Juliette Bruce

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Employment

· University of California, Berkeley Berkeley, CA NSF Postdoctoral Fellow

2020- Present • Mathematical Sciences Research Institute Berkeley, CA Postdoctoral Fellow 2020-2021

Education

• University of Wisconsin Madison, WI 2014 - August 2020 Ph.D. Mathematics

- Advisor: Daniel Erman

 University of Wisconsin Madison, WI M.A. Mathematics 2014 - 2016• University of Michigan Ann Arbor, MI B.S. in Mathematics & Political Science 2010 - 2014

Research Interests

Algebraic Geometry, Commutative Algebra, Combinatorial Algebraic Geometry. Specifically, combinatorial and homological methods in algebraic geometry, and algebraic geometry over finite fields.

Publications

- 12. J. Bruce, D. Erman, S. Goldstein, and J. Yang. The Schur Veronese package in Macaulay2. Journal of Software for Algebra and Geometry, To Appear. E-print: arXiv:1905.12661.
- 11. J. Bruce. The Quantitative Behavior of Asymptotic Syzygies for Hirzebruch Surfaces. Journal of Commutative Algebra, To appear. E-Print: arXiv:1906.07333.
- 10. A. Almousa, J. Bruce, M. Loper, and M. Sayrafi. The Virtual Resolutions Package for Macaulay2. Journal of Software for Algebra and Geometry, 10 (2020), 50-60. E-print: arXiv:1905.07022.
- 9. J. Bruce and D. Erman. A probabilistic approach to systems of parameters and Noether normalization. Algebra and Number Theory, 13 (2019), no. 9, 2081–2102. E-print: arXiv:1604.01704.

- 8. J. Bruce and W. Li. Effective bounds on the dimensions of Jacobians covering abelian varieties. *Proc. Amer. Math. Soc.*, **148** (2020), no. 2, 535-551. E-print: arXiv:1804.11015.
- 7. J. Bruce, D. Erman, S. Goldstein, and J. Yang. Conjectures and computations about Veronese syzygies. *Experimental Mathematics*, **29** (2020), 398-413. E-print: arXiv:1711.03513.
- 6. M. Brandt, J. Bruce, T. Brysiewicz, R. Krone, and E. Robeva. The degree of SO(n). Combinatorial Algebraic Geometry, 207-224, Fields Inst. Commun. **80**, (2017). E-print: arXiv:1701.03200.
- 5. J. Bruce, M. Logue, and R. Walker. Monomial valuations, cusp singularities, and continued fractions. *Journal of Commutative Algebra*, **7** (2015) no. 4, 495-522. E-print: arXiv:1311.6493.
- 4. J. Bruce, P. Kao, E. Nash, B. Perez, and P. Vermeire. Betti tables of reducible algebraic curves. *Proc. Amer. Math. Soc.* **142** (2014) 4039-4051. E-print: arXiv:1210.3064.

Pre-Prints

- 3. J. Bruce, D. Corey, D. Erman, S. Goldstein, R. Laudone, and J. Yang. Syzygies of $\mathbb{P}^1 \times \mathbb{P}^1$: Data and Conjectures. *pre-print*. E-Print: arXiv:2104.14598
- 2. M. Brandt, J. Bruce, M. Chan, M. Melo, G. Moreland, C. Wolfe. On the Top-weight Cohomology of A_g . Submitted. E-Print: arXiv:2012.02892
- 1. J. Bruce. Asymptotic Syzygies in the Setting of Semi-Ample Growth. Submitted. E-Print: arXiv:1904.04944

Software

- 4. SchurVeronese, (with D. Erman, S. Goldstein, and J. Yang). Submitted for distribution with future releases of Macaulay2, a compute algebra system focused on computations in algebraic geometry and commutative algebra.
- 3. VirtualResolutions, (with A. Almousa, M. Loper, and M. Sayrafi). Distributed with version 1.14 of Macaulay2 (2019).
- 2. Frobenius Thresholds, (with D. Hernández, K. Schwede, D. Smolkin, P. Teixeira, and E. Witt). Distributed with version 1.14 of Macaulay2 (2019).
- 1. TestIdeals, (with E. Bela, A. Boix, D. Ellingson, D. Hernández, Z. Kadyrsizova, M. Katzman, S. Malec, M. Mastroeni, M. Mostafazadehfard, M. Robinson, K. Schwede, D. Smolkin, P. Teixeira, and E. Witt). Distributed with version 1.14 of Macaulay2 (2019).

Multimedia

1. SyzygyData.com, (with D. Erman, S. Goldstein, and J. Yang). An online public database on large-scale syzygy computations.

Grants

 Conference Grant – \$23,000 July 2022 Fields Institute / National Science Foundation 2020 - Present Postdoctoral Research Fellowship – \$150,000 National Science Foundation Conference Grant DMS-1908799 – \$15,000 March 2019 National Science Foundation • Graduate Research Fellowship 2015 - 2018National Science Foundation Conference Grant DMS-1812462 – \$15,000 February 2018 National Science Foundation • Professional Development Grant – \$1000 December 2016 Graduate School – University of Wisconsin

Awards & Honors

 Capstone Teaching Award October 2019 Awarded to one student in the math department for an exceptional record of teaching excellence. October 2019 Excellence in Mathematical Research Award Recognizes significant and substantial contributions to research as part of their thesis. October 2018 • Elizabeth Hirschfelder Prize Awarded to an outstanding female student. Mathematics TA Service Award April 2018 Dept. of Mathematics - University of Wisconsin Teaching Assistant Award for Exceptional Service February 2018 Campus-wide award recognizing TA's who perform exceptional service Outstanding Achievement in Mathematics May 2014 Dept. of Mathematics – University of Michigan Phi Beta Kappa April 2014 University of Michigan • Chancellor's Opportunity Award April 2014 University of Wisconsin

Seminar and Colloquium Talks

• What Is Seminar - Held Virtually

September 2021

• Reed College - Mathematics Colloquium

April 2021

| • San Francisco State University - Algebra, Geometry, & Combinatorics Seminar | April 2021 |
|---|------------------------|
| Algebra, Geometry, and Combinatorics Online - Held Virtually | February 2021 |
| • MPI MiS - Non-linear Algebra Seminar Online | February 2021 |
| Syracuse University - Algebra Seminar | November 2020 |
| Arizona State University - AWM Seminar | October 2020 |
| Arizona State University - Number Theory Seminar | October 2020 |
| • Louisiana State University - Algebra & Number Theory Seminar | October 2020 |
| • University of Georgia - Algebraic Geometry Seminar | October 2020 |
| • Stanford University - Algebraic Geometry Seminar | October 2020 |
| • MSRI - The Fellowship of the Ring | September 2020 |
| • University of Washington - Algebra & Algebraic Geometry Seminar | May 2020 [†] |
| • University of Nebraska - Commutative Algebra Seminar | April 2020^{\dagger} |
| • University of Michigan - Commutative Algebra Seminar | December 2019 |
| • University of Notre Dame - Algebraic Geometry Seminar | November 2019 |
| • DePaul University - Algebra, Combinatorics, and Number Theory Seminar | October 2019 |
| • Lawerence University - Mathematics Colloquium | October 2019 |
| • University of Utah - Algebraic Geometry Seminar | September 2019 |
| • Stanford University - Algebraic Geometry Seminar | May 2019 |
| • University of Kentucky - Algebra Seminar | April 2019 |
| • University of Minnesota - Commutative Algebra Seminar | April 2019 |
| • Rice University- Algebraic Geometry and Number Theory Seminar | September 2018 |
| • DePaul University - Algebra, Combinatorics, and Number Theory Seminar | March 2018 |
| • University of Michigan - Commutative Algebra Seminar | December 2017 |
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Conference Talks

| • AWM Research Symposium - University of Minnesota | June 2022 |
|--|---------------------------|
| • Joint Math Meetings (x2) - Seattle, WA | January 2022 |
| CMS Winter Meetings- Held Virtually | December 2021 |
| Fall AMS Central Sectional - Held Virtually | September 2021 |
| • SIAM Conference on Applied Algebraic Geometry 2021 | August 2021 |
| • Queer and Trans in Combinatorics | June 2021 |
| • Math Summer Program for Inclusive Excellence | June 2021 |
| Spring AMS Western Sectional - Held Virtually | May 2021 |
| Spring AMS Central Sectional - Held Virtually | April 2021 |
| • Bay Area Discrete (BAD) Math Day - Held Virtually | April 2021 |
| Spring AMS Southeastern Sectional - Held Virtually | March 2021 |
| • LGBTQ+Math - Fields Institute | November 2020 |
| • Written Geometry: Commutative Algebra - CIRM | October 2020 [†] |
| • Early Commutative Algebra Researchers (eCARS) - Held Virtually | June 2020 |

 $^{^\}dagger \text{Canceled}$ due to the COVID-19 pandemic.

| • Foundations of Computational Mathematics - Simon Fraser University | June 2020^{\dagger} |
|--|------------------------|
| Western Algebraic Geometry Online (WAGON) - Held Virtually | April 2020 |
| • CA+ - Iowa State University | April 2020^{\dagger} |
| • Joint Math Meetings - Denver, CO | January 2020 |
| • Fall AMS Central Sectional - University of Wisconsin | September 2019 |
| • SIAM Conference on Applied Algebraic Geometry 2019 | July 2019 |
| KUMUNUjr - University of Nebraska | March 2019 |
| Spring AMS Southeastern Sectional - Auburn University | March 2019 |
| • Joint Math Meetings - Baltimore, MD | January 2019 |
| • Fall AMS Central Sectional - University of Michigan | October 2018 |
| • Structures on Free Resolutions - Texas Tech University | October 2017 |
| • Midwest Algebraic Geometry Graduate Conference - University of Illinois, Chicago | April 2015 |

Poster Talks

| AWM Poster Session - Joint Math Meetings | January 2020 |
|--|----------------|
| • Summer School on Randomness and Learning in NLA - Max Plank Institute, Leipz | zig July 2019 |
| • 2019 AWM Research Symposium - Rice University | April 2019 |
| AWM Poster Session - Joint Math Meetings | January 2018 |
| AGNES Poster Session - Brown University | September 2018 |
| • Lectures on Arithmetic Geometry - Rice University | February 2017 |
| • Introductory Workshop: Combinatorial Algebraic Geometry - Fields Institute | August 2016 |
| • Commutative Algebra and Its Interactions with Algebraic Geometry | July 2016 |
| • Midwest Commutative Algebra and Algebraic Geometry Conference | May 2016 |

Conference & Seminar Organizing

| • Spec $(\overline{\mathbb{Q}})$ July 6-8, 2022 | Fields Institute |
|--|------------------|
| • LGBTQ+ Math Day November 18, 2021 | Fields Institute |
| • GEMS in Combinatorics September 1-2, 2021 | Held Virtually |
| • Trans Math Day June 14-15, 2021 | Held Virtually |
| • Western Algebraic Geometry Symposium (WAGS) April 23 - April 24, 2021 | Held Virtually |
| • Trans Math Day December 5, 2020 | Held Virtually |
| • CAZoom April 25 - April 26, 2020 | Held Virtually |

• GWCAWMMG University of Minnesota

April 12 - April 14, 2019

• Geometry & Arithmetic of Surfaces

University of Wisconsin

February 9 - February 10, 2019

• M2@UW University of Wisconsin

April 14-17, 2018

• Math Careers Beyond Academia University of Wisconsin

April 14, 2017

Seminar & Session Organizing

• Commutative Algebra & Algebraic Geometry Seminar UC Berkeley

September 2021 - Present

• Special Session on Commutative Algebra AMS Sectional

May 1 - May 2, 2021

• Experimental Talks in Algebraic Geometry Held Virtually

May - July, 2020

• Special Session on Combinatorial Algebraic Geometry AMS Sectional

September 14 - September 15, 2019

Outreach Activities

· Virtual Directed Readings in Geometry

Held Virtually

Organizer

February 2021 – April 2021

- Created a virtual, open access, directed reading program for undergraduate students.
- Approximately 30 students signed up for the 5-week reading group.

• Algebraic Geometry in the Time of COVID

Held Virtually

Shepard

June 2020 – October 2020

- A virtual, open access introductory course in algebraic geometry.
- Approximately 1600 registered participants.

• Undergrad Directed Reading Program Mentor University of Wisconsin

January 2018 - May 2019

- Lead two semester long reading projects on commutative algebra and algebraic geometry.
- Lead an undergraduate women on a two semester reading project, and provided guidance on applying for REU's and graduate school.

• Graduate Peer Mentoring

University of Wisconsin

Mentor

September 2018 - December 2018

 Mentored 5 first year graduate students from minority genders, organizing monthly dinners where the mentees could discuss issues they were facing.

• Girls Math Night Out

University of Wisconsin
September 2018 – December 2018

Mentor

- Lead 2 women from local high schools on a semesters long project about cryptography.

• Madison Math Circle

University of Wisconsin January 2016 – December 2018

Lead Organizer

- Lead the creation of a new outreach program, which directly visits high schools around the state of Wisconsin to better serve students from underrepresented groups.

- Expanded the total number of students reached per year from 25 to >250.

Madison Math Circle

University of Wisconsin

Student Volunteer

January 2015 – December 2018

• Out in STEM (oSTEM) @ UW-Madison

University of Wisconsin July 2017 – Math 2018

co-Founder

- Founded, at the time. the only campus resource specifically for LGBTQ+ individuals in STEM, and grew the organization to over 50 members.

- Secured a travel grant to help 11 members (undergraduate and graduate students) attend the national oSTEM conference.

Madison Mega Math Meet

University of Wisconsin

Graded

May 2015

Bonding Undergraduate and Graduate Students

University of Wisconsin

Mentor for Undergraduate

September 2014 – December 2014

Michigan Math Circle

University of Michigan

Organizer

January 2013 - June 2014

Outreach Panels

• Holding AMS Meetings in Localities with Discriminatory Practices Joint Math Meetings Panelist January 2022

 AWM 101: What You Need to Know about Women in Math Panelist

Joint Math Meetings January 2022

 Equity, Diversity, and Inclusion in Mathematics Panelist

CAIMS June 2021

· Diversity and Inclusion Panel Panelist

Womxn in Math at Berkeley

· How to Stay Productive as a Researcher

April 2021

Panelist

Lunch in the Time of COVID June 2020

• Mathematics Research Online: Hosting Virtual Events Panelist

Held Virtually May 2020

• Supporting Transgender and Non-binary Students

MAA Panel at the JMM

Organizer & Moderator

January 2020

• Out in Math: Professional Issues Facing LGBTQ Mathematicians Panelist

MAA Panel at the JMM

January 2018

Teaching Experience

• Math 221: Calculus and Analytic Geometry I

Teaching Assistant

Instructor

Course Assistant

University of Wisconsin Fall 2014/2018/2019

- Selected as a TA coordinator in 2018 and 2019, and was responsible for overseeing all other TA's and mentoring first year TA's.
- Average score 4.9/5.0

• Math 228: Wisconsin Emerging Scholars

University of Wisconsin

Instructor Fall 2018

- Course providing students from underrepresented groups additional support.
- Average score: 5.0/5.0, 100% amongst all TA's

• Math 132: Wisconsin Emerging Scholars

University of Wisconsin

Spring 2015

- Responsible for all aspects of the course.

• Inquiry Based Learning Courses

University of Michigan

2012-2014

- Assisted with advanced undergraduate courses on topology, analysis, and probability.
- Facilitated inquiry based learning in the classroom, and responsible for office hours, grading, and review sessions.

Service

• Communications in Algebra

Communications Editor

Editorial Board

September 2020 - Present

• Spectra: The Association for LGBTQ+ Mathematicians

Member At Large

Board Member

September 2020 – Present

• AMS Graduate Student Blog

Editor

American Mathematical Society
September 2015 – September 2018

• Committee on Inclusivity and Diversity

Member

Member

UW Dept. of Mathematics

November 2016 – August 2017

- Created policies seeking to make the department a more welcoming, inclusive, and comfortable
 place. This included drafting the department's statement on inclusivity, and creating similar
 statements for syllabi to be used throughout the department.
- Committee on TA Pay and Performance

UW Dept. of Mathematics

September 2015 – August 2017

- Developed and implemented a new system to evaluate TA performance, with the goal of creating a more transparent, useful, and non-biased system.
- Instructor Excellence Program

Teaching Mentor

UW Dept. of Mathematics September 2015 – May 2016

Society of Undergraduate Math Students

President and Founder

University of Michigan

December 2012 – June 2014

Referee Work

• Communications in Algebra, Journal of Algebra, Journal of Commutative Algebra, Journal of Pure and Applied Algebra, Mathematica Scandinavia, Research in the Mathematical Sciences

Memberships

• Society of Industrial and Applied Mathematics

• Association for Women in Mathematics

• American Mathematical Society

January 2017 - Present

January 2016 - Present

September 2014 – Present