Juliette Bruce
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Department of Mathematics
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Dear Committee Members,

I am writing to apply for a tenure-track assistant professor position in the Department of Mathematics & Statistics at James Madison 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 Professor Daniel Erman in 2020. From 2020-2022 I was an NSF Postdoctoral Fellow in the Mathematics Department at the University of California, Berkeley. Additionally, I was a postdoctoral fellow at the Mathematical Sciences Research Institute – now the Simons Laufer Mathematical Sciences Institute – for the 2020-2021 academic year.

I am especially interested in this position given ames Madison University's commitment to providing an excellent education to a diverse student body. I feel like this position is well matched to my goals of working to support students from a wide range of backgrounds, making the mathematics community more inclusive for LGBTQ+ people, and establishing a thriving research program that significantly incorporates undergraduate research. I would be extremely excited to work with such amazing students from diverse backgrounds both in and out of the classroom and on research experiences. 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 an REU program, similar to MSRI-UP, which promotes and supports LGBTQ+ students exploring mathematics research and pursuing graduate school.

My research interests lie in the intersection of algebraic geometry and commutative algebra with connections to combinatorics, number theory, and topology. I am interested in using homological, combinatorial, and computational methods to study the geometry of algebraic varieties. 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 the cohomology of certain 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 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.

With my application, I include a curriculum vitae, a research statement, a teaching statement, and a statement on contributions to equity, diversity, and inclusion. I will have three letters of recommendation: Melody Chan (melody_chan@brown.edu), Daniel Erman (erman@hawaii.edu), and Shirin Malekpour (shirin.malekpour@wisc.edu).

Please do not hesitate to contact me with any questions, or if there is anything else I can provide, and thank you in advance for your consideration.

Sincerely,

Juliette E. Bruce

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