

# Juliette Bruce

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Department of Mathematics  
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## Employment

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|--|----------------------------------|
| • <b>Brown University</b><br><i>Postdoctoral Research Associate</i>                    | Providence, RI<br>2022 – Present |
| • <b>University of California, Berkeley</b><br><i>NSF Postdoctoral Research Fellow</i> | Berkeley, CA<br>2020– 2022       |
| • <b>Mathematical Sciences Research Institute</b><br><i>Postdoctoral Fellow</i>        | Berkeley, CA<br>2020– 2021       |
| • <b>University of Wisconsin, Madison</b><br><i>Teaching &amp; Research Assistant</i>  | Madison, WI<br>2014– 2020        |

## Education

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|--|-----------------------------------|
| • <b>University of Wisconsin</b><br><i>Ph.D. &amp; M.A. in Mathematics</i>                   | Madison, WI<br>2014 – August 2020 |
| • <b>University of Michigan</b><br><i>B.S. in Honors Mathematics &amp; Political Science</i> | Ann Arbor, MI<br>2010 – 2014      |

## Publications

15. M. Brandt, J. Bruce, M. Chan, M. Melo, G. Moreland, C. Wolfe. On the Top-weight Cohomology of  $\mathcal{A}_g$ . *Geometry & Topology*, To appear. E-Print: [arXiv:2012.02892](https://arxiv.org/abs/2012.02892)
14. 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. *Journal of Algebra*, **593** (2022) no. 1, 589-621. E-Print: [arXiv:2104.14598](https://arxiv.org/abs/2104.14598)
13. J. Bruce, D. Erman, S. Goldstein, and J. Yang. The Schur-Veronese package in Macaulay2. *Journal of Software for Algebra and Geometry*, **11** (2021), 83-87 E-print: [arXiv:1905.12661](https://arxiv.org/abs/1905.12661)
12. J. Bruce. The Quantitative Behavior of Asymptotic Syzygies for Hirzebruch Surfaces. *Journal of Commutative Algebra*, To appear. E-Print: [arXiv:1906.07333](https://arxiv.org/abs/1906.07333)
11. 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](https://arxiv.org/abs/1905.07022)
10. 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](https://arxiv.org/abs/1604.01704)
9. 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](https://arxiv.org/abs/1804.11015)
8. 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](https://arxiv.org/abs/1711.03513)

7. 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](#)
6. 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](#)
5. 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

4. M. Brandt, J. Bruce, D. Corey. The virtual Euler characteristic for binary matroids. *Submitted*. E-Print: [arXiv:2301.10108](#)
3. J. Bruce, L. Cranton Heller, M. Sayrafi. Bounds on Multigraded Regularity. *Submitted*. E-Print: [arXiv:2208.11115](#)
2. J. Bruce, L. Cranton Heller, M. Sayrafi. Characterizing Multigraded Regularity on Products of Projective Space. *Submitted*. E-Print: [arXiv:2110.10705](#)
1. J. Bruce. Asymptotic Syzygies in the Setting of Semi-Ample Growth. *Submitted*. E-Print: [arXiv:1904.04944](#)

## Published Software

4. SchurVeronese, (co-authored 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, (co-authored with A. Almousa, M. Loper, and M. Sayrafi). Distributed with version 1.14+ of Macaulay2 (2019).
2. FrobeniusThresholds, (co-authored with D. Hernández, K. Schwede, D. Smolkin, P. Teixeira, and E. Witt). Distributed with version 1.14+ of Macaulay2 (2019).
1. TestIdeals, (co-authored 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

- Fields Institute Conference Grant – \$23,000

July 2022

- NSF Postdoctoral Research Fellowship DMS-2002239 – \$150,000 2020 – 2022
- NSF Conference Grant DMS-1908799 – \$15,000 March 2019
- NSF Graduate Research Fellowship 2015 – 2018
- NSF Conference Grant DMS-1812462 – \$15,000 February 2018

## Awards & Honors

- US Junior Oberwolfach Fellow April 2022  
*Awarded to outstanding junior scientists from US*
- Capstone Teaching Award October 2019  
*Awarded to one student in the math department for an exceptional record of teaching excellence.*
- Excellence in Mathematical Research Award October 2019  
*Recognizes significant and substantial contributions to research as part of their thesis.*
- Elizabeth Hirschfelder Prize October 2018  
*Awarded to an outstanding female student.*
- 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*

## Select Invited Talks

- **Seminars & Colloquiums:** Brown University, Dartmouth College, Harvard University, Max Planck Institute for Mathematics in the Sciences, Princeton University, Simon Fraser University, Stanford University, University of California - Berkeley, University of Michigan, University of Minnesota, University of Notre Dame, University of Utah, University of Texas - Austin, University of Washington
- **Conferences:** Algebraic Geometry Northeast Series (AGNES), AMS Sectional Meetings (x10), Bay Area Discrete (BAD) Math Day, CA+, CMS Winter Meetings, Foundations of Computational Mathematics, Joint Math Meetings (x4), Oberwolfach Research Institute for Mathematics, SIAM Conference on Applied Algebraic Geometry (x2), Structures on Free Resolutions, Western Algebraic Geometry Online