

# Cigole Thomas

Curriculum vitae

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Department of Mathematics,  
George Mason University  
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## Education

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2016 - Present    Ph.D. Candidate | George Mason University, Fairfax, Virginia  
                         Advisor: Prof. Sean Lawton  
2016 - 2017       MS in Mathematics | George Mason University, Fairfax, Virginia  
2010 - 2015       Integrated BS - MS in Mathematics |  
                         Indian Institute of Science Education and Research Mohali (IISER Mohali), India

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## Research Interests

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Algebraic Geometry | Character Varieties over Finite Fields |  
Dynamics of Mapping Class Group Action | Data Learning using Algebraic Varieties

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## Research Experience

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Summer 2018 - Present    **PhD Thesis Research**  
                         Advisor: Prof. Sean Lawton  
                         Topic: *Asymptotic Transitivity on a Rank 2 Character Variety of a one-holed torus*

Aug 2020 - Dec 2020       **Graduate Research Assistant**  
                         Industrial Immersion Program (IIP), George Mason University  
                         Topic: *Algebraic Varieties and Neural Networks*  
                         Advisor: Prof. Sean Lawton

June 2019 - May 2020       **Graduate Research Assistant**  
                         NSF - Improving Undergraduate STEM Education(IUSE) project  
                         George Mason University (GMU), Fairfax, VA  
                         Supervisors: Dr. Robert Sachs and Dr. Jill Nelson

Aug 2018 - Aug 2019       **Graduate Research Assistant**  
                         Industrial Immersion Program (IIP), George Mason University  
                         Topic: *Learning Algebraic Varieties*  
                         Advisor: Prof. Sean Lawton and Dr. Jeff Byers (Naval Research Academy)

Spring 2016 - Fall 2018    **Graduate Student Intern**  
                         Mason Experimental Geometry Lab, GMU  
                         Advisor: Prof. Sean Lawton  
                         Project: *Arithmetic Dynamics of Moduli Spaces*

June 2015 - August 2015   **Graduate Student Intern**  
                         Research Experience for Graduate Student(REGS) by GEAR  
                         Mason Experimental Geometry Lab, GMU  
                         Advisor: Dr. Christopher Manon  
                         Project: *'Experiments with Characteristic Varieties'*

May 2014 - May 2015       **MS Thesis Research**  
                         Indian Institute of Science Education and Research Mohali, India  
                         Advisor: Dr. Krishnendu Gongopadhyay  
                         Topic: *Decomposition of complex hyperbolic isometries by involutions.*

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## Teaching Experience

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Fall 2020	<b>Graduate Learning Assistant</b>	Math 621 Graduate Algebra
Spring 2020	<b>Graduate Teaching Assistant</b>	Math 114 Analytic Geometry and Calculus II
Fall 2019	<b>Graduate Teaching Assistant</b>	Math 114
Summer 2019	<b>Graduate Student Lecturer</b>	Math 113 Analytic Geometry and Calculus I
Summer 2018	<b>Graduate Student Lecturer</b>	Math 125 Discrete Mathematics I
Spring 2018	<b>Graduate Teaching Assistant</b>	Math 113
Fall 2017	<b>Graduate Teaching Assistant</b>	Math 114
Summer 2017	<b>Graduate Student Lecturer</b>	Math 108 Introductory Calculus with Business Applications
Spring 2017	<b>Graduate Teaching Assistant</b>	Math 114
Fall 2016	<b>Graduate Teaching Assistant</b>	Math 114
Summer 2016	<b>Graduate Student Lecturer</b>	Math 108
Spring 2016	<b>Graduate Teaching Assistant</b>	Math 114

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## Preprints and Publications

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- (1) RG Rebecca, H. Klaw, C. Thomas, L. Nguyen, J. Jauchen, P. Seshaiyer and E. Sander. *ON DEMAND: Graduate Assistants supporting active learning in graduate classrooms*. Innovations in Teaching and Learning Conference Proceedings Volume 13, 2 September 2021.
- (2) G. Gongopadhyay and C.Thomas. *Decomposition of complex hyperbolic isometries by involutions*. Linear Algebra and its Applications Volume 500, 1 July 2016, Pages 63-76.  
DOI: <https://doi.org/10.1016/j.laa.2016.03.011>
- (3) Co-author of poster presented on Evolutionary Ecology Conference conducted on June 21-25, 2013 in Utah titled *Mimicry on the wing: Flight morphology and kinematics in a mimetic butterfly and its model*.

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## Awards and Achievements

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- Aug 2021 - May 2022: Recipient of Industrial Immersion Fellowship (IIP) funded by George Mason University's Provost Graduate Education Office .
- Summer 2021: Summer Research Fellowship instituted by Office of Provost, George Mason University (GMU).
- Spring 2021: Doctoral Research Scholars instituted by Office of Provost, GMU.
- Summer 2020: Summer Research Fellowship instituted by Office of Provost, GMU.
- Aug 2019 - May 2020: Selected as Graduate Research Assistant for the project, NSF IUSE (Improving Undergraduate STEM Education) at GMU.
- Aug 2018 - Aug 2019: Recipient of Industrial Immersion Fellowship (IIP) funded by George Mason University's Provost Graduate Education Office .
- May 2018: TC Lim Award for Excellence in Teaching by Department of Mathematics, GMU.
- May 2016: INSPIRE Fellowship for PhD instituted by Department of Science and Technology, Government of India (Declined)
- July 2015 - August 2015: Participant of the Research Experience for Graduate Student(REGS) program instituted by GEAR at George Mason University under the guidance of Dr. Chris Manon and Dr. Sean Lawton to work on *Experiments with Characteristic Varieties*.
- August 2010 - May 2015: Recipient of INSPIRE -SHE Fellowship (Roll No: 259S/2010) instituted by Department of Science and Technology, Government of India.

- June 2012 - August 2012: Summer Fellowship by INSPIRE to conduct research at National Centre for Biological Sciences(NCBS), Bangalore, India.

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### Presentations and Talks

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- January 2022: Poster session of AWM Special Session on Women in Geometry *Dynamics of the outer automorphism group action on  $SL_2(\mathbb{F}_q)$ - character variety of  $\mathbb{Z}^r$ .*
- November 2021: Student Research Talks, George Mason University. (*Upcoming*)
- October 2022: The 3rd JNU-KAIST Geometry Topology Fair, (Virtual) on Talk 1: *An Introduction to Character Varieties* and Talk 2: *Dynamics of the outer automorphism group action on finite field points of character varieties.* (*Upcoming*)
- September 2021: On-Demand Video Session, Innovations in Teaching and Learning Conference at GMU on *Graduate Assistants Supporting Active Learning in Graduate Classrooms* (copresented with Hannah Klawe and Long Nyguen).
- March 2021: The Three Minute Thesis (3MT), Office of Provost at George Mason University on *Dynamics of Mapping Class Group Action on Character Varieties.*
- December 2020: IIP Talks, George Mason University. *Algebraic Varieties and Neural Networks.*
- November 2020: Binghamton University Graduate Conference in Algebra and Topology, Virtual. *Conjugacy classes of polystable unimodular commuting matrices over finite fields.*
- September 2020: Innovations in Teaching and Learning(ITL) Conference, George Mason University. Panelist for ‘*Engaging Students and Giving Feedback as a GTA*’ (Virtual).
- July 2020: Geometry Labs United, ICERM Brown. *A Glimpse into a MEGL Project* (Virtual).
- March 2020: Topology Seminar, George Washington University. *The Character Varieties of Torus knots.*
- Spring 2018: Student Research Talks, George Mason University. *An Introduction to Character Varieties.*
- Spring 2018: Topology Seminar, George Washington University. *On  $SL(2, \mathbb{C})$  Character Varieties.*
- Fall 2016: Student Research Talks, George Mason University. *Decomposition of Complex Hyperbolic Isometries by Involution.*
- Summer 2015, Spring 2016, Fall 2016, Spring 2017, Fall 2017, Spring 2018, Fall 2018 - Poster presentations and talks as part of the MEGL Research Team(jointly with undergraduates) in MEGL Symposium.

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### Funded Workshops and Conferences

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- July 2021: Funding to attend Mathematical Congress of America.
- July 2021: ‘*Motivic Homotopy*’, Park City Advanced Mathematics Institute 2021 Graduate Summer School (PCMI 2021)
- March 2019: *Workshop on the Geometry and Physics of Higgs bundles IV*, Simons Center for Geometry and Physics (SCGP)
- May 2019: *Current trends on spectral data for Higgs bundles V*, Simons Center for Geometry and Physics (SCGP)
- June 2018: *RTG Workshop on the Geometry and Physics of Higgs bundles III* , University of Illinois at Chicago (UIC)
- November 2017: *RTG Workshop on the Geometry and Physics of Higgs bundles II*, University of Illinois at Chicago
- January 2017: Joint Mathematical Meetings, Atlanta
- October 2016: *Workshop on the Geometry and Physics of Higgs bundles I*, University of Illinois at Chicago
- June 2016: *Character Varieties: Experiments and New Frontiers* as part of the AMS: Mathematics Research Committees - 2016, Snowbird, Utah
- October 2015: *Topology and Groups*, Goa University, India

- August 2015: Secured funding for poster presentation at *Advanced School and Workshop on Geometry of Discrete Actions*, International Centre for Theoretical Physics, Trieste, Italy (Didn't attend)
- December 2014: ATM Workshop on *Lattices: Geometry and Dynamics*, IISER Mohali, India
- December 2014 *International Workshop of Geometry and Analysis on Hyperbolic Geometry*, Delhi University, India

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## Professional Services and Outreach

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### ***Committee Member:***

- Served as a graduate student representative in the *GMU College of Science Diversity, Equity and Inclusion subcommittee for Graduate Student Recruitment, Retention, and Degree Attainment* to outline and propose a plan to support undergraduates, graduate students, faculty and staff who have been historically marginalized in STEM fields in Spring 2021.

### ***Reviewer***

- Reviewer for Innovations in Teaching and Learning(ITL) conference proposals at GMU
- Reviewer for Spring 2020 Mason Core Assessment: Natural Sciences

### ***Active Learning and Teaching***

- Teaching - NSF - Improving Undergraduate STEM Education(IUSE) project at GMU
  - Graduate Research Assistant : June 2019 - May 2020 . Duties include:
    - \* Developing Inquiry Based Learning(IBL) worksheets to promote group work and discussion among students for Calculus 1 and Calculus 2.
    - \* Co-organizing biweekly Teaching Seminar to discuss the challenges and progress of the implementation of IBL worksheets in recitations.
    - \* Coordinating other teaching assistants involved in IUSE project.
- Developed IBL type worksheets for Graduate Algebra Course in Fall 2020 based on problems for the Graduate Preliminary Examination.
- Talked about '*Character Varieties and Torus Knots*' as a one day substitute instructor for the graduate course 'Geometric Group Theory' in Spring 2020.

### ***Professional Organizations***

- Association for Women In Mathematics (GMU Chapter)
  - Vice President : 2020 - 2021. Duties include helping organize the events sponsored by AWM.
  - President : March 2018 - March 2020 ;
  - Treasurer: 2017 - 2018. Duties include securing grants/funds from GMU for events sponsored by AWM.
  - Vice President : 2016 - 2017. Duties include helping organize the events sponsored by AWM.

### ***Mentoring and Outreach***

- April 2021 - Member of the panel discussion as part of the virtual outreach session organized by '*Math Initiatives in Nepal*' as part of Kovalsky day in Nepal.
- Mason Experimental Geometry Lab (MEGL)
  - Graduate Lab Manager : Spring 2019, Fall 2019, Spring 2020
  - Volunteer for MEGL Outreach at Elementary, Middle and High Schools including the Nifty Fifty Event Feb 2019.
  - Graduate student mentor for research team of undergraduates in Summer 2015, Spring 2016, Fall 2016, Summer 2016, Spring 2017, Fall 2017 and Spring 2018.
  - Graduate Student Intern : Summer 2015 and Spring 2016 - Fall 2018.
- Mathematics Outreach

- Helped coordinate outreach events for high school girls from Centreville Highschool in Spring 2017 and Spring 2018 (as Vice president and Treasurer of AWM).
- Volunteer for multiple outreach activities organized my MEGL at elementary, middle, high schools and library. Also helped out with a Nifty-Fifty event at the Department of Homeland Security for S&T/CWMD Kids day.
- Volunteer in the SIAM booth at USA Science and Engineering Festival (2016 and 2018).
- Volunteer as Crowd counter for National Math Festival (2017).
- Grader for MATHCOUNTS - Feb 2017, Feb 2018 and Feb 2019.

### ***Seminars and Conferences***

- Organizer - AWM Young Mathematicians Talk Series - April 2021. (Virtual)
- Co-organizer - AWM/IIP Talk at GMU (Virtual)
- StReeTs (Student Research Talks) Seminar Series at GMU
  - Organizer - Fall 2018
  - Co-organizer - Spring 2019, Fall 2019, Spring 2020
- Conference Organization
  - Volunteer for East Coast Optimization Meeting (ECOM) 2019 and ECOM 2020. Duties included securing partial funding from GMU and helping out with organization.
  - Helped organize one day workshop on ‘Professional Development Event’ at GMU in March 2017 in the capacity as the Vice President of AWM.
  - Assistant to Organizers for Mathematics Research Communities(MRC) conference on *Character Varieties: Experiments and New Frontiers* by AMS in June 2011.

### ***Disability Services***

- Reader for Office of Disability Services

Duties include recording chapters of books for Homological Algebra, Equivariant K-Theory, Category Theory and Introduction to Algebraic Geometry.

### ***Social Events- Math Department***

- Helped in coordinating Departmental Tea/Coffee Time organized by Department of Mathematics in Fall 2019.
- Organized AWM Hot Chocolate Event and AWM Social in Fall 2017, Fall 2018, Spring 2019, Fall 2019, Spring 2020(Virtual), Fall 2020(Virtual), Fall 2021

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## References

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| 1. Prof. Sean Lawton<br>(slawton3@gmu.edu)<br>Associate Professor,<br>George Mason University. | 2. Dr. Krishnendu Gongopadhyay<br>(krishnendug@gmail.com)<br>Assistant Professor,<br>IISER Mohali, India |
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Last updated: October 7, 2021.