

EMILY E. WITT

March 2022

EDUCATION

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

PROFESSIONAL APPOINTMENTS

Keeler Intra-University Professor, University of Kansas	2021 – 22
Associate Professor, University of Kansas	2020 –
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

Ruth I. Michler Memorial Prize, AWM/Cornell University	2022 – 23
W. W. Keeler Family Intra-University Professorship, University of Kansas	2021 – 22
Don and Pat Morrison Foundation Award for Excellence in Teaching, University of Kansas	2019
J. Michael Young Academic Advisor Award, University of Kansas (Student Nominated)	
Research Excellence Award, University of Kansas	2018
Graduate Research Consultant Award, University of Kansas	2017
Departmental Nominee, Distinguished Dissertation Award, Rackham Graduate School, University of Michigan	2011
Alumni Award recognizing one outstanding Ph.D. student, University of Michigan	2008
Sigma Xi, the Scientific Research Honor Society	2005
First Place, American Computer Science League Programming Competition	2001

GRANTS AND FELLOWSHIPS

NSF CAREER Award DMS-1945611, New frontiers for Frobenius, singularity theory, differential operators, and local cohomology (\$400,000)	2020 – 25
Simons Foundation Collaboration Grant 582574, Local cohomology and numerical invariants in commutative algebra (\$42,000)	2018 – 21
SQuaRE (Structured Quartet Research Ensemble) Collaboration Award, American Institute of Mathematics	2017 – 20
Course Transformation Grant, University of Kansas (\$1,400)	2019 – 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 (NSF DMS-0502170), University of Michigan	2008, '10
Focused Research Group Assistantship (NSF DMS-0602191), University of Michigan	2007
Departmental Scholarship, University of Michigan	2006 – 07

PUBLICATIONS

- Bernstein's inequality and holonomicity for certain singular rings, with J. Álvarez Montaner, J. Jeffries, D. J. Hernández, L. Núñez-Betancourt, and P. Teixeira, submitted for publication
- 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, to appear in *Transactions of the American Mathematical Society*
- Bernstein-Sato functional equations, V -filtrations, and multiplier ideals of direct summands, with J. Álvarez Montaner, J. Jeffries, D. J. Hernández, L. Núñez-Betancourt, and P. Teixeira, to appear in *Communications in Contemporary Mathematics*
- Classification of Frobenius forms in dimension five, with Z. Kadyrsizova, J. Kenkel, J. Page, J. Singh, K. E. Smith, and A. Vraciu, to appear in *Springer AWM Series*
- 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
- 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. Kadyrsizova, 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

SOFTWARE

Coauthor, *Macaulay2* computer algebra software system packages:

<i>FrobeniusThresholds</i> ; current version: 2.0	2019
<i>TestIdeals</i> ; current version: 1.01	2018

INVITED RESEARCH TALKS

CONFERENCES

- 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
- Texas Algebraic Geometry Symposium, Rice University* 2020
- Morgantown Algebra Days, West Virginia University*
- Midwest Women in Mathematics Symposium, University of Iowa 2019
- Southwest Local Algebra Meeting, University of Texas at El Paso
- Texas Algebraic Geometry Symposium Fall Program, Texas A&M University 2018
- Escuela de Otoño de Álgebra Conmutativa (Fall School in Commutative Algebra), Centro de Investigación en Matemáticas, Guanajuato, Mexico 2017
- CA+ Conference (Commutative algebra and related fields), University of Minnesota
- 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

*Postponed or canceled due to COVID-19.

KUMUNU (Kansas-Missouri-Nebraska) Algebra Conference, University of Missouri	2015
Conference on D -modules in Commutative Algebra, Centro de Investigación en Matemáticas, Guanajuato, Mexico	
International Conference on Representation Theory and Commutative Algebra in Honor of Jerzy Weyman, University of Connecticut	
Bi-annual Algebraic and Tropical Meetings of Brown and Yale, Yale University	2014
KUMUNUjr algebra conference, University of Nebraska, Lincoln	
Workshop on the Commutative Algebra of Singularities in Birational Geometry, Mathematical Sciences Research Institute, Berkeley, CA	2013

SEMINARS AND COLLOQUIA

Joint Northwestern University / University of Illinois at Chicago / University of Chicago Algebra & Geometry Seminar*	2020
Algebraic Geometry Seminar, Duke University*	
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
Algebra Seminar, University of Kansas	2010
Commutative Algebra Seminar, University of Nebraska–Lincoln	

SPECIAL SESSIONS

Special Session on Commutative Algebra, AMS Fall Western Sectional Meeting, University of New Mexico	2020
Special Session on Commutative Algebra, AMS Fall Central Sectional Meeting, Creighton University	
Special Session on Commutative Ring Theory, AMS Spring Central Sectional Meeting, North Dakota State University	2016
Special Session on Commutative Algebra, AMS Spring Western Sectional Meeting, University of Utah	

Effective Methods in D -modules and Singularities Minisymposium, SIAM Conference on Applied Algebraic Geometry, Colorado State University	2013
Special Session on Commutative Algebra, AWM Research Symposium, Santa Clara University	
Special Session on Topics in Commutative Algebra, AMS Spring Central Section Meeting, University of Kansas	2012
Special Session on Commutative Algebra, AMS Fall Western Section Meeting, University of Utah	2011
Special Session on Local Commutative Algebra, AMS Fall Central Section Meeting, University of Nebraska, Lincoln	
AMS Mathematical Research Communities Special Session on Commutative Algebra, JMM, New Orleans, LA	
Route 81 Conference/Special Session on Commutative Algebra and Algebraic Geometry, AMS Fall Eastern Sectional Meeting, Syracuse University	2010
Special Session on Commutative Algebra, AMS–Sociedad Matemática Mexicana, Eighth International Meeting, University of California, Berkeley	

PROFESSIONAL SERVICE

EDITORIAL SERVICE

AWM Series, Springer Publishing, Proceedings of the first Women in Commutative Algebra Workshop	2019 – 22
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ORGANIZATIONAL SERVICE

Algebra Seminar, University of Kansas	2015 –
JMM Special Session on Commutative Algebra in Positive Characteristic in Honor of Karen Smith’s AMS Colloquium Lecture, Denver, CO	2021
Women in Commutative Algebra (WICA) Workshop, Banff International Research Station; First Research Collaboration Conference for Women in the Field	2019
AWM Research Symposium, Special Session in Commutative Algebra, University of California, Los Angeles	2017
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

Macaulay2 Development Workshops: 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

Archiv der Mathematik, Communications in Algebra, Compositio Mathematica, Illinois Journal of Mathematics, International Mathematics Research Notices, Journal of Algebra (3), Journal of Algebra and Its Applications (2), Journal of Commutative Algebra (2), Journal of Pure and Applied Algebra, Nagoya Mathematical Journal, Princeton University Press (book), Proceedings of the American Mathematical Society (2), Selecta Mathematica, Transactions of the American Mathematical Society

REVIEWING

Review Panelist, National Science Foundation, various

Reviewer, Mathematical Reviews, 2015 –

ADVISING

Ph.D. Advisor, Abraham Pascoe	2019 –
Honors Thesis Advisor, Nicole Johnson, University of Kansas	2018 – 19
Advisor, University of Kansas Honors Thesis, 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

DIVERSITY AND INCLUSION EFFORTS

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 (WICA) 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
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 –
Evaluator, Math Awareness Month K-12 Competition, University of Kansas	
Session Leader, Michigan Math Circle, University of Michigan	2021
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
Judge, AWM Essay Contest	2015 – 16
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 Academic 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 middle and high school students, University of Chicago	

TEACHING

UNIVERSITY OF KANSAS

Commutative Algebra (MATH 831; Spring 2022)

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

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)
 Intermediate Analysis (MATH 500; Spring 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	2005 –