

**Summer Research for Women in
Mathematics 2019 H98230-19-1-0119**

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A. Introduction

The MSRI project, Summer Research for Women in Mathematics (SWiM) is part of MSRI's overall activities aimed at strengthening the mathematical sciences by facilitating research and professional activities leading to or enhancing successful, productive careers. As part of this goal, it is important to recognize that for some populations inequities exist and need to be redressed. For some, a remedy is to increase the visibility and impact of their research, for others it is to increase their productivity. This program has been aimed at creating a rewarding and collegial environment that furthers success, benefiting the mathematical community at large. Responses to the exit survey reveal that the program was successful in working toward this goal; when asked about their level of professional satisfaction with MSRI, 88% of respondents gave a rating of 5 out of 5. MSRI is also gratified to see that 93% of respondents gave a 5 out of 5 rating to the administrative support they received.

The present grant provided space and funds for 13 groups of women researchers to work on a research project for one or two weeks at MSRI during the summer of 2019. Each group was comprised of between 2 and 6 researchers, with a total of 46 women participating overall. These were research projects that had already been started, perhaps at a conference such as Women in Topology, Women in Numbers or could be freestanding activities.

As part of their application package, the groups were asked to provide bio sketches, a brief history of the collaboration, the context and description of the research problems to be addressed, partial results already obtained, realistic goals to be achieved during the residence at MSRI, and plans for research that will occur before, during and after their stay at MSRI.

Factors in choosing the groups included: scientific merit of the project, the likelihood of finishing the project within the timeline specified in the application, and the extent to which this opportunity will enhance the project, for example by bringing together researchers from different institutions.

B. Summary of Participant Demographics

Officially Registered Participants Information

Participants		46
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Gender		46
Male	0%	0
Female	100%	46
Declined to state	0%	0

Ethnicity*		46
White	78%	36
Asian	11%	5
Hispanic	0%	0
Pacific Islander	0%	0
Black	2%	1
Native American	0%	0
Mixed	7%	3
Declined to state	2%	1

* ethnicity specifications are not exclusive

Participants		
First Name	Last Name	Institution
Shabnam	Akhtari	University of Oregon
Kevser	Aktas	Gazi University
Selvi	Beyarslan	University of South Alabama
Jennifer	Biermann	Hobart and William Smith College
Kirsti	Biggs	University of Bristol
Laura	Cladek	University of California, Los Angeles
Blair	Davey	City College, CUNY
Anna	Duwenig	University of Victoria
Sabine	El Khoury	American University of Beirut
Melissa	Emory	University of Toronto
Emily	Evans	Brigham Young University
Amanda	Francis	Mathematical Reviews
Holley	Friedlander	Dickinson College
Elena	Fuchs	University of California, Davis
Elizabeth	Gillaspy	University of Montana
Heidi	Goodson	Brooklyn College, CUNY
Rachel	Grotheer	Goucher College
Alia	Hamieh	University of Northern British Columbia
Megumi	Harada	McMaster University
Piper	Harron	University of Hawaii at Manoa
Catherine	Hsu	University of Bristol
Shuang	Li	Colorado School of Mines
Kuei-Nuan	Lin	Pennsylvania State University
Anna	Ma	University of California, San Diego
Claudia	Miller	Syracuse University
Jennifer	Morse	University of Virginia
Deanna	Needell	University of California, Los Angeles
Rachael	Norton	Northwestern University
Augustine	O'Keefe	Connecticut College
Kathleen	Petersen	Florida State University
Martha	Precupp	Washington University
Jing	Qin	University of Kentucky
Priyanka	Rajan	University of Notre Dame
Sarah	Reznikoff	Kansas State University
Noella	Rizo Carrion	University of Valencia
Amanda	Schaeffer Fry	Metropolitan State University of Denver
Anne	Schilling	University of California, Davis
Catherine	Searle	Wichita State University
Alexandra	Secelaeanu	University of Nebraska
Liana	Sega	University of Missouri
Katherine	Stange	University of Colorado
Krystal	Taylor	Ohio State University
Lola	Thompson	Oberlin College
Julianna	Tymoczko	Smith College
Carolina	Vallejo	Autonomous University of Madrid
Sarah	Wright	Fitchburg State University

D. & E. Description of Conference Activities & Publications

Each research group worked on the projects outlined in their proposal. They met daily at MSRI, and many met in the evenings and weekends at the apartments reserved for them on the campus of UC Berkeley. Unfortunately, due to the COVID-19 pandemic, the groups have not all been able to reunite in person after the summer program but they have continued to meet virtually to further their research. When travel again becomes advisable, MSRI will make travel funding available to facilitate continued in-person collaboration.

The following status updates have been provide to MSRI:

Group 1

Update from 5/27/20

We have some new results, and are currently working on the last stages of preparing an article, which will be submitted to a peer-reviewed research journal specialized in number theory. We are expecting to submit the article by the end of July 2020.

Group 2

Update from 12/4/19:

We have submitted our first joint paper. We also started another project and we are using the extended support to work together. This will not be possible without the supports that we received at MSRI. Me and another group of researchers just submitted another application for this coming summer because of such positive experience I have. Thank you for all of the work you have done for this program.

Update from 5/22/20:

There is no change on the status of our submitted paper. The journal has not gave us any update since the submission.

Group 3

Update from 3/7/20:

Paper 1 - submitted. Paper 2 - In progress

Update from 5/26/2020:

This paper appears on the arXiv and is currently under review.

Group 4

Update from 5/22/20:

Paper accepted for publication in Journal of Functional Analysis (10/1/20)

Group 5

Update from 6/20/20:

At the moment we do not have a completed paper to report. As you might recall, we were planning a follow up meeting for our group in Syracuse in late March. However, the time of our meeting turned out to coincide with university closures and travel bans due to the current health crisis and we had to cancel

our plans. Due to this and the demands of the current situation on our time we have not had the chance to complete our project. We will keep you informed of our progress.

Group 6

Update from 5/25/20:

Paper 1 - submitted

Paper 2 - submitted

Paper 3 - In progress, plan to submit by the end of June 2020

Paper 4 - In progress, plan to submit by the end of summer 2020

Group 7

Update from 5/22/20:

We had a good meeting at JMM (and I spoke about the project there), but our group was really set-back this spring, mainly by COVID -- almost all of us had to give over most/all research time to childcare, and one of us had a personal loss. We are finding a bit of time now, and have overcome some outstanding research obstacles on the project, and hoping to get a final version of our paper together in the next months.

Group 8

Update from 5/22/20:

Paper submitted 4/22/20

Group 9

Update from 12/5/19:

We have two papers submitted and are working on a third. It was a VERY productive two weeks.

Update from 5/22/20:

Paper 1 - Submitted on 9/13/19

Paper 2 - Submitted on 8/22/19

Paper 3 - In progress

Paper 4 - In progress

We are currently working on applying our methods to COVID-19 problems, so the group is very much still active.

Group 10

Update from 12/5/19:

*Based on our work at MSRI, [our group is] currently completing work on a manuscript which is jointly authored with [other researchers]. (We discovered *after* our MSRI visit that we were thinking about similar questions . . . and ended up collaborating with them.) The manuscript is nearing completion, and we hope to have a preprint available very soon (roughly within the next month).*

Update from 12/31/19:

I am writing to let you know that [our group has] completed a research manuscript pertaining to one of the two main projects we started at MSRI during the SWiM program last summer (July 2019). It turned

out that we joined forces with two other mathematicians who were thinking about the same problem, so the final paper has 5 authors. However, the ideas and conversations we had at MSRI made the final results possible. The paper is now posted on the preprint (ArXiv) server. We will keep you updated regarding the second of our two main projects.

Paper 2 – Submitted on 3/11/20

Group 11

Update from 12/4/19:

*A short version of the paper was also accepted as a poster for FPSAC2020. Paper to appear in *Seminaire Lotharingien de Combinatoire (2020)**

Update from 5/29/20:

*Paper 2 – Accepted for publication in *The Electronic Journal of Combinatorics**

Group 12

Update from 5/24/20:

Paper 1 – Submitted on 3/13/20

Paper 2 – Submitted on 4/21/20

Paper 3 – Submitted on 5/24/20

By the way, since we work so well together thanks to the program, we are currently working on some new joint projects that have begun since our stay at MSRI!

Group 13

Update from 6/18/20:

[We] don't have a paper ready yet. Given the current situation with the pandemic, my plans to visit [my research partner] during the summer have been postponed. I will be on sabbatical this coming academic year and provided it is safe to travel and [my research partner's] schedule permits, I was planning to try and visit her at some point during that time so that we could finish our work.

From the participants reports we can see that 10 of the 13 groups have already written up some of their results and posted their manuscript on the arXiv. So far, 13 papers were submitted, 2 have already been accepted, and the other eleven are awaiting referee's reports.

F. Conclusion

This program has been and continues to be a success. A selection of comments from the exit interviews shows the impact that this has had on the summer 2019 participants:

"I thought that this was a fantastic program. It was so useful to have the funds and time to work with my collaborators. The six of us normally reside in four different time zones, which makes it difficult to work over Skype. I don't think that we could have completed our project without these two weeks. I love that the mothers in our group were able to have childcare

provided. It really gave us the ability to focus and stay productive throughout the two-week period.”

“The most beneficial part was about being in the same place to work together without any distractions. My collaborators and I tried to meet weekly on Skype to work on our project since November but given our teaching/mentoring/service responsibilities at our institutions and our private life, our progress was slow. While we were at MSRI, we made so much progress in our project that would take us months if we kept working remotely with each other.”

“Our group was able to learn about an area of research that was relatively new to almost all of us and to apply work we had done previously to this new and increasingly popular area. Since I work at a small teaching school, having two weeks of dedicated research time with collaborators that live far from me and receiving the funding to do so, is invaluable to helping me progress in my research.”

“We felt less judged and found ourselves working much more openly - we were more willing to throw ideas out there, even if they were silly or didn't pan out. This helped stem creativity and led to success in the project that wouldn't have happened otherwise. Maybe this shouldn't be the case - we should just be confident to work this way all the time. I think this experience helped us realize that and has helped us gain more confidence in collaborating (together and with others) going forward in our careers.”

“I met women researchers from other fields (participants in the other SWiM groups), building my support network. Many of the women participating in SWiM this summer had young children that accompanied them to MSRI; it was inspiring to see how these women are managing to balance family and research. I now have more role models and mentors that I can ask about how to achieve such a balance.”

All groups are working on manuscripts for publication, some of which have already been submitted and accepted. Eighty groups in diverse fields (comprised of 294 women) applied for the 2020 program, up from 46 groups and 153 women who applied for the 2019 program. Unfortunately, due to the COVID-19 pandemic, MSRI has postponed the next iteration of the SWiM program until summer 2021. However, thanks to grants from private foundations, we have already been able to extend offers to 18 groups (82 women), which represents an increase of more than 30% above the number of 2019 participants.