1. Background Information

Department: Mathematics
Degree sought: Doctoral Degree
Degree Start Date: 06/2021
Research interest/topic: Algebraic geometry, commutative algebra
Keywords: F-signature, F-singularities, tight closure, toric geometry, mirror symmetry, tropical geometry
Research Advisor 1: Timothy
Telephone: 5124716142
Email: perutz@math.utexas.edu

Research Advisor 2:
Telephone:
Email:

Research Advisor 3:
Telephone:
Email:

2. Skills

Research Skills
Participated in formal coursework/training in research methods, practices, and/or instrumentation in your primary discipline.
Other preparation to conduct research (e.g. short course) - I was on leave from my home institution to complete a one year masters degree at the University of Cambridge in the UK.

Courses/seminars taken in major discipline: 10
Courses/seminars taken outside of major discipline: 0
Courses/seminars taken that specifically covered interdisciplinary topics related to GRFP project: 0

Professional Skills
Authored, submitted or published research paper(s) in refereed journals.
Made presentation(s) at academic/scientific professional conferences, meetings, or departmental seminars.
Produced multimedia materials, web sites, or other cyber-enabled tools to communicate the results of GRF activities to external audiences.
Undertook coursework/training that included regular faculty critique of and feedback on professional writing.

Career Skills
Served as a mentor to others (e.g., graduate students, undergraduates, laboratory technicians)

3. International Experience

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

Type	Country	Duration	International Experince
Conferences/Workshops; Coursework/Training; Research/Fieldwork; Work with other nationalities; Other - I was away at the University of Cambridge on the Churchill Scholarship for the duration of the reporting period.	United Kingdom	9 - 10	Awards/Honors/Recognitions; Presentations; Other - Courework (I completed Part III of the Mathematical Tripos).

4. Achievements

Had any achievements to report for this period: Yes

Achievement Type	Achievement Description
Publications	Mark J. Hagmann and Isaac Martin. #Design and simulations of a prototype nanocircuit to transmit microwave and terahertz harmonics generated with a mode-locked laser#. In: AIP Advances 12.1 (2022), p. 015014. doi: 10.1063/5.0070872. eprint: https://doi.org/10.1063/5.0070872. url: https://doi.org/10.1063/5.0070872. Isaac Martin. #The number of torsion divisors in a strongly F -regular ring is bounded by the reciprocal of F -signature#. In: Communications in Algebra (2021). doi: 10.1080/00927872.2021.1986057.

5. Career Plans

Expected Graduation Date: 05/2026
Type of employment pursued: 4 Year College/University - Postdoc
Other:

6. Internships

Took part in any internship(s) lasting 1 month or more: No

7. Other Financial Support

Received any fellowships (other than GRFP), scholarships, or grants during the period: Yes

Fellowship Offer	Year Awarded	Source of Support
Churchill Scholarship	2021	Churchill Foundation

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: For the duration of the funding period, I have been on leave from my home instituion pursuing a masters degree at the University of Cambridge. My primary activity during this reserve year was participation in Part III of the Mathematical Tripos, where I studied topics in algebraic geometry and number theory. I'm writing my Part III essay on D-modules and the structure of the ring of differential operators in prime characteristic, which bridges the gap between my past work on F-singularities and research topics I hope to pursue in the future at Austin. Beyond aiding my mathematical development, my time in Cambridge has greatly enhanced my ability to communicate research to academics outside my own discipline and has generally improved my involvement in the broader academic community. I've had opportunities to present my research both formally and informally to a variety of audiences in various formats.

During the summer and fall of 2021, I finalized and submitted the papers listed above. Both were accepted and have since been published.

I've been engaged in a few different mentorship roles during this funding period. Last fall, I remotely mentored the directed reading project (DRP) of an undergrad at UT Austin, which concluded with a successful presentation by the mentee to the other DRP participants. We covered the basic theory of elliptic curves. I also served as the mentor to two incoming Churchill Scholars through the Churchill Scholarship's mentorship scheme, offering advice primarily regarding logistics surrounding immigration to the UK and the Part III program.