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November 23, 2023

Dear Committee Members,

I am writing to apply for the mathematics assistant professor position in the Engineering & Mathematics Division at the the University of Washington Bothell. 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 extremely interested in this position as I feel my qualifications and goals are well matched to the position. For example, as I describe in more detail below my research interests are in algebra and broadly touch on algebraic geometry and commutative algebra with connections to combinatorics, number theory, and recently topology. Further, I am particularly excited by and interested in teaching and supporting undergraduates from diverse backgrounds. In this position, I feel like I could achieve my goals of teaching and working with students, continuing a thriving research program in algebra that engages undergraduate students, promoting an inclusive and supportive community both at the division and university level, and supporting students from broad and diverse social and cultural backgrounds. I would love the opportunity to contribute to the division, build collaborations and connections with colleagues in the division and beyond, and work with and mentor 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 school. Given the University of Washington Bothell's commitment to diversity and history of organizing and hosting REU programs I feel like organizing such a program at the University of Washington Bothell would be ideal.

Finally, on a personal level I am particularly interested in this position because my spouse and I are especially looking to end up in the greater Seattle area.

My research interests lie in the intersection of algebraic geometry and commutative algebra with connections to combinatorics, number theory, and recently 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.

(iii) 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 awards an *NSF Graduate Research Fellowship* to student mathematics.

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.
- 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 awards an *NSF Graduate Research Fellowship* to student mathematics.

With my application, I include a curriculum vitae, a research statement, a teaching statement, a diversity statement, and unofficial copies of my graduate transcripts. I will have four letters of recommendation. Three research letters: Christine Berkesch (cberkesc@umn.edu), Melody Chan (melody_chan@brown.edu), and Daniel Erman (erman@hawaii.edu), and one teaching letter from 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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