zupan, *Bridge trisections and classical knotted surface theory*, to appear in Pac. J. Math.

[20] M. Hughes, S. Kim, M. Miller, *Knotted handlebodies in the 4-sphere and 5-ball*, arXiv:2111.13255 [math.GT], Nov. 2021. Submitted.

[19] M. Hughes, S. Kim, M. Miller, *Band diagrams of immersed surfaces in 4-manifolds*, arXiv:2108.12794 [math.GT], Aug. 2021. Submitted.

[18] K. Hayden, A. Kjuchukova, S. Krishna, M. Miller, M. Powell, and N. Sunukjian, *Brunnian exotic surface links in the 4-ball*, arXiv:2106.13776 [math.GT], June 2021. Submitted.

[17] M. Miller and B. Ozbagci, *Lefschetz fibrations on nonorientable 4-manifolds*, Pac. J. Math. **312**(1):177–202, 2021.

[16] M. Miller and P. Naylor, *Trisections of non-orientable 4-manifolds*, to appear in Mich. Math. J.

[15] M. Miller and A. Zupan, *Equivalent characterizations of handle-ribbon knots*, to appear in Commun. Anal. Geom.

[14] P. Aceto, J. Meier, A. N. Miller, M. Miller, JH. Park, and A. I. Stipsicz, *Branched covers bounding rational homology balls*, to appear in Algebra. Geom. Topol.

[13] A. Juhász, M. Miller, and I. Zemke, *Transverse invariants and exotic surfaces in the 4-ball*, to appear in Geom. Topol.

[12] M. R. Klug and M. Miller, *Concordance of surfaces and the Freedman-Quinn invariant*, J. Topol. **14**(2):560–586, 2021.

[11] N. A. Castro, G. Islambouli, M. Miller, and M. Tomova, *The relative $\mathcal{L}$-invariant of a compact 4-manifold*, to appear in Pac. J. Math.

[10] I. Dai and M. Miller, *The 0-concordance monoid is infinitely generated*, to appear in Proc. Amer. Math. Soc.

[9] M. Miller, *The effect of link Dehn surgery on the Thurston norm*, arXiv:1906.08458 [math.GT], Jun. 2019. Submitted.

[8] A. Juhász, M. Miller, and I. Zemke, *Knot cobordisms, torsion, and Floer homology*, J. Topol. **13**(4):1701–1724, 2020.

[7] P. Lambert-Cole and M. Miller, *Trisections of 5-manifolds*, 2019 MATRIX Annals, MATRIX Book Ser., Springer, pp. 117–134, 2021.

[6] M. Miller and I. Zemke, *Knot Floer homology and strongly homotopy-ribbon concordances*, Math. Res. Lett. **28**(3):849–861, 2021.

[5] M. Miller, *A concordance analogue of the* 4*-dimensional light bulb theorem* Int. Math. Res. Not. IMRN **2021**(4):2565–2587, 2021.

[4] M. C. Hughes, S. Kim, and M. Miller, *Isotopies of surfaces in 4-manifolds via banded unlink diagrams*, Geom. Topol. **24**(3):1519–1569, 2020.

[3] M. Miller, *Extending fibrations on knot complements to ribbon disk complements*, Geom. Topol. **25**(3):1479–1550, 2021.

Papers and Preprints (continued)

[2] S. Kim and M. Miller, *Trisections of surface complements and Price twist*, Algebr. Geom. Topol. **20**(1):343–373, 2020.

[1] M. Miller, *Concordances from the standard surface in* $S^2 \times S^2$, J. Knot Theory Ramifications **29**(9):1950–57, 2019.

Teaching and Outreach

Summer 2021	Mentor in the Summer Research – Early Identification Program (Program meant to encourage unrerepresented students to pursue graduate education)
	Mentored an undergraduate research project in 4-dimensional topology
2015 – 2020	Noetherian Ring (Princeton women in mathematics) graduate representative
	Co-founded a Noetherian Ring lecture series at Princeton in Spring 2019
2018 – 2020	Princeton Graduate Teaching Fellow
	Developed and led instructor orientations for grad students in 2018 and 2019
2017 – 2020	Princeton Science Café (STEM outreach to children aged 9–15)
2015 – 2019	Mentoring Möbius, Princeton Mathematics (graduate mentorship of undergrads)
Spring 2018	MAT 201 (Multivariable Calculus), challenge problem sessions
	Ran flipped TA sessions for MAT 201
Fall 2017	MAT 201 (Multivariable Calculus), instructor
	Received Princeton Graduate Teaching Award
2015 – 2016	Women in STEM Leadership Council, Princeton University (a group at all career levels that makes policy recommendations to university administration)

Organizational activities

January 2023	Workshop #2304 "Morphisms in Low Dimensions," at the Oberwolfach Research Institute for Mathematics (with Andrew Lobb and Arunima Ray)
November 2022	BIRS Workshop #22w5065 "Topology in Dimension 4.5" at the Banff International Research Station (with David Gay, Jason Joseph, Hannah Schwartz)
October 2022	"Special Session on Knotted Surfaces and Concordances," at the 2022 Fall Western AMS Sesional Meeting (with Mark Hughes and Patrick Naylor)
June 2022	"Developments in Four Dimensions," week-long conference at the University of Victoria (with Ryan Budney and Jeffrey Meier).
April 2022	"Special Session on Knot Theory in Dimension Four," at JMM 2022 (with Jeffrey Meier and Patrick Naylor).
2019 –	Geometric Topology Grad and Postdoc Seminar (sole organizer until June 2021, then joint with Tam Cheetham-West and Luya Wang)
Spring 2021	"4D Topology" AIM Research Community (with Miriam Kuzbary, Juanita Pinzón-Caicedo, Hannah Schwartz)
October 2020	"Special session on knotted surfaces and concordances," at the 2020 Fall Western AMS Sectional Meeting (with Mark Hughes and Jeffrey Meier)
June 2020	"Knots, surfaces, and 4-manifolds," special topic in the Carbon-Neutral Geometric Topology Conference (with JungHwan Park)

Referee for mathematical journals including:

Algebraic & Geometric Topology, *Bulletin of the London Mathematical Society*, *Canadian Mathematical Bulletin*, *Commentarii Mathematici Helvetici*, *Communications in Analysis and Geometry*, *Geometriae Dedicata*, *Geometry & Topology*, *Inventiones Mathematicae*, *Journal of the European Mathematical Society*, *Journal of Topology*, *Mathematical Research Letters*, *Proceedings of the American Mathematical Society*, *Selecta Mathematica*

Miscellaneous Activities

I am a member of an AIM SQuaRE (running 2020–2024) studying Casson-Gordon homotopy 4-balls. My SQuaREmates are Paolo Aceto, Nickolas A. Castro, JungHwan Park, and András Stipsicz.

Selected Invited Talks

I have a full list of invited talks (past and upcoming) available on my website with URLs to abstracts when available.

Spring 2022	"Building concordances," University of British Columbia Topology Seminar
	"Knotted handlebodies," University of Chicago Mathematics Colloquium
Fall 2021	"Concordance of surfaces," UC Berkeley Mathematics Colloquium (Zoom talk)
	"Exotic surfaces in the 4-ball," Rice University Mathematics Colloquium
Summer 2021	"Exotic Brunnian surface links in B^4," Georgia Tech Topology Summer School (Zoom talk)
Spring 2021	"Diagrams of immersed surfaces," UC Berkeley Topology Seminar (Zoom talk)
Fall 2020	"Trisections of non-orientable 4-manifolds," UCSD Topology Seminar (Zoom talk)
	"Characterizing handle-ribbon knots," Cascade Topology Seminar (Zoom talk)
Spring 2020	"Light bulbs in 4-manifolds," Stanford University Topology Seminar
Fall 2019	"Concordance of light bulbs", MIT Topology Seminar
	"Dehn surgery on links versus the Thurston norm," Brandeis Topology Seminar
Summer 2019	"Uniqueness of bridge trisections," Four-Manifolds: Confluence of High and Low Dimensions at the Fields Institute
Spring 2019	"Knot cobordisms, torsion, and Floer homology," UCLA Topology Seminar
	"Building fibrations of 4-manifolds," Rice University Topology Seminar
	"Diagrams for surface isotopies in 4-manifolds," University of Sydney Topology Seminar
Fall 2018	"Fibering ribbon disk complements," Virginia Topology Conference
	"Trisections of surface complements and surgery on $\mathbb{R}P^2$s", Knotted Surfaces in 4-Manifolds, University of Massachusetts
	"Unit surfaces in $\mathbb{C}P^2$," University of Virginia Geometry Seminar
Summer 2018	"The Price twist via trisections," Low-dimensional topology and its interactions with symplectic geometry, Princeton University