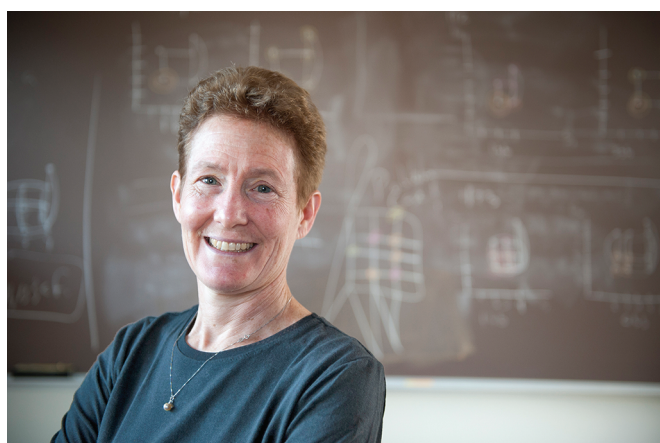




## Ruth Haas Interview

*Conducted by Alexander Diaz-Lopez*



Ruth Haas, president-elect of the Association for Women in Mathematics, is professor of mathematics at the University of Hawai'i at Mānoa and Achilles Professor Emerita in Mathematics and Statistics at Smith College. At Smith, she co-founded and co-directed the Center for Women in Mathematics, which received the 2011 AMS Programs That Make a Difference Award for its post-baccalaureate program. Haas received the 2015 AWM Humphreys Award for mentoring undergraduate women to continue to PhDs in the mathematical sciences. She earned her undergraduate degree at Swarthmore College and PhD at Cornell University. She has more than 30 publications in discrete mathematics, including both algebraic combinatorics and graph theory.

**Diaz-Lopez:** When did you know you wanted to be a mathematician?

**Haas:** I've always known I loved mathematics, but as a child when I said I liked math people said I should be a scientist. It was a great revelation and relief to me when I found out that math itself was a career option.

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**Diaz-Lopez:** Who encouraged or inspired you?

**Haas:** Early on I certainly had lots of advice to stop doing math. Some of this came from misunderstandings of what mathematics is, what mathematicians do, and certainly what a mathematician must be like (you know the stereotype). But there were people who were encouraging as well—my 7th grade math teacher, Mrs. Ruben, and the math major who lived down the hall my freshman year, Donna Crystal-Llewellyn. For the past 30+ years my biggest support and encouragement has come from my life partner and fellow mathematician, Loek Helminck.

**Diaz-Lopez:** How would you describe your work to a graduate student?

**Haas:** Recently, I have been interested in reconfiguration problems, especially in graph theory. Given a problem with multiple feasible solutions, the reconfiguration problem asks if it is possible to get from one feasible solution to another following some reconfiguration rule. For example, can you change from one proper vertex coloring of a graph to another under the rule that you can only change the color of one vertex at a time and at each step the coloring must be proper? There are many questions to be asked about reconfiguration both about computational complexity and structure.

**Diaz-Lopez:** What theorem are you most proud of?

**Haas:** While there are theorems and proofs of which I am proud, I think I am prouder of some of the questions I've posed to others which have led them to do interesting work.

**Diaz-Lopez:** What advice do you have for graduate students?

**Haas:** I have lots of advice! To start with—get lots of advice, from lots of different people. There are many things that one might want in an ideal PhD advisor. Do you like the kinds of problems they work on? Do they place former students in the kinds of positions you aspire to (research postdocs, industry, small college jobs)? Do they currently have enough time/space/funding for another student? While it might be nice to have an advisor who can give you everything you want, it is really not necessary and often impossible. Your advisor doesn't have to serve

all these roles; they just need to find other people to help you with the other aspects.

**Diaz-Lopez:** All mathematicians feel discouraged occasionally. How do you deal with discouragement?

**Haas:** That's a great question. Personally, I guess I love having the "aha" moment enough, and I have enough of them to keep me going. More generally though, I am concerned about how we as a community sometimes cultivate competition that can lead to unnecessary discouragement. Math is not a foot race where the winner and losers are clear. Not enjoying competition is not the same as not being good at math.

**Diaz-Lopez:** You co-founded and co-directed the Center for Women in Mathematics at Smith College, which received the AMS 2011 Programs That Make a Difference Award. Can you tell us about the Center's programs and achievements?

**Haas:** The Center is the first post-baccalaureate program in mathematics. The post-bac is for women who already have bachelor's degrees but are not prepared for graduate school in mathematics. They come to Smith College for a year and take advanced course work in math. Beyond the course work, the program provides a research experience and mentoring about the graduate school process. Furthermore, the students become a support network for each other as they go on to (different) graduate schools and careers. Almost all the students who have completed the program have gone on to PhD programs in the mathematical sciences, and they proceed to earn degrees at a higher rate than the general grad school population. I am happy to say that Smith College has agreed to partially support the program now that its NSF funding has ended.

As we all know, to be prepared for graduate school in mathematics requires a strong undergraduate mathematics major. If one has strayed from that path, it can be very difficult to re-enter the pipeline. People from groups that are underrepresented in mathematics often commit to math later, so that they are likely to benefit from a post-bac program to set them up for graduate programs. The physics professional society (APS) has started an extensive post-bac program because their discipline has the same challenge. I'd like to see math find more ways to allow people to re-enter the pipeline.

**Diaz-Lopez:** You are president-elect of the Association for Women in Mathematics (AWM). What are your goals and objectives for AWM?

**Haas:** As the AWM approaches its 50th year, it is time to take stock of where we are and what we should be doing going forward. The barriers to women in mathematics are different and often more subtle than they were 50 years ago. The AWM needs to continue to find ways to encourage and promote women in mathematics at all levels. Although we have made great strides, the percentage of women PhDs in mathematics is flat or declining, and it remains the case that at every stage women drop out at a higher rate than men.

**Diaz-Lopez:** Any final comment or advice?

**Haas:** Don't forget that simply being an average mathematician is a great accomplishment. And there are lots of

*There are lots of places to be a mathematician.*

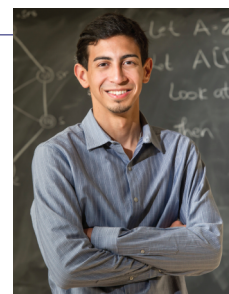
places to be a mathematician. In graduate school you are surrounded by high-profile faculty whose main focus is research, but the balance between teaching and research varies widely in academia, and there are jobs in industry and government labs with very different responsibilities as well.

## Photo Credit

Photo of Ruth Haas courtesy of Smith College.

## ABOUT THE INTERVIEWER

**Alexander Diaz-Lopez**, having earned his PhD at the University of Notre Dame, is now assistant professor at Villanova University. Diaz-Lopez was the first graduate student member of the *Notices* Editorial Board.



**Alexander Diaz-Lopez**