Connections for Women: Algebraic Topology
January 21 - 24, 2014
MSRI, Berkeley, CA, USA

Organizers:
Julie Bergner (University of California)
Teena Gerhardt (Michigan State University)
Brooke Shipley (University of Illinois at Chicago)
1 Workshop Description

At the heart of algebraic topology is the interplay between algebra and geometry. Foundational geometric problems are translated into algebra and meanwhile geometric tools are applied to algebraic problems. This creates a rich field of mathematics with many tools and techniques, and close ties to algebraic geometry, geometric topology, number theory, representation theory, etc.

This Connections for Women workshop was the first event in the semester-long Algebraic Topology program at the Mathematical Sciences Research Institute (MSRI) in Spring 2014. The workshop was organized by Teena Gerhardt (Lead Organizer) from Michigan State University, Julie Bergner from University of California Riverside, and Brooke Shipley from University of Illinois at Chicago.

The goals of the Connections for Women: Algebraic Topology Workshop were as follows:

- Highlight the outstanding work of female mathematicians in Algebraic Topology.
- Provide an introduction to several important areas of Algebraic Topology in a way that is accessible to early-career mathematicians as well as to researchers in neighboring fields of mathematics.
- Aid in the discovery and creation of mathematical connections between participants.
- Create a network of female mathematicians in Algebraic Topology where open communication about personal and professional successes and challenges is encouraged.

The workshop was very successful in meeting these goals. The workshop had three main components: mini-courses, participant talks, and a panel discussion followed by a conference dinner. These three components are discussed below.

1.1 Mini-Courses

Since one of the primary workshop goals was for it to be accessible to early-career researchers and people in neighboring fields of mathematics, the workshop was structured around 3 mini-courses each consisting of 2 one-hour lectures. All of the mini-course lecturers were prominent female mathematicians in the field: Kathryn Hess from Ecole Polytechnique Fédérale de Lausanne (EPFL), Nathalie Wahl from the University of Copenhagen, and Kirsten Wickelgren from Georgia Institute of Technology. These lecturers were chosen for both their excellence in research and their ability to communicate with a diverse audience, and indeed they gave excellent lectures. The scientific content of the mini-courses is briefly described below. Videos and typed notes for these courses are available on the MSRI website.

Operads in Algebraic Topology – Kathryn Hess

Hess provided an introduction to operads and the many important applications of operads to algebraic topology. She discussed their origin as a convenient means for understanding iterated loop spaces and ended with a discussion of Deligne’s conjecture and various solutions.

Homological Stability for Families of Groups – Nathalie Wahl

Wahl discussed a host of exciting recent homological stability results. Harer’s theorem for mapping class groups showed that the homology of the mapping class group stabilizes in certain degrees as
the genus of the surface grows. Such stability phenomena have had dramatic and far-reaching generalizations in recent times. Wahl outlined her own recent work on a general axiomatic approach which would subsume most known stability results.

**Homotopy Theory and Arithmetic Geometry – Kirsten Wickelgren**

Wickelgren discussed the use of homotopy theory to study non-abelian phenomena in the intersection of algebraic topology, algebraic geometry, and number theory. She focused on Grothendieck’s anabelian conjectures which predict that certain schemes are determined by their étale fundamental group.

### 1.2 Participant Talks

Two important goals of the workshop were to highlight the work of female mathematicians and to create mathematical connections between participants. Thus participants were offered the opportunity to propose a short talk for the workshop, allowing early-career participants a chance to present their results and share their research interests. There were 5 twenty-minute participant talks, highlighting the work of promising early-career female algebraic-topologists: Emily Riehl from Harvard University, Simona Settepanella from Hokkaido University, Marcy Robertson from University of Western Ontario, Cristina Costoya from Universidad de Coruña, Anna Marie Bohmann from Northwestern University, and Angelica Osorno from Reed College (with the last two giving a talk together on their joint work). There were additionally 5 ten-minute participant talks during the workshop.

Participants gave lovely talks, and the talks covered a diverse set of research interests, including equivariant stable homotopy theory, category theory, structured ring spectra, fibre bundles, and braid groups. More details can be found on the MSRI website.

### 1.3 Panel Discussion and Conference Dinner

One of the workshop goals was to help create a network of female mathematicians in Algebraic Topology with open communication about personal and professional challenges, in addition to mathematics. To encourage such communication there was a panel discussion on the first day of the workshop. This panel discussed issues particularly relevant to early-career researchers, women, and members of under-represented groups. The lively discussion was guided by questions from the audience, and many audience members contributed their thoughts and experiences in addition to the panel members. The panel was scheduled immediately before the Conference Dinner and the conversations sparked during the panel continued informally throughout the evening. The panel was moderated by Teena Gerhardt (Assistant Professor at Michigan State University) and the panelists were:

Maia Averett – Assistant Professor – Mills College
Julie Bergner – Assistant Professor – University of California Riverside
Brenda Johnson – Professor – Union College
Emily Riehl – Postdoc – Harvard University
Brooke Shipley – Professor – University of Illinois at Chicago
Nathalie Wahl – Professor – University of Copenhagen
These panelists represented a variety of career stages and types of institutions. There were panelists both with and without children and panelists who have dealt with “two-body” problems. In an online participant survey, participants responded very positively about both the panel and the dinner. One participant noted: “I found the panel discussion about women’s experiences in their careers to be very beneficial.” Another participant commented, “It was great to have a chance to talk with my fellow mathematicians—many of whom I’d just met— in a more casual setting while eating delicious food.”

1.4 Participant Response

The Connections for Women workshop was immediately followed by the Introductory Workshop in Algebraic Topology, also at MSRI. These two workshops together marked the beginning of the Algebraic Topology semester. Many of the participants in the Connections for Women workshop stayed to participate in the Introductory Workshop. The two workshops were closely coordinated, contributing to the success of both workshops.

Participants gave feedback on the Connections for Women workshop via an online survey. The participant feedback was overwhelmingly positive. One participant noted “The workshop was a great opportunity to make new contacts and solidify old ones. I was able to work with collaborators on a project during lunch breaks. This was an excellent experience.” Another commented, “I had a wonderful time and thought it was excellently organized, with lots of very intense mathematics, well-balanced with much opportunity to meet and form relationships with our fellow mathematicians.” From comments such as these as well as the huge majority of participants indicating that the overall experience was “very worthwhile,” it seems clear that the goals of the workshop were met.
### Organizers

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### Speakers

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## Connections for Women: Algebraic Topology

**January 23 - 24, 2014**

### Schedule

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<td>Welcome</td>
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<td>Emily Riehl Limits of quasi-categories with (co)limits</td>
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<td>Anna Marie Bohmann Angelica Osorno A new equivariant infinite loop space machine</td>
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<td>Nathalie Wahl Homological stability for families of groups</td>
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<td>6:30PM - 8:30PM</td>
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<td>Dinner at Taste of the Himalayas</td>
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<td>Cristina Costoya Realizability of G-modules: on a dual of a Steenrod problem</td>
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## Officially Registered Participant Information

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* ethnicity specifications are not exclusive
Summary

Workshop assessment

The workshop was intellectually stimulating

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The overall experience of the workshop was worthwhile

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The time between lectures was adequate for discussion

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</table>
Additional comments on the workshop organization

I enjoyed the lunch selection, and it was very reasonably priced. I sent a few emails before arriving for which I did not receive a response. I had a wonderful time and thought it was excellently...

Personal assessment

I was well prepared to benefit from the lectures

<table>
<thead>
<tr>
<th>Score</th>
<th>Count</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>4%</td>
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<tr>
<td>2</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>26%</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
<td>59%</td>
</tr>
</tbody>
</table>

My interest in the subject matter was increased by the workshop

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<tr>
<td>3</td>
<td>2</td>
<td>7%</td>
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<tr>
<td>4</td>
<td>6</td>
<td>22%</td>
</tr>
<tr>
<td>5</td>
<td>19</td>
<td>70%</td>
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</tbody>
</table>

The workshop helped me meet people with similar scientific interests

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<tr>
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<th>Percentage</th>
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<tbody>
<tr>
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<td>2</td>
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<td>0%</td>
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<tr>
<td>3</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>26%</td>
</tr>
<tr>
<td>5</td>
<td>19</td>
<td>70%</td>
</tr>
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</table>

Additional comments on your personal assessment

thanks!
Did you attend the panel discussion?

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<tbody>
<tr>
<td><strong>Yes</strong></td>
<td>27</td>
<td>100%</td>
</tr>
<tr>
<td><strong>No</strong></td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

If you did attend the panel discussion, did you find it worthwhile?

<p>| | | |</p>
<table>
<thead>
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</thead>
<tbody>
<tr>
<td>1 - Not at all</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>19%</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>33%</td>
</tr>
<tr>
<td>5 - Very much</td>
<td>12</td>
<td>44%</td>
</tr>
</tbody>
</table>

What other subjects should be addressed in future panel discussions?

It would have been useful to have a member on the panel who did not go to Harvard. Perhaps shorter more directed panels would be nice.

Did you attend the dinner?

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</thead>
<tbody>
<tr>
<td><strong>Yes</strong></td>
<td>24</td>
<td>89%</td>
</tr>
<tr>
<td><strong>No</strong></td>
<td>3</td>
<td>11%</td>
</tr>
</tbody>
</table>

If you did attend the dinner, did it help to solidify the contacts you made in the workshop?
Please provide any comments on the dinner

more spicy food! great choice. It was great to have a chance to talk with my fellow mathematicians--many of whom I'd just met-- in a more casual setting while eating delicious food. very good food and ... 

Venue

The MSRI physical facilities were conducive for such a workshop

1 - Not at all 0 0%
2 0 0%
3 3 11%
4 6 22%
5 - Very 18 67%

The MSRI computer facilities were adequate for such a workshop
The MSRI lunch arrangements were satisfactory

- 1 - Not at all 0 0%
- 2 0 0%
- 3 1 4%
- 4 5 19%
- 5 - Very 21 78%

The MSRI tea arrangements were satisfactory

- 1 - Not at all 0 0%
- 2 3 11%
- 3 4 15%
- 4 9 33%
- 5 - Very 11 41%

Additional comments on the venue

Excellent. A bit difficult to get to from the airport but the shuttles from campus are convenient. The lecture hall could be improved: far too few seats are good with respect to following the lecture. ...

MSRI Wireless Network

Did you use MSRI's wireless network?
Did you experience any difficulties with the network?

- Yes: 1 (4%)
- No: 23 (85%)

If you did experience difficulties with the network, please explain:
printing from my own computer was a problem. Hence I printed from a library computer instead.

Thank you for completing this survey

We welcome any additional comments or suggestions you may have to improve the overall experience for future participants.

The workshop was a great opportunity to make new contacts and solidify old ones. I was able to work with collaborators on a project during lunch breaks. This was an excellent experience.
Connections for Women: Algebraic Topology
January 23 - 24, 2014

Additional Survey Responses

Additional comments on your personal assessment
• thanks!

Additional comments on the venue
• Excellent.
• A bit difficult to get to from the airport but the shuttles from campus are convenient.
• The lecture hall could be improved: far too few seats are good with respect to following the lectures (including being able to read the blackboard!). Temperature was also an issue.
• On Friday, we were late to tea because a talk ran long and then we took a photo. By the time we got there, a lot of the snacks were gone.
• The cash only lunch was not convenient and not good.

We welcome any additional comments or suggestions you may have to improve the overall experience for future participants.
• The workshop was a great opportunity to make new contacts and solidify old ones. I was able to work with collaborators on a project during lunch breaks. This was an excellent experience.

If you did experience difficulties with the network, please explain:
• printing from my own computer was a problem. Hence I printed from a library computer instead.

What other subjects should be addressed in future panel discussions?
• It would have been useful to have a member on the panel who did not go to Harvard.
• perhaps shorter more directed panels would be nice.

Please provide any comments on the dinner
• more spicy food!
• great choice.
• It was great to have a chance to talk with my fellow mathematicians--many of whom I'd just met-- in a more casual setting while eating delicious food.
• very good food and company

Additional comments on the workshop organization
• great
• I enjoyed the lunch selection, and it was very reasonably priced
• I sent a few emails before arriving for which I did not receive a response.
• I had a wonderful time and thought it was excellently organized, with lots of very intense mathematics, well-balanced with much opportunity to meet and form relationships with our fellow mathematicians.
• I found the panel discussion about women's experiences in their careers to be very beneficial.
• The latches in the restrooms are not working properly.
• could have been more variety in lecture topics, enjoyed the short lectures
• Thank you!
• Because of the large number of people, it was a bit difficult to make new connections. It did help solidify old connections.