

Education

- **University of Notre Dame** Notre Dame, IN
Ph.D. Candidate in Applied and Computational Mathematics and Statistics Expected May 2020
– Advisor: Jonathan Hauenstein
- *M.S. in Applied and Computational Mathematics and Statistics* May 2017
– GPA: 3.85/4.00
- **Swarthmore College** Swarthmore, PA
B.A. Mathematics and Physics (with Honors) June 2014
– GPA: 3.44/4.00.

Academic Appointments

- **Nonlinear Algebra Group** Max Planck Institute for Mathematics in the Sciences, Leipzig
Visiting Researcher Aug. 2019 - Sept. 2019
- **Computer Vision Cluster** ICERM at Brown University
Visiting Researcher Feb. 2019
- **Semester Program on Nonlinear Algebra** ICERM at Brown University
Visiting Researcher Sept. 2018 - Dec. 2018

Publications

- Ricardo Fabbri, Timothy Duff, Hongyi Fan, **Margaret H. Regan**, David da Costa de Pinho, Elias Tsigaridas, Charles W. Wampler, Jonathan D. Hauenstein, Benjamin Kimia, Anton Leykin, and Tomas Pajdla, “Trifocal relative pose from lines at points and its efficient solution.” *Submitted*.
- Jonathan D. Hauenstein and **Margaret H. Regan**, “Real monodromy action.” *Submitted*.
- Danielle A. Brake, Jonathan D. Hauenstein, and **Margaret H. Regan**, “polyTop: Software for computing topology of smooth real surfaces.” *LNCS*, 10931, 397-404, 2018. DOI: 10.7274/R0PV6HF4
- Jonathan D. Hauenstein and **Margaret H. Regan**, “Adaptive strategies for solving parameterized systems using homotopy continuation.” *Applied Mathematics and Computation*, 332, 19-34, 2018. DOI: 10.7274/R0C53HXK
- Peter J. Collings, Joshua N. Goldstein, Elizabeth J. Hamilton, Benjamin R. Mercado, Kenneth J. Nieser, **Margaret H. Regan**, “The nature of the assembly process in chromonic liquid crystals.” *Liquid Crystals Reviews* 3(1), 1-27, 2015. DOI: 10.1080/21680396.2015.1025305
- Elizabeth A. Mills, **Margaret H. Regan**, Vesna Stanic, and Peter J. Collings, “Large Assembly Formation via a Two-Step Process in a Chromonic Liquid Crystal.” *The Journal of Physical Chemistry B* 116(45), 13506-13515, 2012. DOI: 10.1021/jp306135w

Awards

- SIAM Student Travel Award (\$850) for SIAM Conference on Applied Algebraic Geometry (July 2018)
- Graduate Student Professional Development Award (\$500) from ACMS Department at the University of Notre Dame for SIAM Annual Meeting (July 2019)
- SIAM Outstanding Efforts and Achievements Award – University of Notre Dame SIAM Student Chapter (May 2019)
- AMS Travel Award (\$250) for AMS Sectional Meeting (Nov. 2018)
- SIAM Student Travel Award (\$650) for SIAM Annual Meeting (July 2018)
- Graduate Student Professional Development Award (\$500) from ACMS Department at the University of Notre Dame for SIAM Annual Meeting (July 2018)
- SIAM Student Travel Award (\$650) for SIAM Conference on Applied Algebraic Geometry (Aug. 2017)
- Arthur J. Schmitt Leadership Fellowship in Science and Engineering (2016 - present)
- National Science Foundation Graduate Research Fellowship Honorable Mention 2016
- Bobby Berman '05 Memorial Prize (\$1000) - Awarded by the Department of Physics and Astronomy at Swarthmore College (June 2014)

Invited Presentations

- *Structure of Real Algebraic Varieties via Monodromy and Topology*, Sept. 2019, Seminar on Nonlinear Algebra, Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany.
- *Image Reconstruction using Numerical Algebraic Geometry*, Aug. 2019, IMPACT Seminar, Czech Institute of Robotics, Informatics and Cybernetics, Prague, Czech Republic.
- *Structure of Real Algebraic Varieties via Monodromy and Topology*, Aug. 2019, Applied Algebra and Analysis Seminar, Technische Universitt Braunschweig, Braunschweig, Germany.
- *Numerical computation of monodromy action over \mathbb{R}* , March 2019, SIAM Conference on Applied Algebraic Geometry, University of Bern, Bern, Switzerland.
- *Real monodromy action*, March 2019, AMS Southeastern Sectional Meeting, Auburn University, Auburn, AL.
- *Numerically solving elliptic PDEs on real algebraic curves and surfaces*, Nov. 2018, AMS Northeastern Sectional Meeting, University of Arkansas, Fayetteville, AR.
- *polyTop: Software for computing topology of smooth real surfaces*, July 2018, SIAM Annual Meeting, Portland, OR.
- *polyTop: Software for computing topology of smooth real surfaces*, July 2018, ICMS Conference, University of Notre Dame, Notre Dame, IN.
- *Homotopies for Overdetermined Systems with Applications in Computer Vision*, Aug. 2017, SIAM Conference on Applied Algebraic Geometry, Georgia Institute of Technology, Atlanta, GA.
- *Homotopies for Overdetermined Systems with Applications in Computer Vision*, May 2017, Graduate COS-JAM, University of Notre Dame, Notre Dame, IN.

Poster Presentations

- *Real monodromy action*, June 2019, MEGA and MEGAR Conference, Universidad Complutense de Madrid, Madrid, Spain.
- *Solving elliptic PDEs on real algebraic curves and surfaces*, Nov. 2018, Nonlinear Algebra and Applications, ICERM at Brown University, Providence, RI.
- *Applications of Homotopies for Overdetermined Systems*, Sept. 2018, Core Computational Methods, ICERM at Brown University, Providence, RI.
- *polyTop: Software for computing topology of smooth real surfaces*, June 2018, TCU CBMS Conference: Applications of Polynomial Systems, TCU, Fort Worth, TX. (Also contributed to a software demonstration.)
- *polyTop: Software for computing topology of smooth real surfaces*, April 2018, Meeting on Applied Algebraic Geometry, Georgia Institute of Technology, Atlanta, GA.
- *Applications of Homotopies for Overdetermined Systems*, June 2017, Polynomials, Kinematics, and Robotics Conference, University of Notre Dame, Notre Dame, IN. Awarded second place prize.
- *Study and Analysis of Pinacyanol Acetate, a Chromonic Liquid Crystal*, Oct. 2012, Sigma Xi Poster Presentation, Swarthmore College, Swarthmore, PA.

Research Experience

- **Numerical Algebraic Geometry Research** University of Notre Dame, Notre Dame, IN
Research Assistant May 2016 - present
 - Work on multiple projects in the field of numerical algebraic geometry dealing specifically with homotopy theory and numerical methods applied to topics in computer vision, engineering, and more.
- **Mean First Passage Time Research** University of Notre Dame, Notre Dame, IN
Research Assistant June 2015 - Dec. 2015
 - Worked both analytically and numerically to solve a narrow escape problem to determine the statistical behavior of particles that follow a random walk in cell environments that are both heterogeneous and dynamic.
- **Liquid Crystal Research** Swarthmore College, Swarthmore, PA
Research Assistant May 2012 - Aug. 2012 and Sept. 2013 - Aug. 2014

- Designed computer programs based on molecular assembly theory.
- Experimentation and analysis of the phase diagram, absorption spectra, and kinetics of Pinacyanol Acetate.
- Investigated the pitch and twist properties of certain compounds with liquid crystalline properties in Cano wedge cells, among others.

- **Number Theory Research** Swarthmore College, Swarthmore, PA
Research Assistant May 2013 - Aug. 2013
 - Created algorithms in Python based on the theory of finding the number of consecutive quadratic residues or nonresidues modulo a prime number. Collected data from these algorithms using a super computer.
 - Split and reformatted files of prime numbers using Unix to use for the computing.
- **Galaxy-Galaxy Collisions** Swarthmore College, Swarthmore, PA
Research Assistant Jan. - May 2011 and Jan. 2012 - May 2012
 - Conducted simulations of galaxy collisions using MatLab, specifically looking at the Milky Way and Andromeda galaxies.
 - Analyzed the previous research of another Swarthmore student and new research in order to correct our models of the collisions and create better simulations.

Professional Experience

- **Cambridge Associates, LLC** Boston, MA
Quantitative Research Associate Aug. 2014 - Jan. 2015
 - Designed models in Excel and complete coding in MATLAB for different investment strategies and situations.
 - Helped fix models and counsel investment associates on inputs and exhibits of the models.

Teaching Experience

- **Applied and Computational Mathematics and Statistics Department** University of Notre Dame
Instructor on Record Jan. 2018 - present
 - Teaching ACMS 20620 - Applied Linear Algebra to undergraduate students at the University of Notre Dame.
- **Westville Education Initiative** Holy Cross College
Adjunct Professor May 2017 - Aug. 2017
 - Taught Math 113 - College Algebra to inmates at the Westville Correctional Facility working to complete their Associates Degree with Holy Cross College through the Westville Education Initiative.
- **Department of Mathematics** University of New Hampshire
Teaching Assistant Jan. 2015 - May 2015
 - Held bi-weekly recitations for students and assisted them in understanding the concepts and problems better, while also grading assignments/exams and clarifying mistakes to the students.
- **Ridley High School** Ridley, PA
Student Teacher Sept. 2013 - Dec. 2013
 - Taught math and physics classes to freshman and sophomore high school students.
 - Coordinated class activities, wrote lesson plans, and created assessments for the material in the curriculum.

Outreach and Broader Impacts

- **SIAM Student Chapter** University of Notre Dame
President Dec. 2017 - Aug. 2019
- **Expanding Your Horizons at Notre Dame** University of Notre Dame
Volunteer March 2019
- **University of Notre Dame Pi Day 5k** University of Notre Dame
Fundraising Committee Oct. 2017 - Mar. 2018
- **ACMS Graduate Student Organization/SIAM Student Chapter** University of Notre Dame
Treasurer May 2017 - Dec. 2017
- **Schmitt Leadership Conference** University of Notre Dame
Mentor/Organizer April 2017 - Oct. 2017
- **Graduate Student Union** University of Notre Dame
ACMS Department Representative Aug. 2016 - May 2017
- **Alumni Association** Swarthmore College
Class Agent Oct. 2015 - present

Professional Memberships

- Society for Industrial and Applied Mathematics (SIAM) (2015 - present)