EMILY E. WITT

June 2024

EDUCATION

Ph.D., University of Michigan	2011
Mathematics Department Nominee, Distinguished Dissertation Award	
B.S., University of Chicago	2005
Honors in Mathematics, Specialization in Computer Science	

PROFESSIONAL APPOINTMENTS

Associate Professor, University of Kansas	2020–
Affiliate Faculty, Institute for Information Sciences, University of Kansas	2020–
Research Professor, Simons Laufer Mathematical Sciences Institute/Mathematical Sciences Research Institute	2024
Ruth I. Michler Faculty Scholar, Cornell University	2022
Keeler Intra-University Professor, University of Kansas	2021–22
Assistant Professor, University of Kansas	2015–20
Research Assistant Professor, University of Utah	2014–15
Dunham Jackson Assistant Professor, University of Minnesota	2011–14
Postdoctoral Fellow, Mathematical Sciences Research Institute	2013

AWARDS AND HONORS

NATIONAL AND INTERNATIONAL

Ruth I. Michler Memorial Prize, Association for Women in Mathematics	2022–23
Sigma Xi, the Scientific Research Honor Society	2005
First Place, American Computer Science League Programming Competition	2001

UNIVERSITY OF KANSAS

W. W. Keeler Family Intra-University Professorship	2021–22
Don and Pat Morrison Foundation Award for Excellence in Teaching	2019
J. Michael Young Academic Advisor Award, Student Nominated	
Research Excellence Award	2018
Graduate Research Consultant Award	2017

UNIVERSITY OF MICHIGAN

Rackham Graduate School Distinguished Dissertation Award, Departmental Nominee	2011
Alumni Award Recognizing One Outstanding Ph.D. Student	2008

GRANTS AND FELLOWSHIPS

NSF CAREER Award DMS-1945611: New frontiers for Frobenius, singularity theory, differential operators, and local cohomology ($400,000)	2020–25
Collaboration@ICERM Award, Institute for Computational and Experimental Research in Mathematics	2024
Simons Foundation Collaboration Grant 582574: Local cohomology and numerical invariants in commutative algebra ($42,000)	2018–21
Course Transformation Grant, University of Kansas ($1,400)	2019–20
Structured Quartet Research Ensemble (SQuaRE) Collaboration Award, American Institute of Mathematics	2017–20
Research Grant Opportunity Award, University of Kansas ($12,400)	2018–19
NSF Standard Grant DMS-1501404/1623035: Local cohomology, the Frobenius endomorphism, D-module theory, and invariant theory ($127,000)	2015–19
NSF Conference Grant DMS-1645050, KUMUNU (Kansas-Missouri-Nebraska) Algebra Conference ($12,000)	2016–17
New Faculty Research Fund Grant, University of Kansas ($8,000)	
NSA–AMS Young Investigator Award ($40,000, declined)	2015–16
AMS–Simons Travel Grant ($4,000)	2014–15
AMS Travel Grant, International Congress of Mathematicians, Seoul ($1,200)	2014
Collaboration Grant, AMS Mathematical Research Communities	2012
Algebraic Geometry Research Training Grant Fellowship, University of Michigan, NSF DMS-0502170	2008, '10
Focused Research Group Assistantship, University of Michigan, NSF DMS-0602191	2007
Mathematics Departmental Scholarship, University of Michigan	2006–07

PUBLICATIONS

Local cohomology of subspace arrangements and simplicial homology
 with A. Pascoe, submitted (32 pages)

Formalizing Commutative Algebra in Coq: Nakayama's Lemma
 with D. Cousino and P. Alexander, submitted (12 pages)

Jumping numbers of F-pure submodules
 with A. De Stefani, D. J. Hernández, and L. Núñez–Betancourt
 submitted (26 pages)

Bernstein's inequality and holonomicity for certain singular rings
 with J. Àlvarez Montaner, J. Jeffries, D. J. Hernández, L. Núñez–Betancourt, and P. Teixeira
 to appear in **International Mathematics Research Notices** (34 pages)

Lower bounds on the F-pure threshold and extremal singularities
 with Z. Kadyrsizova, J. Kenkel, J. Page, J. Singh, K. E. Smith, and A. Vraciu
 Transactions of the American Mathematical Society 9 (2022), 977–1005

Bernstein–Sato functional equations, V-filtrations, and multiplier ideals of direct summands
with J. Àlvarez Montaner, J. Jeffries, D. J. Hernández, L. Núñez–Betancourt, and P. Teixeira
Communications in Contemporary Mathematics 24 (2022), no. 10, Paper No. 2150083, 47 pp.

Cubic surfaces of characteristic two
with Z. Kadyrsizova, J. Kenkel, J. Page, J. Singh, K. E. Smith, and A. Vraciu
Transactions of the American Mathematical Society 374 (2021), 6251–6267

Classification of Frobenius forms in dimension five
with Z. Kadyrsizova, J. Kenkel, J. Page, J. Singh, K. E. Smith, and A. Vraciu
Women in Commutative Algebra, Springer, AWM Series 29 (2021), 353–367

The FrobeniusThresholds package for Macaulay2, with D. J. Hernández, K. Schwede, and P. Teixeira
Journal of Software for Algebra and Geometry 11–1 (2021), 25–39

Frobenius powers, with D. J. Hernández and P. Teixeira
Mathematische Zeitschrift 296 (2020), no. 1–2, 541–572

Frobenius powers of some monomial ideals, with D. J. Hernández and P. Teixeira
Journal of Pure and Applied Algebra 224 (2020) no. 1, 66–8

Connectedness and Lyubeznik numbers, with L. Núñez–Betancourt and S. Spiroff
International Mathematics Research Notices 2019 (2019), no. 13, 4233–4259

Lyubeznik numbers and the injective dimension of local cohomology in mixed characteristic
with D. J. Hernández, L. Núñez–Betancourt, and F. Pérez
Transactions of the American Mathematical Society 371 (2019) no. 11, 7533–7557

The TestIdeals package for Macaulay2, with A. Boix, D. J. Hernández, Z. Kadyrizova, M. Katzman,
S. Malec, M. Robinson, K. Schwede, D. Smolkin, and P. Teixeira
Journal of Software for Algebra and Geometry 9 (2019), no. 2, 89–110

Cohomological dimension, Lyubeznik numbers, and connectedness in mixed characteristic
with D. J. Hernández, L. Núñez–Betancourt, and F. Pérez
Journal of Algebra 514 (2018), 442–467

Local m-adic constancy of F-pure thresholds and test ideals
with D. J. Hernández and L. Núñez–Betancourt
Mathematical Proceedings of the Cambridge Philosophical Society 164 (2018) no. 2, 285–295

On the behavior of singularities at the F-pure threshold
with E. Canton, D. J. Hernández, and K. Schwede
Illinois Journal of Mathematics 60 (2016) no. 3–4, 669–685

F-pure thresholds of homogeneous polynomials
with D. J. Hernández, L. Núñez–Betancourt, and W. Zhang
Michigan Mathematical Journal 65 (2016), 57–87

A survey on the Lyubeznik numbers, with L. Núñez-Betancourt and W. Zhang
Contemporary Mathematics 657 (2016)

Generalized Lyubeznik numbers, with L. Núñez-Betancourt
Nagoya Mathematical Journal 215 (2014), 167–202

Local cohomology with support in ideals of maximal minors and sub-maximal Pfaffians

with C. Raicu and J. Weyman
Advances in Mathematics 250 (2014), 596–610

Lyubeznik numbers in mixed characteristic, with L. Núñez-Betancourt
Mathematical Research Letters 20 (2013) no. 6, 1–19

Local cohomology with support in ideals of maximal minors
Advances in Mathematics 231 (2012) 1998–2012

Local cohomology and group actions
Ph.D. Thesis–University of Michigan (2011), ProQuest LLC

SOFTWARE

Formalization of Local Cohomology in Lean, with S. van Gool, J. Levinson, and S. Morrison	2023
FrobeniusThresholds Package for Macaulay2 (Current version: 2.0), with J. Bruce, et. al.	2019
TestIdeals Package for Macaulay2 (Current version: 1.01), with E. Bela, et. al.	2018

INVITED RESEARCH TALKS

NATIONAL AND INTERNATIONAL CONFERENCES

The 56th Congress of the Mexican Mathematical Society, San Luis Potosí, Mexico	2023
Macaulay2: Expanded Functionality and Improved Efficiency, American Institute of Mathematics, Pasadena, CA	
Formalization of Cohomology Theories, Banff International Research Station, Banff, Alberta, Canada	
Conference in Honor of Craig Huneke and Melvin Hochster, International Centre for Theoretical Physics, Trieste, Italy[1]	
D-modules, Group Actions, and Frobenius: Computing on Singularities, Institute for Computational and Experimental Research in Mathematics, Providence, RI	2021
Singularities in Positive Characteristic, Centre International de Rencontres Mathématiques, Luminy, Marseilles, France	
Morgantown Algebra Days, West Virginia University[1]	
Escuela de Otoño de Álgebra Conmutativa (Fall School in Commutative Algebra), Centro de Investigación en Matemáticas, Guanajuato, Mexico	2017
Local Cohomology in Commutative Algebra and Algebraic Geometry, a Conference in Honor of Gennady Lyubeznik, University of Minnesota	
Conference on Geometric Methods in Representation Theory, University of Missouri	2016
Commutative Algebra and its Interactions with Algebraic Geometry: A Conference Honoring Craig Huneke, University of Michigan	
Conference on *D*-modules in Commutative Algebra, Centro de Investigación en Matemáticas, Guanajuato, Mexico	

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[1]Canceled due to COVID-19.

International Conference on Representation Theory and Commutative Algebra in Honor of Jerzy Weyman, University of Connecticut

Workshop on the Commutative Algebra of Singularities in Birational Geometry, Mathematical Sciences Research Institute, Berkeley, CA — 2013

REGIONAL CONFERENCES

Texas Algebraic Geometry Symposium, Rice University[1] — 2020

Midwest Women in Mathematics Symposium, University of Iowa — 2019

Texas Algebraic Geometry Symposium Fall Program, Texas A&M University — 2018

CA+ Conference on Commutative Algebra and Related Fields, University of Minnesota

KUMUNU (Kansas-Missouri-Nebraska) Algebra Conference, University of Missouri — 2015

Bi-annual Algebraic and Tropical Meetings of Brown and Yale, Yale University — 2014

KUMUNUjr Algebra Conference, University of Nebraska, Lincoln

Route 81 Conference, Syracuse University — 2010

SEMINARS AND COLLOQUIA

Colloquium, Commutative Algebra Program, SLMath/MSRI — 2024

Ruth I. Michler Lecture, Cornell University — 2022

Joint Northwestern University / University of Illinois at Chicago / University of Chicago Algebra & Geometry Seminar[1] — 2020

Algebraic Geometry Seminar, Duke University[1]

Colloquium; University of California, Irvine

Colloquium, University of Minnesota

Colloquium, Texas A&M University — 2019

Algebra and Combinatorics Seminar, Texas A&M University — 2018

Colloquium, Georgia State University — 2017

Combinatorial Commutative Algebra Seminar, Centro de Investigación en Matemáticas, Guanajuato, Mexico

Colloquium, Syracuse University — 2016

Commutative Algebra Seminar, University of Illinois at Chicago

Commutative Algebra Seminar, University of Virginia — 2015

Commutative Algebra Seminar, University of Michigan

Colloquium, University of New Mexico — 2014

Commutative Algebra Seminar, University of Utah — 2013

Invariant Theory Seminar, Mathematical Sciences Research Institute, Berkeley, CA

Junior Member Seminar, Mathematical Sciences Research Institute, Berkeley, CA

Commutative Algebra Seminar, University of Michigan — 2012

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[1]Canceled due to COVID-19.

Algebra Seminar, University of Kansas   2010

Commutative Algebra Seminar, University of Nebraska–Lincoln

SPECIAL SESSIONS

Commutative Algebra, AMS Fall Western Sectional, University of New Mexico   2021

Commutative Algebra, AMS Fall Central Sectional, Creighton University

Commutative Ring Theory, AMS Spring Central Sectional, North Dakota State University   2016

Commutative Algebra, AMS Spring Western Sectional, University of Utah

Effective Methods in D-modules and Singularities, SIAM Conference on Applied Algebraic   2013
    Geometry, Colorado State University

Commutative Algebra, AWM Research Symposium, Santa Clara University

Topics in Commutative Algebra, AMS Spring Central Sectional, University of Kansas   2012

Commutative Algebra, AMS Fall Western Sectional, University of Utah   2011

Local Commutative Algebra, AMS Fall Central Sectional, University of Nebraska, Lincoln

Commutative Algebra, AMS Mathematical Research Communities, JMM, New Orleans, LA

Commutative Algebra, AMS–Sociedad Matemática Mexicana, Eighth International Meeting,
    University of California, Berkeley

PROFESSIONAL SERVICE

EDITORIAL SERVICE

Associate Editor, Journal of Software for Algebra and Geometry   2024–

Editor, Women in Commutative Algebra, Springer Publishing   2022

ORGANIZATIONAL SERVICE

Algebra Seminar, University of Kansas   2015–

Macaulay2: Expanded Functionality and Improved Efficiency, American Institute of   2023
    Mathematics, Pasadena, CA

Women in Commutative Algebra Workshop, Thematic Program in Commutative Alge-   2025
    bra and Applications, Fields Institute, Toronto, Canada (Upcoming)

JMM Special Session on Commutative Algebra in Positive Characteristic in Honor of   2021
    Karen Smith's AMS Colloquium Lecture, Denver, CO

Women in Commutative Algebra Workshop, Banff International Research Station, Banff,   2019
    Alberta, Canada

AWM Research Symposium, Special Session in Commutative Algebra, University of Cal-   2017
    ifornia, Los Angeles

KUMUNU (Kansas-Missouri-Nebraska) Algebra Conference, University of Kansas   2016

JMM Special Session on Commutative Algebra in Honor of Karen Smith's AWM– AMS
    Noether Lecture, JMM, Seattle, WA

BIKES Postdoc/Student Learning Seminar, University of Utah   2014–15

AMS Special Session on Commutative Algebra, Western Spring Sectional Meeting, University of New Mexico	2014
Postdoc Seminar, University of Minnesota	2013
Student Commutative Algebra Seminar, University of Michigan	2010–11
Frobenius Splittings in Algebraic Geometry, Commutative Algebra, and Representation Theory, University of Michigan (Local Organizer)	2010
Conference in Honor of Mel Hochster, University of Michigan (Local Organizer)	2008

SOFTWARE DEVELOPMENT LEADERSHIP

Macaulay2 Development Workshops: American Institute of Mathematics (Organizer, 2023), University of California, Berkeley (Team lead, 2017), University of Utah (Team lead, 2016), Boise State University (Team lead, 2015), Mathematical Sciences Research Institute (2014), Wake Forest University (2012)

Macaulay2 development sessions: Coding Sprint, Institute for Mathematics and its Applications (2019); Collaborative Meeting, the University of Utah (2018)

REFEREEING AND REVIEWING

Review Panelist, National Science Foundation	Various
Proposal Reviewer, Banff International Research Station Banff	Various
Reviewer, Mathematical Reviews	2015–
Referee; Archiv der Mathematik, Communications in Algebra, Compositio Mathematica, Illinois Journal of Mathematics (2), International Mathematics Research Notices (2), Journal of Algebra (3), Journal of Algebra and Its Applications (2), Journal of Commutative Algebra (3), Journal of Pure and Applied Algebra (2), Nagoya Mathematical Journal (2), Notices of the American Mathematical Society, Pacific Journal of Mathematics, Princeton University Press (book), Proceedings of the American Mathematical Society (2), Selecta Mathematica, Transactions of the American Mathematical Society (4)	

DIVERSITY, EQUITY, AND INCLUSION EFFORTS

Organizer, Women in Commutative Algebra, Thematic Program in Commutative Algebra and Applications, Fields Institute, Toronto, Canada (Upcoming)	2025
Co-Director and Organizer, Cryptography Boot Camp NSF-REU professional development program serving students from underrepresented groups, funded by NSF CAREER DMS-1945611, University of Kansas	2023
Mentor, National Alliance for Doctoral Studies in the Mathematical Sciences	2017–
Faculty Advisor, AWM Student Chapter, University of Kansas	2015–
Mentor, Ph.D. students at various institutions, AWM Mentor Network	2012–
AWM Research Networks Committee	2022–25
Facilitator, Panel on Graduate Student Life, AWM Student Chapter, University of Kansas	2020
Organizer, Women in Commutative Algebra Workshop, Banff International Research Station; first research collaboration conference for women in the field	2019

Invited Panelist, Nebraska Conference for Undergraduate Women in Mathematics	2019
Director and Co-Advisor, Cryptography and Number Theory Boot Camp REU Program serving students from underrepresented groups, University of Texas at El Paso, funded by NSF DMS-1623035	2017
Judge, AWM Essay Contest	2015–16
Invited Panelist, Truth Values by Gioia de Cari, Lied Center of Kansas	2015
Volunteer, Girls Excel in Math program serving Twin Cities area elementary students	2013–14
Instructor, Michigan Science, Technology, Engineering, and Mathematics Academy preparatory program serving incoming underrepresented engineering students, University of Michigan	2009–11
Instructor, Professionals in Training Program serving incoming underrepresented engineering students, University of Michigan	2008
Invited Panelist, Women in Science and Engineering Panel, University of Michigan	2010

OUTREACH AND COMMUNITY ENGAGEMENT

Sustainability Ambassador, University of Kansas	2016–
Session Leader, Michigan Math Circle, University of Michigan	2021
Evaluator, Math Awareness Month K-12 Competition, University of Kansas	2016–21
Speaker, Undergraduate Math Club, University of Kansas	2019
Inaugural Committee Member, Jedel Excellence in Mathematics Education Award recognizing exemplary K-12 teaching in greater Kansas City	2018–19
Faculty Mentor for Undergraduates on Academic Probation, University of Kansas	2016–19
Organizer, Graduate Student Professional Development Sessions, University of Kansas	2018
Speaker, "What is Math?" Day, University of Utah	2015
Session leader, Math for America Utah Teachers' Circle	
Facilitator, Institute for Mathematics and its Applications Outreach Event, Minnesota State Fair	2013
Facilitator, Mathematical Sciences Research Institute's Pi Nightlife, California Academy of Sciences	
Session Leader, Berkeley Math Circle, University of California, Berkeley	
Speaker, University of Minnesota Talented Youth Mathematics Program	
Instructor, Michigan Math and Science Scholars program for middle and high school students, University of Michigan	2008–11
Graduate Student Peer Mentor, University of Michigan	2006–11
Speaker, Undergraduate Research Opportunity Program, University of Michigan	2010
Speaker, Undergraduate Math Club, University of Michigan	2009
Departmental Delegate, Graduate Student Forum, University of Michigan	2006–07
Course Assistant, Seminars for Elementary Specialists and Mathematics Educators program serving Chicago Public Schools teachers, University of Chicago	2003–05

Counselor, Young Scholars Program for secondary students, University of Chicago

ADVISING

Ph.D. Advisor, Ryan Hunter, University of Kansas	2023–
Postdoctoral Mentor, Jonah Tarasova, SLMath	2024
Ph.D. Advisor, Abraham Pascoe, University of Kansas	2019–24
Honors Thesis Advisor, Nicole Johnson, University of Kansas	2018–19
Honors Thesis Advisor, University of Kansas, Ransheng Guan	2016–17
Senior Thesis Advisor, Lorenzo David, University of Minnesota	2014
Honors Thesis Advisor, Ana Liard-Blanco, University of Minnesota	2013
Honors Contract Advisor, Ana Liard-Blanco, University of Minnesota	2012
REU Co-Advisor, Joseph Billian and Sifat Rahman, University of Michigan	2011
Math Placement Advisor, New Student Orientation, University of Michigan	2008

TEACHING

UNIVERSITY OF KANSAS

Multivariable Calculus (Math 127; Fall 2023)

Intermediate Analysis (MATH 500; Fall 2023, Spring 2017)

Directed Reading: Local Cohomology (MATH 993; Fall 2023/2021)

Commutative Algebra (MATH 831; Spring 2022)

Introductory Modern Algebra (MATH 558; Fall 2020/2016/2015, Spring 2018)

Directed Reading: Gröbner Bases (MATH 993; Spring 2020)

Algebraic Topics in Computing: Cryptography (Course designer) (MATH 601; Spring 2020)

Directed Reading: Commutative Algebra (MATH 993; Fall 2019/2020, Spring 2021)

Honors Integral Calculus (MATH 146; Fall 2019, Spring 2016)

Modern Algebra (Graduate) (MATH 791; Spring 2019)

Directed Reading: Monomial Ideals (MATH 699; Spring 2019)

Elementary Linear Algebra (MATH 290; Fall 2018)

Directed Reading: Topology (MATH 699; Fall 2018)

Directed Reading: Algebraic Geometry (MATH 699; Spring 2018)

Honors Differential Calculus (MATH 145; Fall 2017)

Directed Reading: Elliptic Curves and Cryptography (MATH 699; Spring 2017)

Directed Reading: Galois Theory (MATH 699; Fall 2016)

UNIVERSITY OF UTAH

Cryptography and Codes (MATH 5405; Spring 2015)

Integral Calculus (MATH 1220; Fall 2014)

UNIVERSITY OF MINNESOTA

Introduction to Modern Algebra (MATH 4281; Spring 2014)

Differential Calculus (MATH 1371; Fall 2013)

First Year Experience, College of Science and Engineering (CSE 1001; Fall 2013)

Cryptology and Number Theory (MATH 5248; Spring 2012)

Integral Calculus (Course coordinator) (MATH 1372; Fall 2012/2011)

UNIVERSITY OF MICHIGAN (as Instructor of Record)

Integral Calculus (MATH 116; Fall 2009/2007)

Differential Calculus (MATH 115; Winter 2008/2006, Fall 2006)

Precalculus (MATH 105; Fall 2005)

PROFESSIONAL MEMBERSHIPS

Association for Women in Mathematics	2007–
American Mathematical Society	2005–
Sigma Xi, the Scientific Research Honor Society	