

# Melissa Emory

Department of Mathematics  
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## Professional Employment

Assistant Professor, Oklahoma State University	August 2022 - Present
NSF Postdoctoral Fellow, University of Toronto	July 2020 - August 2022
University of Toronto, Postdoctoral Fellow	July 2018 - June 2020
Kyoto University, JSPS Fellowship	May 2019 - August 2019
MSRI Research Member	July 22, 2019 - August 02, 2019

## Education

University of Missouri, Ph.D., mathematics	May 2018
Thesis advisor: Shuichiro Takeda	
Thesis title: On the global Gan-Gross-Prasad conjecture for general spin groups	
University of Nebraska, M.A., mathematics	May 2013
University of Nebraska at Omaha, B.S., mathematics	May 2011
<i>magna cum laude</i> , with honors	

## Publications

1. “Contragredients and a multiplicity one theorem for general spin groups”, with S. Takeda (2023) *Math Ziet*. Preprint arXiv:1901.01746
2. “Sato-Tate distributions of  $y^2 = x^p - 1$  and  $y^2 = x^{2p} - 1$ ”, with H. Goodson, *J. Algebra* (2022), doi.org.10.1016/j.jalgebra.2022.01.002
3. “Towards the Sato-Tate groups of trinomial hyperelliptic curves”, with H. Goodson and A. Peyrot *International Journal of Number Theory*, (April 2021), 2175-2206 DOI 10.1142/S1793042121500822. Preprint arXiv:1812.00242 (32 pp).
4. “On the global Gan-Gross-Prasad conjecture for general spin groups”, *Pacific Journal of Mathematics* 306-1 (2020), 115–151. DOI 10.2140/pjm.2020.306.115. Preprint arXiv:2104.04814.
5. “The Diophantine equations  $x^4 + y^4 = D^2 z^4$  in quadratic fields”, *Integers* **12** (2012), article A65 (08 pp).

## Research Interests

Automorphic forms and representations, number theory, representation theory

## Honors and Awards

- NSF Postdoctoral Fellowship (\$150,000.00) July 2020 - August 2022
- Early Career Invited Lecture Award, UBC March 2021
- AMS Simons Travel Grant (\$4,000.00) July 2019 - June 2023
- The Blumenthal Prize, MU Department of Mathematics May 2018
- AWM and AMS Graduate Student Travel award (\$1,000.00) January 2018
- John D. Bies International Travel Award (\$1,200.00) , University of Missouri 2017-2018

- Outstanding Community Service Award, MU Department of Mathematics (x 2) 2016-2018
- Miller Scholarship, MU Department of Mathematics 2013-2014
- NASA Nebraska Space Grant Fellow (Research Fellowship) 2010, 2013
- Outstanding Mathematics Award, University of Nebraska at Omaha 2010-2011
- James Earl Scholarship, UNO Department of Mathematics 2009-2011
- National Science Foundation Step Recipient 2008-2009

## Talks

- Number Theory Seminar, Oklahoma State University November 2023
- *Automorphic forms, their arithmetic, and their applications*, 2023 Fall Central Sectional Meeting, Creighton University, NE October 2023
- *AMS Special Session on Automorphic Forms and L Function*, 2023 Fall Eastern Sectional Meeting, University of Buffalo, NY September 2023
- *AMS Special Session on Homological Aspects of p-adic Groups and Automorphic Representations*, University of Buffalo, NY September 2023
- New Connections between Physics and Number Theory, Pollica, Italy June 2023
- 35th Automorphic Forms Workshop, Baton Rouge, LA, May 2023
- Number Theory Seminar, Kansas State University February 2023
- Joint Mathematics Meeting, Boston MA January 2023
- AMS Special Session on Automorphic Forms and Representation Theory
- Joint Mathematics Meeting, Boston MA January 2023
- AMS Special Session on Women in Automorphic Forms
- Number Theory Seminar, University of British Columbia October 2022
- Association for Women in Mathematics, Undergraduate Student Talk, OSU October 2022
- Lie Groups Seminar (2 talks), Oklahoma State University September 2022
- Number Theory Seminar, Oklahoma State University, September 2022
- *Community-building in the Langlands program*, University of Bonn August 2022
- *AWM Research Symposium, Session: New Directions in Number Theory* University of Minnesota June 2022
- *ESI workshop: Minimal Representations and Theta Correspondence* April 2022
- *AMS Spring Central Sectional Meeting: Recent Developments of Automorphic Groups and Representations of p-adic groups* (online) March 2022
- *Midwest Representation Theory Conference* (online) March 2022
- University of Toronto Number/Representation Theory seminar February 2, 2022
- Duke University Number Theory seminar December 1, 2021
- Midwest Representation Theory conference (tentative) November 12 - 14, 2021
- Florida State University, Algebra and Its Applications, “Beyond Endoscopy” April 2021
- University of British Columbia, Department of Mathematics Colloquium March 2021
- AMS Spring Eastern Sectional Meeting (online, formerly at Brown University) March 2021
- Florida State University, Algebra and Its Applications Seminar February 2021
- University of Nebraska at Omaha, Department of Mathematics Colloquium “The Langlands Program: A Grand Unified Theory” January 2021
- University of Arizona, Algebra and Number Theory Seminar November 2020
- University of Oregon, Number Theory Seminar November 2020
- University of California Los Angeles, Number Theory Seminar October 2020
- Association for Women in Math Lectures, University of Toronto March 2020
- Boston College, Number Theory and Algebraic Geometry Seminar November 2019
- University of Toronto, Number Theory and Representation Theory Seminar October 2020
- February 2019, October 2019
- AMS Sectional Meeting, University of Wisconsin Special Session on Automorphic Forms and L-functions September 2019
- Hokuriku University, Number Theory Seminar July 2019
- Kyoto University, Number Theory Seminar May 2019
- AMS Sectional Meeting, University of Hawaii at Manoa March 2019
- Special Session on Recent Developments in Automorphic Forms
- University of Waterloo, Canada, Number Theory Seminar October 2018
- AMS Sectional Meeting, University of Michigan October 2018

- Representations of Reductive Groups over Local Fields and Related Topics
- University of Toronto, GANITA Lab Seminar June 2018
  - Canadian Number Theory Association Conference XV June 2018
  - Purdue University, Automorphic Forms and Representation Theory Seminar April 2018
  - Tufts University, 32nd Automorphic Forms Workshop March 2018
  - Joint Math Meetings, San Diego, CA January 2018
  - Association for Women in Mathematics Workshop, San Diego, CA (poster) January 2018
  - University of Missouri, Number Theory Seminar March, May, Oct. 2016
  - University of Missouri, Graduate Student Seminar Oct. 2014, April 2016
  - Midwest Number Theory Conference for Graduate Students and Recent PhDs IX, University of Illinois at Urbana-Champaign October 2012
  - MAA Sectional Meeting, Fremont Nebraska March 2012
  - Pi Mu Epsilon National Conference, Pittsburgh PA August 2010
  - Nebraska Conference for Undergraduate Women in Mathematics January 2010

### Conferences and Workshops Attended

- *Analytic, arithmetic, and geometric aspects of automorphic forms*, American Institute of Mathematics, Pasadena, California, January 2024
- *Arthur packets*, BIRS-IASM Workshop, November, 2023.
- *TORA XII*, University of Oklahoma, October 2023
- *New Connections between Physics and Number Theory*, Pollica, Italy June 2023
- *35th Automorphic Forms Workshop*, Baton Rouge, LA, May 2023
- *Beyond Endoscopy Mini Conference*, the Fields Institute, April 2023
- *Joint Mathematics Meetings*, Boston MA, January 2023
- *Community-building in the Langlands program: University of Bonn*, August 2022
- *AWM Research Symposium, Session: New Directions in Number Theory* University of Minnesota, June 2022
- *ESI workshop: Minimal Representations and Theta Correspondence*, April 2022
- *Midwest Representation Theory Conference* University of Michigan, March 2022
- *Periods, Functoriality, and L-functions*, CIRM (online) January 2022
- *Relative Aspects of the Langlands Program, L-Functions and Beyond Endoscopy Aspects relatifs du programme de Langlands, fonctions-L et beyond endoscopy*, CIRM, (online) May 2021
- *Cross Atlantic Representation Theory and Other topics Online conference*, May 2020
- *New Developments in Representation Theory of  $p$ -adic Groups*, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany, October 2019
- *On the Langlands Program: Endoscopy and Beyond*, National University of Singapore (partially funded participant) December 2018 - January 2019
- *Sixth Abel Conference: A Mathematical Celebration of Robert P. Langlands*, Institute for Mathematics and its Applications, November 2018 (funded participant)
- *Communicating Mathematics Effectively*, University of Washington, June 2018 (funded participant)
- *Women in Mathematics Symposium*, Purdue University, April 2018 (funded participant)
- *32nd Automorphic Forms Workshop*, Tufts University, March 2018 (funded participant)
- *Joint Math Meetings*, San Diego, CA, January 2018 (funded AWM participant)
- *Functoriality and the Trace Formula*, American Institute of Mathematics, Dec. 2017
- *Paul J. Sally, Jr. Midwest Representation Theory Conference*, October 2017, Purdue University (funded participant)
- *Representation Theory of  $p$ -adic Groups Conference and Workshop*, July 2017 Indian Institute of Science Education and Research, Pune, India (funded participant)
- *Graduate Summer School on Automorphic Forms and the Langlands Program*, July-August 2017, Mathematical Sciences Research Institute, Berkeley (funded participant)
- *re:boot number theory*, June 2017, Duke University (funded participant)
- *Arizona Winter School: Perfectoid Spaces*, March 2017, University of Arizona, Ana Caraiani's Study Group (funded participant)
- *Midwest Women in Mathematics Symposium*, Indiana University - Indianapolis, February 2017 (funded participant)

- *Paul J. Sally, Jr. Midwest Representation Theory Conference*, October 2016, University of Iowa (funded participant)
- *Graduate Summer School on Character and Representation Theory*, July 2016, Mathematical Sciences Research Institute, Berkley (funded participant)
- *Pacific Institute for the Mathematical Sciences*, June 2016, University of Calgary, Graduate Summer School on Abelian Varieties (funded participant)
- *30th Automorphic Forms Workshop*, March 2016, Wake Forest University (funded participant)
- *Arizona Winter School: Analytic Methods in Arithmetic Geometry*, March 2016, University of Arizona, Andrew Sutherland's project group (funded participant)
- *Joint Mathematics Meeting*, January 2016, Seattle, WA
- *Paul J. Sally, Jr. Midwest Representation Theory Conference*, October 2015, University of Missouri
- *Arizona Winter School: Arithmetic Statistics*, March 2014, University of Arizona, Chantel David's study group, (funded participant)
- *Midwest Number Theory Conference for Graduate Students and Recent PhDs*, University of Illinois at Urbana-Champaign, 2012, 2014, University of Illinois at Chicago, 2015 (funded participant)
- *KUMUNU*, 2014, 2015, University of Missouri
- *MAA Spring Regional Meeting*, April 2012, Fremont Nebraska
- *Workshop on Hopf Algebras and Galois Scaffolds*, May 2011, University of Nebraska at Omaha
- *American Mathematical Society Fall Central Sectional Meeting*, April 2011 University of Nebraska
- *MathFest and Pi Mu Epsilon Conference*, August 2010, University of Pittsburgh (funded)
- *Nebraska Conference for Undergraduate Women in Mathematics*, 2008, 2010, University of Nebraska (funded participant)
- *MathFest*, August 2008, University of Wisconsin (funded participant)

## Major Teaching Experiences

### Oklahoma State University

- MATH 4713/5713 Number Theory, Fall 2023
- MATH 2890, Honors Calculus in Calculus II (1 credit hour add-on course), Fall 2023
- MATH 4453/5453 Theory of Mathematical Interest, Spring 2023, Spring 2024
- MATH 2153 Calculus II (2 sections) Fall 2022: (1 Section) Fall 2023

### University of Toronto

- Instructor, Calculus I, Fall 2018, Fall 2019
- Instructor, Calculus II, Spring 2020

### University of Missouri

- Instructor, Theory of Numbers, Spring 2018
- Teaching Assistant, Calculus II, Fall 2017
- Instructor, Calculus for Social Sciences I, Fall 2015, Spring 2016
- Instructor, Trigonometry, Fall 2015
- Instructor, Finite Math, Spring 2015
- Instructor, Summer Transition Program for underrepresented minorities, Summer 2015
- Instructor, College Algebra Fall 2013 - Fall 2014

### University of Nebraska at Omaha

- Instructor, Calculus 1, Fall 2016 - Spring 2017
- Instructor, Theory of Interest, Fall 2016
- Instructor, Developmental Math Courses through MCC, Fall 2011 - Spring 2013
- Trio Project Achieve Tutor in Mathematics, 2008 - 2010

Arizona Winter School: Problem Session Leader, March 2022

## Service and Outreach Activities

- Reviewer
  - Annals of Mathematics, Canadian Journal of Math, Journal of Number Theory, Journal de

## Théorie des Nombres de Bordeaux

- Organizer of Conferences and Seminars
  - Co-organizer for the 36th Automorphic Forms Workshop, Stillwater OK April 2024
  - Co-organizer for the Texas-Oklahoma Representations and Automorphic Forms Conference (TORA), August 2022 - Present
  - Co-organizer for the Beyond Endoscopy Mini Conference, the Fields Institute, April 2023
  - Co-organizer of AMS Spring Western Sectional Meeting on "Recent Advances in the Langlands Program", Denver, CO, May 2022
  - Co-organizer of the Lie Groups seminar, Oklahoma State University (Fall 2022- present).
  - Organizer of Number/Representation Theory seminar, University of Toronto (Fall 2021 - Spring 2022)
  - Organizer of a weekly working seminar with Prof. Arthur's Ph.D students, University of Toronto. (Fall 2019 -present.)
  - Community of Practice (University of Toronto), Member (2018-2019), Organizer (2019-present). This is a seminar focused on peer mentorship and best practices for active learning in large classes.
  - Representation Theory and Number Theory Seminar (MU) Co-organizer (Spring 2016) Organizer (Fall 2017)
  - Organized on campus showing of Hidden Figures movie and discussion panel for the MU community to encourage underrepresented minorities in STEM majors (March 2017).
- Outreach to the Community
  - Guest speaker for the High School Classification in Mathematics Course (summer program) at the University of Toronto (June 2020)
  - Developed and taught a cryptography course to the Girls in STEM program at the University of Toronto (October 2018, March 2022)
  - Tutored at risk high school students in mathematics through the MU Math Department (2015 - 2018)
  - Developed and taught a Cryptography course to under-represented minority youth during Eureka! Girls Camp, University of Nebraska at Omaha, (June, 2014).

## Computer Skills

- Experience with Sage, Magma, Maple, and Java

## Professional Memberships

- American Mathematical Society (AMS)
- Association for Women in Mathematics (AWM)
- Canadian Mathematical Society (CMS)