Curriculum Vitae

Katherine A. Maxwell

katherine.maxwell@ipmu.jp
Kavli IPMU, The University of Tokyo
5-1-5 Kashiwanoha, Kashiwa-shi
Chiba, 277-8583
JAPAN

Webpage
ORCiD: 0000-0002-8872-4788
MathSciNet: 1519673
zbMATH: maxwell.katherine-a
arXiv: maxwell_k_1

Research Interests

- super moduli space of super Riemann surfaces and applications to superstring theory and qft
- foundations of algebraic supergeometry
- local geometric Langlands correspondence
- enumerative geometry and super integrable hierarchies

Employment

Kavli Institute for the Physics and Mathematics of the Universe (University of Tokyo)
Project Researcher — Sep 2022 - Aug 2025

Max Planck Institute for Mathematics Bonn
Postdoctoral Fellow — Aug 2021 - Jul 2022

University of Minnesota Twin Cities
Teaching Assistant — Aug 2015 - May 2021

Langley Research Center, NASA
Summer Research Intern — Jun 2015 - Jul 2015

Southern Illinois University Carbondale
Undergraduate Researcher — Jun 2013 - Jul 2013

Education

University of Minnesota Twin Cities
Ph.D. in Mathematics — Jun 2021
Advisor: Alexander Voronov
M.S. in Mathematics — 2019

Truman State University
B.S. in Physics and in Mathematics, Summa Cum Laude — 2015

Honors & Awards

University of Minnesota Twin Cities
Outstanding Teaching Assistant Award, Mathematics Department — 2017 - 2018

Truman State University
Outstanding Graduating Senior in Physics — 2015
Outstanding Graduating Senior in Mathematics — 2015

Ongoing Projects

- *The super period map, superstring measure, and the Sato Grassmannian*, in preparation
- geometric solutions to super KP and KdV integrable systems
- superconformal blocks and τ functions
- super Koszul duality in S-duality
- super Schubert calculus

Publications & Preprints

4. *The Neveu-Schwarz group and Schwarz's extended super Mumford form* (with A. Voronov). arXiv: 2412.18585.
3. *Toward the Universal Mumford form on Sato Grassmannians* (with A. Voronov). arXiv: 2412.18570. Submitted.
2. *The super Mumford form and Sato Grassmannian.* Journal of Geometry and Physics. 2022. doi: 10.1016/j.geomphys.2022.104604.
1. *Bell inequalities with communication assistance* (with E. Chitambar). Phys. Rev. A, **89**:042108, 2014. doi: 10.1103/PhysRevA.89.042108.

Selected Talks

Simons Center for Geometry and Physics

SuperGeometry and Supermoduli Workshop — Mar 2023

Kavli IPMU

String Lunch Seminar — May 2023

GTM Seminar — Nov 2022

Postdoc Colloquium — Oct 2022

ICTP/SISSA Institute for Geometry and Physics

Workshop on Supermoduli — Jun 2022

MPIM Bonn

Algebra, Geometry, and Physics Seminar — 9 Nov 2021

The super Mumford form and Sato Grassmannian

Joint Mathematics Meetings

Special Session on Quantum Algebra and Geometry — 7 Jan 2021

The Neveu-Schwarz algebra and the super Krichever map

Virginia Commonwealth University

Topology and Geometry Seminar — 1 May 2020

The super Mumford form and Sato Grassmannian

University of Wisconsin Madison, AMS Sectional Meeting

Special Session on Supergeom., Poisson Brackets, and Homotopy Structures — 14 Sep 2019

A Flat Holomorphic Connection of the Super Mumford Isomorphism via NS Action and the Super Sato Grassmannian

University of Minnesota Twin Cities

Student Topology and Algebraic Geometry Seminar 25 Oct 2019

Attended Conferences & Workshops

Kavli IPMU

Enumerative geometry, representation theory, and physics Mar 2025

Categorical and analytic invariants in algebraic, symplectic and complex geometry Feb 2025

Tsinghua-Tokyo workshop on Calabi-Yau Jan 2024

McKay correspondence, Tilting theory and related topics Dec 2023

The World of Mathematical Sciences Aug 2023

Gauge Theory, Moduli Spaces and Representation Theory Feb 2023
In honor of the 60th birthday of Hiraku Nakajima

Geometry and Automorphicity of Supersymmetric partitions Feb 2023

Current Trends in the Categorical Approach to Alg. and Symp. Geometry Feb 2023

Kyiv Formula and Related Aspects (remote participant) Apr 2022

Kyoto University/RIMS

New Aspects in Topological Recursion, Resurgence and Related Topics Jul 2024

Workshop on Mirror symmetry and Related Topics Dec 2023

Gauge Theory, Moduli Spaces and Representation Theory Feb 2023
In honor of the 60th birthday of Hiraku Nakajima

BIMSA

Beijing Summer Workshop in Math. and Math. Physics (remote participant) Jun 2024
Integrable Systems and Algebraic Geometry, Dedicated to the memory of Igor Krichever

Hausdorff Center for Mathematics

Workshop: Representations of supergroups Jul 2024

TQFTs and their connections to representation theory and mathematical physics Jun 2023

Aalto University

Workshop on Probabilistic Field Theories Jun 2024

ICTP/SISSA Institute for Geometry and Physics

String-Math 2024 Jun 2024

WAGP24 Algebro-geom. Techniques for Physics: Bundles, Stacks and Supergeom. Jun 2024
A celebration of Daniel Hernández Ruipérez's 70th Birthday

Workshop on Supermoduli Jun 2022

Workshop on Supermoduli Sep 2019

MATRIX Mathematical Research Institute

Algebraic Geometry at the interface between Mathematics and Physics Jul 2023

University of Melbourne

String Math 2023 Jul 2023

Simons Center for Geometry and Physics

SuperGeometry and SuperModuli Workshop and Program Mar 2023

LMU München

Gender equity in academia: A first aid kit (remote participant) Sep 2022

Perimeter Institute

QFT for Mathematicians 2022 (remote participant) Jun 2022

Virginia Commonwealth University

Richmond Geometry Festival (remote participant) May 2022

MPIM Bonn

Algebra, Geometry and Physics: a mathematical mosaic Mar 2022

On the occasion of Yuri I. Manin's 85th birthday

University of Wisconsin Madison

AMS Sectional Meeting Sep 2019

Special Session on Supergeometry, Poisson Brackets, and Homotopy Structures

University of Hamburg

Algebraic Structures in Quantum Field Theory, Summer School Aug 2019

Outreach

Kavli IPMU

Science Cafe, speaker, The geometric origins of supersymmetry Sep 2023

Gave general audience talk (in English to Japanese audience), recieved high audience rating.

University of Minnesota Twin Cities

Mathematics Project at Minnesota, counselor Jan 2021

Truman State University

Women in Physics, president 2012 - 2015

Held weekly meetings, built community, and lead several trips to (CUWiP) conferences.

Service

Kavli IPMU

GTM seminar, co-organizer and co-chair 2024 - 2025

MPIM Bonn

Seminar on Algebra, Geometry and Physics, co-chair 2021 - 2022

University of Minnesota Twin Cities

Advocating against the DHS changes to F, J and I Nonimmigrant Visas, participant Aut 2020

Truman State University

The Office of Student Research Steering Committee, student representative 2013 - 2015

Professional Development

Kavli IPMU

Lumina Learning Leadership Training 2022 - 2023
Learned how to inclusively communicate, use people's strengths, and give effective feedback.

University of Minnesota Twin Cities

Teaching in Higher Education (GRAD 8101) Spr 2019
Learned how to use active-learning methods, recieve useful feedback, and set learning goals.

Mentoring & Supervision

University of Minnesota Twin Cities

Directed Reading Program Spr 2019
Guided an senior math major through Algebraic Geometry by Gathmann.

Directed Reading Program Aut 2019
Guided an undergraduate math major through part I of The Rising Sea by Vakil.

Teaching Experience

University of Minnesota Twin Cities

Course Supervisor

Hybrid PreCalculus II Aut 2019, Aut 2020, Spr 2021
Supervised several undergraduate and graduate teaching assistants.
Managed the drop-in in-person quiz and office hours center.
Promoted active learning in online format by restructuring course.

Lecturer

Hybrid PreCalculus II Aut 2018
Lead lectures for 120 students using active learning worksheets and online technology.
Emphasized explanations and problem solving instead of calculations.

Calculus II Spr 2020

Linear Algebra & Differential Equations Sum 2018, Sum 2019
Developed course syllabus and wrote exams with two other lecturers.
Prepared daily lectures for 30 students and daily quizzes.

Teaching Assistant

Multivariable Calculus Spr 2019

Linear Algebra & Differential Equations Spr 2018

Hybrid PreCalculus II Spr 2016, Aut 2016, Aut 2017
Lead discussions where students present to the class their solutions.
Graded students' participation based on oral and written communication.

CSE Linear Algebra & Differential Equations Spr 2017

Calculus I Aut 2015

Grader

Honors Analysis II Spr 2017

Truman State University

Grader

Differential Equations Spr 2015

Calculus II Aut 2014

Memberships

American Mathematical Society
Phi Beta Kappa (liberal arts and sciences honor society)
Sigma Pi Sigma (physics honor society)
Kappa Mu Epsilon (mathematics honor society)

Other Skills

English, native
French, proficient
German, basic
Japanese, basic

Large lecture instructional software
(Minnesota online learning system, MOLS)
MATLAB
Mathematica

Sage
Linux

References

Research

Alexander Voronov
Professor
voronov@umn.edu
School of Mathematics
University of Minnesota
206 Church St. SE
Minneapolis, MN 55455
USA

Daniel Hernández Ruipérez
Professor of Geometry and Topology
ruiperez@usal.es
Departamento de Matemáticas
Universidad de Salamanca
Plaza Merced, 1-4
Salamanca 37008
SPAIN

Todor Milanov
Professor
todor.milanov@ipmu.jp
Kavli IPMU
The University of Tokyo
5-1-5 Kashiwanoha, Kashiwa-shi
Chiba, 277-8583
JAPAN

Teaching

Mike Weimerskirch
Associate Professor, Director of Educational Innovation, MathCEP
weim0024@umn.edu
School of Mathematics
University of Minnesota
206 Church St. SE
Minneapolis, MN 55455
USA

Bryan Mosher

Professor, Director of Undergraduate Studies

mosher@umn.edu

School of Mathematics
University of Minnesota
206 Church St. SE
Minneapolis, MN 55455
USA