



BROWN

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Dear Committee Members,

I am writing to apply for the tenure-track assistant professorship in the Department of Mathematics and Computer Science at Santa Clara University. Currently, I am a postdoctoral researcher in the Mathematics Department at Brown University, a position I have held since August 2022. I received my Ph.D. in Mathematics from the University of Wisconsin-Madison under the guidance of my advisor Professor Daniel Erman in 2020. From 2020-2022 I was an NSF Postdoctoral Fellow in the Mathematics Department at the University of California, Berkeley. I was a postdoctoral fellow at the Mathematical Sciences Research Institute for 2020-2021.

I am especially interested in this position because during the Fall of 2023 while working remotely at Brown University, I had the opportunity to teach at San Francisco State University. This proved to be one of the most rewarding teaching experiences I have ever had, and I am motivated to pursue similar experiences where I can support and work with students in the Bay Area from a wide range of backgrounds. In this way working at Santa Clara University, and contributing as a teacher-scholar via my research, teaching, and service would be a dream. On a personal note, my family lives in California, and I would love to be near them.

The Department of Mathematics and Computer Science's commitment to the academic success of all our students, aligns extremely well with my passion for making mathematics a more inclusive community and supporting students from underrepresented communities. For example, I have worked to make mathematics more inclusive of people from underrepresented groups by founding events like *Trans Math Day* and leading *Spectra: the Association for LGBTQ+ Mathematicians*. To promote the success of mathematicians from underrepresented groups, I organized numerous national and international workshops and conferences. Further, in the classroom, I have sought to implement inclusive pedagogical practices to make all students feel welcome, valued, and supported. Going forward, I would be excited to help develop curriculum that centers the lives, experiences, and needs of underrepresented students.

I am committed to continually trying to refine and advance my teaching practices, by seeking out new ways to better center the needs of students. For example, would love to organize initiatives and programs aimed at supporting LGBTQ+ students, students of color, and women in mathematics. In the long term, I would love to organize a summer research program, similar to MSRI-UP, which promotes and supports LGBTQ+ undergraduate and graduate students by providing them with a supportive introduction to mathematics research and helps them transition to graduate school. Given Santa Clara University's commitment to supporting students from diverse socio-economic and cultural backgrounds and the Bay Area's long LGBTQ+ history I feel like organizing such a program at the here would be ideal.

My research interests lie in the intersection of algebraic geometry and commutative algebra with strong connections to computational algebra. I am interested in using homological, combinatorial,



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and computational methods to study the geometry of algebraic varieties. Much of my work carries a significant computational component. I have co-authored four published software packages, and multiple publications that revolve around using high-throughput high-performance computing to explore new mathematical phenomena. Computation is a driving component of my research and teaching, and I would love the opportunity to share my views on computation, mathematics, and science with my colleagues and students. Currently, my research program has two broad directions.

- (i) I have sought to deepen and expand our understanding of the ways homological algebra can be used to study the geometry of toric varieties. This seeks to generalize a very classical story using homological algebra to understand subvarieties of projective space.
- (ii) I have been studying the geometry and topology of various moduli spaces, e.g., the moduli space of (principally polarized) abelian varieties of a fixed dimension, via combinatorially and homological methods. This has led to novel applications to arithmetic groups.

Further, I am passionate about promoting inclusivity, diversity, and justice in the mathematics community. This passion extends throughout my teaching where I am dedicated to creating an interactive and supportive classroom environment that helps students thrive.

My research output includes 15 papers, with publications in journals such as *Algebra & Number Theory*, *Geometry & Topology*, and *Experimental Mathematics*, as well as, multiple published software packages. Below are a few of the non-research highlights of my file.

- I was awarded an *NSF Postdoctoral Research Fellowship*, an *NSF Graduate Research Fellowship*, and I have secured over \$100,000 in conference grants including 4 NSF conference grants.
- I served on the Software Presentation Committee for the International Symposium for Symbolic and Computational Algebra.
- I have organized 12+ conferences, workshops, and special sessions, including multiple events aimed at supporting and promoting mathematicians from generally underrepresented groups, especially women and LGBTQ+ mathematicians.
- I was awarded the highest departmental and campus-wide teaching awards at the University of Wisconsin - Madison, the Capstone Teaching Award (2019) and the Teaching Assistant Award for Exceptional Service (2018), awarded to 1 and 3 students each year respectively.
- I organized two summer undergraduate research programs, and participated in one summer research program for students starting graduate school. One of the undergraduates I mentored was awarded an *NSF Graduate Research Fellowship* to student mathematics.

With my application, I include a curriculum vitae, a teaching statement, a research statement, sample student evaluations, sample course materials, unofficial graduate transcripts, representative publications, and the contact information for three references. Please do not hesitate to contact me if there is anything else I can provide, or with any questions, and thank you for your consideration.

Sincerely,

Juliette Bruce
Postdoctoral Associate