Isaac Sundberg

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updated
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Academic Positions

Postdoctoral fellow — Max-Planck-Institut für Mathematik (MPIM), Bonn, Germany   2022-2024

Education

Ph.D. Mathematics — Bryn Mawr College, Bryn Mawr, Pennsylvania, USA   2022
> *Dissertation*: Khovanov homology & uniqueness of surfaces in the 4-ball
> *Advisor*: Paul Melvin

M.A. Mathematics — Bryn Mawr College, Bryn Mawr, Pennsylvania, USA   2018
> *Thesis*: On fibering 3-manifolds

B.S. Mathematics — University of Wisconsin La Crosse, La Crosse, Wisconsin, USA   2016

Research Interests

Low-dimensional topology: exotic phenomena in 4-dimensions; isotopy of surfaces in 4-manifolds; Khovanov homology; link homology theories; cobordism categories; concordance and sliceness; knots and links.

Publications & Preprints

Finding nontrivial Khovanov homology classes
> Preprint in preparation (2024)

Almost concordance in $S^1 \times S^2$ — with Arunima Ray and Rob Schneiderman
> Preprint in preparation (2024)

Seifert surfaces in the 4-ball — with Kyle Hayden, Seungwon Kim, Maggie Miller, and JungHwan Park
> Preprint arXiv:2205.15283 (2022), featured in Quanta Magazine

Khovanov homology and exotic surfaces in the 4-ball — with Kyle Hayden
> Journal für die reine und angewandte Mathematik (Crelle's Journal), 2024-809 (2024), 217-246

Relative Khovanov-Jacobsson classes — with Jonah Swann
> Algebraic & Geometric Topology, 22-8 (2022), 3983-4008

Multiplication operators on weighted Banach spaces of a tree — with Robert F. Allen
> Bulletin of the Korean Mathematical Society, 54:3 (2017), 747-761

Software

KhNoDe — *a program for studying the nontriviality of Khovanov homology classes*
> Python with SymPy (2023)

Invited Talks

2024 — Pisa Geometry Seminar • European Congress of Mathematics

2023 — MPIM Topology Seminar • Heidelberg Symplectic Topology Seminar • Hamburg Research Seminar on Quantum Topology and Categorification (QTCat)

2022 — MPIM Low-dimensional Topology Seminar (3 talk mini-series) • Rutgers-Newark Colloquium • Philadelphia Area Contact/Symplectic/Topology (PATCH) Seminar • MPIM Low-dimensional Topology Seminar • Algebra and Low-Dimensional Topology Minisymposium, DMV Jahrestagung (Freie Universität Berlin) • Princeton Topology Seminar • Duke Geometry & Topology Seminar

2021 — University of Oregon Topology Seminar • MIT Geometry & Topology Seminar • Columbia Geometric Topology Seminar • Philadelphia Area Contact Topology Seminar (5 talk mini-series) • Nearly Carbon Neutral Geometric Topology Conference • AIM Research Community in 4-dimensional Topology

Teaching Positions

Instructor — Max-Planck-Institut für Mathematik

Slice Knots and Knot Concordance (with Arunima Ray)	2023

Instructor — Bryn Mawr College

Math 201: Transitions to Higher Mathematics (with Lisa Traynor)	2022
Math 201: Transitions to Higher Mathematics (with Lisa Traynor)	2021
Math 101: Calculus I	2020

Teaching Assistant — Bryn Mawr College

Math 303: Abstract Algebra I (2 sections)	2019
Math 205: Theory of Probability	2019
Math 312: Topology	2018
Math 304: Abstract Algebra II	2018
Math 303: Abstract Algebra I	2017
Math 295: History of Mathematics	2017
Math 303: Abstract Algebra I (2 sections)	2016

Tutor — University of Wisconsin La Crosse

Murphy Learning Center	2013-2016

Awards & Honors

National Science Foundation

MSPRF proposal recommended for funding (declined for lack of funding)	2023

Bryn Mawr College

Community Building Honor Roll	2019, 2022
Doris Sill Carland Award for Excellence in Teaching	2021
Research Assistantship	2020, 2021
Convocation Speaker Representing the Graduate Student Association	2018
McPherson Graduate Award for Excellence	2018

UW La Crosse

Department of Mathematics: Outstanding Service Award	2016
SIAM Award for Outstanding Efforts & Accomplishments in the Chapter	2016

Supervision & Mentorship

M.A. Advisor — *supervised the research and completion of the M.S. thesis, academic well-being, and professional development of the student through regular one-on-one meetings*

Alejandro García Rivas, University of Bonn, *Corks and 4-manifolds*	2023-2024

M.A. Mentor — *provided guidance on the M.S. thesis, academic well-being, and professional development of the student through regular one-on-one or group meetings*

Shun Ming Samuel Lee, University of Bonn, with Peter Teichner	2023-2024
Maximilian David Hans, University of Bonn, with Peter Teichner	2023-2024
Cara Hobohm, University of Bonn, with Arunima Ray	2023-2024
Avalon Vanis, Bryn Mawr College, with Paul Melvin	2022-2023
Xingya Wang, Bryn Mawr College, with Paul Melvin	2017-2018

Research Mentor — *supervised short-term reading and research projects through regular meetings*

    Verochka Lavrova, Summer Student Intern Program at MPIM, with Luciana Basualdo Bonatto   2023

    Aisha Mechery, Directed Reading Program at Bryn Mawr College   2020

Service & Outreach

Speaker — Pride Math Month, University of Bonn	2024
Committee Member — Gender Equality Task Force, MPIM	2022-2024
Referee — Transactions of the American Mathematical Society	2021-2022
Committee Member — Prelim Restructuring Committee, Bryn Mawr College	2021-2022
Graduate Student Association — Bryn Mawr College	2017-2020

    Co-chair (2017-2019) • Representative to Graduate Council (2017-2019) • Committee Chair for Diversity, Equity, & Inclusion (2017-2019) • Departmental Representative (2019-2020)

President — AMS Graduate Student Chapter, Bryn Mawr College	2018-2020
President — Mathematics & Statistics Club, UW La Crosse	2015-2016
Tutor/Staff — FastTrack Remedial Mathematics Camp, UW La Crosse	2015
Staff — Girls in Science Day Camp, UW La Crosse	2015

Organization

Co-organizer — Low-Dimensional Topology Seminar, MPIM	2023-2024
Topic Group Organizer — Nearly Carbon Neutral Geometric Topology, online (with Alex Manchester)	2023
Founder/Organizer — Graduate Research Seminar, Bryn Mawr College	2019-2022
Co-founder/Co-organizer — Directed Reading Program, Bryn Mawr College (with Aisha Mechery)	2019-2020
Organizer — Professional Development Seminar organizer, Bryn Mawr College	2018-2019

Contributed Talks, Conferences, & Workshops

2024 — Invariants in Low-Dimensional Topology (MFO) • Braids Reunion Workshop (ICERM)

2023 — MPIM Open Problem Seminar • Morphisms in Low Dimensions (MFO)

2022 — Topology in Dimension 4.5 (BIRS) • MPIM Topology Seminar • DMV Jahrestagung (Freie Universität Berlin) • Braids in Low-Dimensional Topology (ICERM)

2021 — Tech Topology Summer School on 4-manifolds • Nearly Carbon Neutral Geometric Topology

2020 — Nearly Carbon Neutral Geometric Topology

2019 — Graduate Student Topology and Geometry Conference (UIUC) • EPaDel MAA Section Meeting (King's College) • Graduate Student Conference in Algebra, Geometry, & Topology (Temple)

2018 — MSRI Summer Graduate School on H-Principles (Tambara Institute/University of Tokyo) • Graduate Student Conference in Algebra, Geometry, & Topology (Temple) • Summer Geometry/Topology RTG mini-conference (Princeton) • Topology Student Workshop (Georgia Tech) • EPaDel MAA Section Meeting (Temple)

2016 — AMS Session on Undergraduate Research (JMM Seattle)

Languages

English — native

French — B1

German — A1