NSF BIOGRAPHICAL SKETCH

NAME: Bruce, Juliette

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POSITION TITLE & INSTITUTION: Postdoctoral Research Associate in Mathematics, Brown University

(a) PROFESSIONAL PREPARATION -(see PAPPG Chapter II.C.2.f.(a))

INSTITUTION	LOCATION	MAJOR / AREA OF STUDY	DEGREE (if applicable)	YEAR YYYY
University of Michigan	Ann Arbor, MI	Mathematics / Political Science	BS	2014
University of Wisconsin	Madison, WI	Mathematics	MA	2016
University of Wisconsin	Madison, WI	Mathematics	PHD	2020

(b) APPOINTMENTS -(see PAPPG Chapter II.C.2.f.(b))

2020 - present Postdoctoral Research Associate in Mathematics, Brown University, Department of Mathematics, Providence, RI

2020 - 2022 NSF Postdoctoral Research Fellow, University of California, Berkeley, Department of Mathematics, Berkeley, CA

2020 - 2021 Postdoctoral Fellow, Mathematical Sciences Research institute (MSRI), Berkeley, CA

2015 - 2018 NSF Graduate Research Fellow, University of Wisconsin, Department of Mathematics, Madison, WI

2014 - 2020 Graduate Student Teaching/Research Assistant, University of Wisconsin, Department of Mathematics, Madison, WI

(c) PRODUCTS -(see PAPPG Chapter II.C.2.f.(c))

Products Most Closely Related to the Proposed Project

1. Brandt M, Bruce J, Chan M, Melo M, Moreland G, Wolfre C. On the top weight cohomology of $\mathcal{A}_{g}$. Geometry & Topology. Forthcoming. Available from: https://arxiv.org/abs/2012.02892
2. Juliette Bruce. The quantitative behavior of asymptotic syzygies for Hirzebruch surfaces. Journal of Commutative Algebra. 2022; 14(1):19-26. Available from: https://doi.org/10.1216/jca.2022.14.19 DOI: 10.1216/jca.2022.14.19
3. Bruce J, Corey D, Erman D, Goldstein S, Laudone R, Yang J. Syzygies of $\mathbb{P}^{1}\times\mathbb{P}^{1}$: Data and conjectures. Journal of Algebra. 2022 March; 593:589-621. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0021869321005160 DOI: 10.1016/j.jalgebra.2021.10.023
4. Bruce J, Erman D, Goldstein S, Yang J. Conjectures and Computations about Veronese Syzygies. Experimental Mathematics. 2018 June 21; 29(4):398-413. Available from: https://www.tandfonline.com/doi/full/10.1080/10586458.2018.1474506 DOI: 10.1080/10586458.2018.1474506

5. Bruce J, Erman D. A probabilistic approach to systems of parameters and Noether normalization. Algebra & Number Theory. 2019 December 7; 13(9):2081-2102. Available from: https://msp.org/ant/2019/13-9/p05.xhtml DOI: 10.2140/ant.2019.13.2081

Other Significant Products, Whether or Not Related to the Proposed Project

1. Bruce J, Cranton Heller L, Sayrafi M. Characterizing Multigraded Regularity on Products of Projective Spaces. arXiv [Preprint]. 2021 October 20 [revised 2022 January 03]. Available from: https://arxiv.org/abs/2110.10705 DOI: https://doi.org/10.48550/arXiv.2110.10705
2. Bruce J, Cranton Heller L, Sayrafi M. Bounds on Multigraded Regularity. arXiv [Preprint]. 2022 August . Available from: https://arxiv.org/abs/2208.11115 DOI: https://doi.org/10.48550/arXiv.2208.11115
3. Bruce J. Asymptotic Syzygies in the Setting of Semi-Ample Growth. arXiv [Preprint]. 2019 April 9. Available from: https://arxiv.org/abs/1904.04944 DOI: https://doi.org/10.48550/arXiv.1904.04944
4. Almousa A, Bruce J, Loper M, Sayrafi M. The virtual resolutions package for Macaulay2. The Journal of Software in Algebra and Geometry. 2020; 10:51-60. Available from: https://msp.org/jsag/2020/10-1/jsag-v10-n1-p06-p.pdf DOI: https://msp.org/jsag/2020/10-1/jsag-v10-n1-p06-p.pdf
5. Bruce J, Li W. Effective bounds on the dimensions of Jacobians covering abelian varieties. Proceedings of the American Mathematical Society. 2019; 148(2):535-551. Available from: https://www.ams.org/proc/2020-148-02/S0002-9939-2019-14756-0/ DOI: 10.1090/proc/14756

(d) SYNERGISTIC ACTIVITIES -(see PAPPG Chapter II.C.2.f.(d))

1. Conference Organizer M2@UW: I organized a 4-day conference, titled M2@UW, in April 2018 focused on creating new software packages for Macaulay2 — an open source computer algebra system — by bringing together developers and users of all skill levels and experiences. The conference had over 45 participants from all career stages (undergraduate students through tenured professors) from around the country. As an organizer, I created conference activities that promoted the development of collaborative relationships that cut across standard topic collaborations and involved a diverse group of researchers. Multiple published software packages and papers arose from work that began or continued at this conference.
2. Undergraduate Research Advisor: Since the Summer of 2021, I have mentored and advised Daniel Rostamloo -- an undergraduate at the University of California, Berkeley -- through two research projects. The first research project was part of an online summer undergrad research program where, together with five other undergraduate students, Daniel explored combinatorial questions related to the graphical matroid locus within the moduli space of tropical abelian varieties. Following the completion of this project, I began advising Daniel on a second research project proving sharp non-vanishing results for the syzygies of certain products of projective spaces. This project is ongoing, and I will hopefully result in a pre-print to be posted later this year. Daniel is now applying to graduate programs in mathematics.
3. Board Member (President) of Spectra, The Association for LGBTQ+ Mathematicians: Since the Fall of 2022 I have served as a board member for Spectra, The Association for LGBTQ+ Mathematicians through which I worked to make the mathematical community a more welcoming, inclusive, and supportive place for LGBTQ+ people. As a board member I oversaw

the growth and formalization of the organization including: our mailing/member lists reaching over 500 people, the creation and adoption of the groups first bylaws, the establishment of an invited lecture held annually at the Joint Mathematics Meetings, and the launch fundraising campaign that has raised over $20,000. Further, as a board member I led Spectra's efforts to work with publishers and other mathematically societies to adopt more inclusive publishing practices. In 2022 I am serving as the inaugural president of Spectra.

4. Organizer, Madison Math Circle: Between 2015 and 2018 I served as a volunteer, and eventually lead organizer, with the Madison Math Circle. When I began volunteering with the Madison Math Circle the circle's main programming was a weekly on-campus lecture given by a member of the math department. After roughly a year I stepped into the role of lead organizer overseeing the administrative needs of the circle. As an organizer, I worked to build stronger connections between the Madison Math Circle, local schools and teachers, and other outreach organizations focused on underrepresented groups. These ties helped the weekly attendance of the circle to more than double. I also led the creation of a new outreach arm of the circle, which visits high schools around the state of Wisconsin to better serve students from underrepresented groups. This dramatically expanded the reach of the Madison Math Circle, and during my final year as an organizer the circle reached over 300 students.
5. co-Organizer of Algebraic Geometry in the Time of COVID: In response to the COVID-19 pandemic causing many mathematical activities to ship to virtual formats I worked create online events and activities support those most likely to be harmed by the lose of in-person activities as well as those often at the periphery. During the Summer and Fall of 2020 I helped shepherd Ravi Vakil's Algebraic Geometry in the Time of Covid (AGITOC) project. This massive online open access course in algebraic geometry brought together over 2,000 registered participants at various career stages -- ranging high school and undergraduate students to tenured professors and people working in industry -- from around the world. This project consisted break the participants in to small discussion groups hosted on an online discussion platform together with 17 2-hour online lectures delivered by Ravi Vakil, with myself and other organizers helping add additional content to the lectures. As a co-organizer I helped process participants registration information, assigning them into their discussion groups. I also mentored a number of discuss groups totally roughly 200 students.