Cigole Thomas

Curriculum vitae

Department of Mathematics,
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Education

2018 - 2022 (Expected)	Ph.D. Student in Mathematics | George Mason University, Virginia Advisor: Prof. Sean Lawton
2016 - 2018	MS in Mathematics | George Mason University, Fairfax, Virginia
2010 - 2015	Integrated BS - MS in Mathematics | Indian Institute of Science Education and Research Mohali (IISER), India

Research Interests

Algebraic Geometry | Arithmetic Dynamics on Character Varieties
Mathematics Education | Data Learning using Algebraic Varieties

Research Experience

Summer 2018 - Present	**PhD Thesis Research** Advisor: Prof. Sean Lawton Topic: *Stratification and Arithmetic Dynamics on Character Varieties*
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 Undergraudate 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 (MEGL), 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 at MEGL 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.*

Teaching Experience

Fall 2020	**Graduate Learning Assistant** (Online)	Math 621 Graduate Algebra
Spring 2020	**Graduate Teaching Assistant** (Online for second half of semester)	Math 114 Analytic Geometry and Calculus II
Fall 2019	**Graduate Teaching Assistant**	Math 114
Summer 2019	**Graduate Student Lecturer**	Math 113 Analytic Geometry and Calculus I
Summer 2018	**Instructor of Record**	Math 125 Discrete Mathematics I
Spring 2018	**Graduate Teaching Assistant**	Math 113
Fall 2017	**Graduate Teaching Assistant**	Math 114
Summer 2017	**Instructor of Record**	Math 108 Introductory Calculus with Business Applications
Spring 2017	**Graduate Teaching Assistant**	Math 114
Fall 2016	**Graduate Teaching Assistant**	Math 114
Summer 2016	**Instructor of Record**	Math 108
Spring 2016	**Graduate Teaching Assistant**	Math 114

Active Learning Experience

- Teaching - NSF - Improving Undergraudate 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.
- Ran problem sessions using active learning for Graduate Algebra course in Fall 2020 as a Learning Assistant.
- Developed IBL type worksheets for Graduate Algebra Course based on problems for the Graduate Preliminary Examination.

Preprints and Publications

(1) C. Thomas. *Transitivity and Asympotic Transitivity on finite field points of* $\mathrm{SL}_3(\mathbb{F}_q)$ *character varieties of* F_r. (In preparation)

(2) J. Jauchen, H. Klawa, L. Nguyen, R.G. Rebecca, E. Sander, P. Seshaiyer and C. Thomas. *Graduate Learning Assistants in the Mathematical Sciences: A new approach to core graduate classes* (Submitted).

(3) RG Rebecca, H. Klawa, 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.

(4) Broeckelman-Post, M; Fernandez, L; Polk, T; Hwang, J; Thomas, C; Stewart, B; Tuckerman, S; Hassell-Goodman, S; Taylor, S; Nordin, K; Brophy, N; Hingle, A; Staudt, E RC. *WORKSHOP: [For GTAs] Engaging Students and Giving Feedback as a GTA*. Innovations in Teaching & Learning Conference Proceedings Vol. 12 (2020).

(5) 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

Awards and Achievements

Spring 2022	**Dissertation Completion Grant** Instituted by Office of Provost, George Mason University (GMU)
Aug 2021 - Dec 2022 & Aug 2018 - Aug 2019	**Industrial Immersion Program (IIP) Fellowship** Funded by George Mason University's Provost Graduate Education Office
Summer 2021 & Summer 2020	**Summer Research Fellowship** Instituted by Office of Provost, GMU
Spring 2021	**Doctoral Research Scholars Fellowship** Instituted by Office of Provost, GMU
Aug 2019 - May 2020	**Graduate Research Assistant** for the project, NSF-IUSE (Improving Undergraudate STEM Education) at GMU
May 2018	**T.C. Lim Award for Excellence in Teaching** Awarded by Department of Mathematics, GMU.
May 2016	**INSPIRE Fellowship for PhD** instituted by Department of Science and Technology, Government of India (Not availed)
July 2015 - August 2015	**Research Experience for Graduate Student (REGS)** By GEomteric Structures And Representation Varieties (GEAR)
August 2010 - May 2015	**INSPIRE - SHE Fellowship** (Roll No: 259S/2010) Instituted by Department of Science and Technology (DST), Government of India
June 2012 - August 2012	**Undergraduate Summer Fellowship** Innovation in Science Pursuit for Inspired REsearch (INSPIRE), DST India Location: National Centre for Biological Sciences (NCBS), India

Presentations and Talks

April 2022	**AMS Contributed Paper Session on Algebraic and Arithmetic Geometry and Commutative Algebra, JMM** (Virtual) *Dynamics of the Outer Automorphism Group Action on Certain Character Varieties over finite fields.* (Upcoming)
April 2022	Poster session of **AWM Special Session on Women in Geometry, JMM** (Virtual) *Dynamics of Outer Automorphism group action on* $\mathrm{SL}_2(\mathbb{F}_q)$*-Character Variety of* $\mathbb{Z}^r$. (Upcoming)
April 2022	**Combinatorics, Algebra and Geometry Seminar**, GMU(Upcoming)(Invited)
March 2022	**Student Research Talks**, GMU (Upcoming)
March 2022	The **Three Minute Thesis** (3MT), GMU *Motion of Points on Varieties* (Upcoming)
February 2022	**IISER Math Alumni Talk** (Virtual) *Dynamics of Group Action on Character Varieties* Indian Institute of Science Education and Research Mohali, India
January 2022	**Student Research Talks, IIP Presentations**, George Mason University *Varieties in Data Learning*
November 2021	**Binghamton University Graduate Conference in Algebra and Topology (BUGCAT) 2021** (Virtual) *Asymptotic Transitivity of Outer Automorphism Group Action on Character Varieties over Finite Fields.* (Upcoming)
November 2021	**Student Research Talks**, George Mason University (GMU) *Asymptotic Transitivity of Dynamics on Character Varieties* (Upcoming)

October 2021	The **3rd JNU-KAIST Geometry Topology Fair**, (Virtual) Talk 1: *An Introduction to Character Varieties* Talk 2: *Dynamics of the outer automorphism group action on finite field points of character varieties* (Invited)
September 2021	**Innovations in Teaching and Learning Conference (ITL)**, GMU On-Demand Video Session *Graduate Assistants Supporting Active Learning in Graduate Classrooms* (co-presentor with Hannah Klawa and Long Nyguen.)
March 2021	The **Three Minute Thesis** (3MT), GMU *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**, **BUGCAT 2020** (Virtual) *Conjugacy classes of polystable unimodular commuting matrices over finite fields*
September 2020	**Innovations in Teaching and Learning (ITL) Conference**, GMU (Virtual) Panelist for '*Engaging Students and Giving Feedback as a GTA*'(Invited)
July 2020	**Geometry Labs United**, ICERM Brown. *A Glimpse into a MEGL Project* (Virtual).
March 2020	**Topology Seminar**, George Washington University *The Character Varities of Torus knots.* (Invited)
Spring 2018	**Student Research Talks**, George Mason University *An Introduction to Character Varities.*
Spring 2018	**Topology Seminar**, George Washington University *On SL(2,$\mathbb{C}$) Character Varities.* (Invited)
Fall 2016	**Student Research Talks**, George Mason University *Decomposition of Complex Hyperbolic Isometries by Involution.*
Summer 2015 - Fall 2018	**MEGL Symposium**, George Mason University Talks and Poster Presentations as part of Mason Experimental Geometry Lab Research Team (jointly with undergraduate students)

Funded Workshops and Conferences

- January 2022: *AMS Grad Student Travel Grant* to attend JMM, 2022. (Didn't avail)
- July 2021: Funding to attend Mathematical Congress of America organized by Mathematical Association 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: AMS-MRC funding to attend 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: Selected with 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

Professional Services and Outreach

1. **Diversity, Equity and Inclusion**
   - **Committee Member:** Graduate student representative in the *GMU College of Science Diveristy, 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 (Spring 2021).
   - Part of the *Association for Women in Mathematics (National Chapter)* group of *Capitol Hill Visit* in November 2018. The purpose of the visit was to engage in discussions with legislators/legislative staffers advocating for Women in STEM. See Article 16, '*Advocating for STEM: A Capitol Idea!*' from AWM Newsletter for details of this visit.
2. **Reviewer**
   - Reviewer for Innovations in Teaching and Learning (ITL) conference proposals at GMU
   - Reviewer for Spring 2020 Mason Core Assessment: Natural Sciences
3. **Teaching**
   - Talked about *Character Varities and Torus Knots* as a one day substitute instructor for the graduate course 'Geometric Group Theory' in Spring 2020.
4. **Professional Organizations**
   - **Association for Women In Mathematics (GMU Chapter)**
     * Vice President: 2020 - 2022 , 2016 - 2017
       Duties include helping organize the events sponsored by AWM
     * President: 2018 - 2020
     * Treasurer: 2017 - 2018
       Duties include securing grants/funds from GMU for events organized/sponsored by AWM
   - Society for Industrial and Applied Mathematics (SIAM) GMU Chapter : Member
   - Women of Color in STEM (GMU Chapter) : Member
   - American Mathematical Society (AMS) National Chapter : Member
   - Association for Women in Mathematics National Chapter : Member
5. **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 Kovalesky day in Nepal
   - August 2020 - May 2022: Mentor for three incoming PhD students as part of the peer mentor program instituted by Department of Mathematics at GMU
   - **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**
- Co-organizer of outreach events for girl students from 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 including the Nifty-Fifty event at the Department of Homeland Security for S&T/CWMD Kids day
- Volunteer at 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

6. **Seminars and Conferences Organized**

– Co-chair : **AMS Contributed Paper Session on Algebraic and Arithmetic Geometry and Commutative Algebra, JMM 2022** (Virtual)

– Co-organizer : **AWM/IIP Talk** at GMU by Dr. Anne Costolanki on '*Navigating a technical career as a woman in STEM*'- Nov 2021. (Virtual)

– Organizer : **AWM Young Mathematician Talk** at GMU - April 2021 (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
- Co-organizer for 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

7. **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

8. **Organizing Social Events - Math Department**

– Helped in coordinating Departmental Tea/Coffee Time organized by Department of Mathematical Sciences, GMU in Fall 2019.

– Organized AWM Hot Chocolate Event/AWM Social in Fall 2017, Fall 2018, Spring 2019, Fall 2019, Spring 2020 (Virtual), Fall 2020 (Virtual), Fall 2021.
Duties included securing funding and coordinating the event.

References

1. Prof. Sean Lawton
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3. Dr. Neil Epstein
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