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Suzanne H. Plimpton
Reports Clearance Officer
Office of the General Counsel
National Science Foundation
Alexandria, VA 22314

1. Background Information

Department: Mathematics

Degree sought: Doctoral Degree

Degree Start Date: 08/2022

Research interest/topic: I'm interested broadly in algebraic geometry and more specifically in logarithmic Gromov Witten invariants, the Gross-Siebert program and localization formulas. Unrelated to this I am also interested in non-convex optimization.

Keywords: mirror symmetry, algebraic geometry, commutative algebra, logarithmic geometry, gross-siebert program, gromov-witten theory, localization, equivariant cohomology

Research Advisor 1: Bernd Siebert

Telephone: 5124717711

Email: siebert@math.utexas.edu

Research Advisor 2:

Telephone:

Email:

Research Advisor 3:

Telephone:

Email:

2. Skills

Research Skills
Undertook additional formal coursework/training.
Other preparation to conduct research (e.g. short course) - Reading courses with Bernd Siebert, as is standard research preparation in mathematics

Courses/seminars taken in major discipline: 5

Courses/seminars taken outside of major discipline: 1

Courses/seminars taken that specifically covered interdisciplinary topics related to GRFP project: 1

Professional Skills
Made presentation(s) at academic/scientific professional conferences, meetings, or departmental seminars.
Presented results from GRF activities to professional, nonacademic audiences (e.g., industry, government)

Career Skills
Served as a mentor to others (e.g., graduate students, undergraduates, laboratory technicians)
Received training/instruction on the interaction between academic research and industrial technical requirements.
Had an internship (an off-campus, research, educational, and/or work experience) in a nonacademic setting (e.g., industry, government)

3. International Experience

Took part in any international experiences during this reporting period: Yes

Type	Country	Duration	International Experience
Conferences/Workshops	United Kingdom	0 - 1	Other - Learning workshop in combinatorial algebraic geometry

4. Achievements

Had any achievements to report for this period: No

5. Career Plans

Expected Graduation Date: 05/2027

Type of employment pursued: 4 Year College/University - Postdoc

Other:

6. Internships

Took part in any internship(s) lasting 1 month or more: Yes

Company/Agency/Organization	Duration (in months)	Contributions
National Security Agency/Laboratory of Physical Sciences	3 - 4	Research/Industrial Interaction

7. Other Financial Support

Received any fellowships (other than GRFP), scholarships, or grants during the period: No

8. Stipend Feedback

Stipend comparison to stipends received at your organization: Equal to Others

9. Additional Funding Opportunities

Have you received any Additional Funding Opportunity: No

10. Fellowship Year Summary

Fellowship Year Summary Uploaded: No

Fellowship Year Summary Text: The first year of my Ph.D. was primarily spent on coursework and preparation for research in algebraic geometry. I have narrowed my interests significantly and am now involved in two unrelated research directions. I also spent significant time on community involvement within my own department by organizing events and seminars and on one-on-one mentoring of undergraduates through directed reading courses.

My primary focus over the reporting period was to learn the basic mathematics forming the foundation of modern mathematical research and algebraic geometry in particular. This partly entailed completing preliminary coursework required by my degree and passing the associated exams, but principally involved individual reading supervised by Professor Bernd Siebert. I worked through a significant portion of Hartshorne's Algebraic Geometry (chapters II and III, mostly) and the early chapters of Toric Geometry by Cox Little and Schneck. I organized and ran a toric geometry learning seminar within the department to complement this reading. I also began reading papers regarding logarithmic geometry and stability conditions. I will continue to work through Hartshorne sporadically but have begun learning about equivariant cohomology and localization formulas in the hope of starting a research project with Bernd Siebert which aims to extend localization formulas to the logarithmic setting.

During this period I also completed an internship at the Laboratory of Physical Sciences at the University of Maryland. There, I worked on the reverse Ising problem for Multiplication circuits, a nonlinear nonconvex mixed optimization problem. The full time internship lasted the duration of the summer of 2022, and I continued the research in a (very) part time capacity over the school year independently. Recent results are promising, and I hope to be preparing a publication by this upcoming September. I began talking to Professor Joe Kileel, who works at the intersection of optimization and algebraic geometry, to see if there is any possibility of growing this project into something that will complement my primary research goals.

I mentored three distinct undergraduate reading courses over the reporting period, all covering topics in commutative algebra and algebraic geometry. I also organized and ran SOPHEX, a loose, inclusive seminar traditionally targeted at the first year students within the department.