ASSOCIATION FOR WOMEN IN MATHEMATICS

Newsletter

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The purpose of the Association for Women in Mathematics is

- to encourage women and girls to study and to have active careers in the mathematical sciences, and
- to promote equal opportunity and the equal treatment of women and girls in the mathematical sciences.

IN THIS ISSUE

PRESIDENT'S REPORT

Ahhh summer! Classes ended, grades submitted, I took a deep breath and flew all the way across the Atlantic without starting my President's Report. So, instead of greetings from 35,000 feet, this month my greetings come from Basel, Switzerland.

In my role as AWM President, I am frequently reminded of the impressive contributions female mathematicians today are making to the mathematical sciences. At the same time, I am struck by the continued dearth of women on the faculty of most research universities. One of the goals of AWM is to address this dichotomy by highlighting and celebrating outstanding contributions by female mathematicians, and this season we have much to celebrate.

This year, AWM instituted two new prizes for early-career women, the AWM-Sadosky Research Prize in Analysis and the AWM-Microsoft Research Prize in Algebra and Number Theory. (For more about these prizes see the article in the January 2013 AMS *Notices*.) We received a truly impressive slate of nominees for both of these prizes. Every one of the nominees had made important contributions to her field and the selection committees were faced with an exceedingly difficult decision.

The winner of the inaugural AWM-Sadosky Prize in Analysis is Svitlana Mayboroda, Associate Professor of Mathematics at the University of Minnesota. Mayboroda's research centers on boundary value problems for second and higher order elliptic equations in non-smooth media. According to the prize citation, "Mayboroda's contributions have opened up fundamental new paths in uncharted territory." Her work has also been recognized by a Sloan Research Fellowship and an NSF Career grant.

The winner of the AWM-Microsoft Prize in Algebra and Number Theory is Sophie Morel, Professor of Mathematics at Princeton University. Morel received her PhD from l'Université Paris-Sud and held positions at the Institute for Advanced Study, the Clay Mathematics Institute, and Harvard University before moving to Princeton. She works in the field of arithmetic algebraic geometry and has made fundamental contributions to the Langlands program. Her research garners the highest praise; it has been favorably compared to that of several Fields medalists.

AWM is proud to honor both of these women. For more details about Svitlana Mayboroda and Sophie Morel, see the citations later in this newsletter.

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ASSOCIATION FOR WOMEN IN MATHEMATICS

AWM was founded in 1971 at the Joint Meetings in Atlantic City.

The *Newsletter* is published bi-monthly. Articles, letters to the editor, and announcements are welcome.

Opinions expressed in AWM *Newsletter* articles are those of the authors and do not necessarily reflect opinions of the editors or policies of the Association for Women in Mathematics. Authors sign consent to publish forms.

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PRESIDENT'S REPORT *continued from page 1*

Their prizes will be presented at the AWM reception at the Joint Mathematics Meetings in Baltimore in January 2014. Please join us there to congratulate them and celebrate their achievements!

The Sadosky and Microsoft Prizes will be awarded every second year. In the interim, we will be seeking nominations early next year for a third new prize, the AWM – Joan and Joseph Birman Research Prize in Topology and Geometry. Joan Birman, Emeritus Professor of Mathematics at Barnard College-Columbia University, has been an inspiration to many of us in the topology world. She earned her PhD in mathematics after raising three children. She has made major contributions to knot theory and low-dimensional topology, and her research is still going strong nearly a decade after her retirement. Her tremendous love of mathematics has been an inspiration to many, not least to her 21 PhD students. Our thanks go to Joan for serving as an outstanding role model, as well as for funding this prize together with her husband, Joseph Birman, Distinguished Professor of Physics at City College, CUNY.

Finally, AWM would like to congratulate two recipients of this year's Sloan Research Fellowships, Anna Wienhard, Assistant Professor at Princeton, and Sarah Koch, Assistant Professor at Harvard. (Yes, there were only 2 women among the 20 Sloan Fellowships in mathematics this year.) Congratulations to Wienhard and Koch for a stellar start on their research careers.

Looking ahead, the summer will be filled with AWM sponsored events at major national meetings. The SIAM Annual Meeting will take place in July in San Diego. It will include two mini-symposia, consisting of talks by recent PhDs, a poster session, and a two-part career panel. The panel will feature eight speakers who will share their diverse career experiences and advice. In addition, the SIAM-AWM Sonia Kovalevsky Lecture will feature Margaret Cheney, Yates Chair and Professor of Mathematics at Colorado State University, who will give an "Introduction to Radar Imaging."

Also coming up soon is MathFest 2013, to be held in Hartford, July 31–August 3. AWM activities at MathFest include the AWM-MAA Etta Z. Falconer Lecture and a panel discussion. This year's Falconer Lecture will be given by Patricia Kenschaft, Professor Emerita of Mathematics at Montclair University, who will speak about "Improving Equity and Education: Why and How." (See the citation later in this newsletter.) The panel discussion will focus on "Successful Career Transitions" and will feature five panelists from a wide variety of academic and non-academic institutions.

I close this report with some thoughts on the value of conferences for women. In the last newsletter, I described the excitement generated by the AWM Research Symposium in Santa Clara. I am sometimes asked why we need conferences and workshops primarily for women. Indeed, in the early days of my career there was no such thing. Yet, looking back, I can see that the few connections I made with women in my field at that time made a huge difference to me. It meant that I looked forward to going to conferences, felt much less isolated and had someone to share my concerns with. In recent years I have participated in and organized several events aimed primarily at women. I see how quickly and naturally

friendships, mentoring relationships, and research collaborations form at these events. I see how energized and enthusiastic the participants are by the end of the meeting. If our goal is to keep more women in mathematics, to enable them to do their best work, to attend more conferences, to enjoy their experience, and to transmit that attitude to the next generation, then these events are the most effective means I have seen to date. Conferences and workshops for women are not an end in themselves. They are a beginning.

I wish everyone a productive and rejuvenating summer.

Ruth Charney
Basel, Switzerland
May 23, 2013

Ruth Charney

AWM Slate Announced!

We are pleased to announce the slate for this fall's AWM election.

President: Kristin Lauter (Microsoft)
Clerk: Janet Beery (University of Redlands)
Members-at-Large of the Executive Committee (four to be elected):

Alissa Crans (MSRI, Loyola Marymount University)
Rachelle DeCoste (Wheaton College, Massachusetts)
Joan Ferrini-Mundy (NSF, Michigan State University)
Rebecca Goldin (George Mason University)
Genetha Gray (Sandia National Labs)
Bryna Kra (Northwestern University)
Rosa Orellana (Dartmouth College)
Talitha Washington (Howard University

Nominations by petition signed by 15 members are due to our president by **September 1, 2013**.

Thanks to the Nominating Committee (Georgia Benkart (chair), Estelle Basor, Sun-Yung Alice Chang, Carolyn Gordon, Rhonda Hughes, and Katherine Socha) for their efforts in producing this fine slate of candidates.

Membership Dues
Membership runs from Oct. 1 to Sept. 30
Individual: $65 **Family:** $30
Contributing: $150
New member, affiliate and reciprocal members, retired, part-time: $30
Student, unemployed: $20
Outreach: $10
AWM is a 501(c)(3) organization.

Institutional Membership Levels
Category 1: $325
Category 2: $325
Category 3: $200
Category 4: $175
See www.awm-math.org for details on free ads, free student memberships, and ad discounts.

Sponsorship Levels
α **Circle:** $5000+
β **Circle:** $2500–$4999
γ **Circle:** $1000–$2499

See the AWM website for details.

Subscriptions and Back Orders—All members receive a subscription to the newsletter as a privilege of membership. Libraries, women's studies centers, non-mathematics departments, etc., may purchase a subscription for $65/year ($75 foreign). Back orders are $10/issue plus S&H ($5 minimum).

Payment—Payment is by check (drawn on a bank with a US branch), US money order, or international postal order. Visa and MasterCard are also accepted.

Newsletter Ads—AWM will accept ads for the *Newsletter* for positions available, programs in any of the mathematical sciences, professional activities and opportunities of interest to the AWM membership and other appropriate subjects. The Managing Director, in consultation with the President and the Newsletter Editor when necessary, will determine whether a proposed ad is acceptable under these guidelines. *All institutions and programs advertising in the* Newsletter *must be Affirmative Action/Equal Opportunity designated.* Institutional members receive discounts on ads; see the AWM website for details. For non-members, the rate is $116 for a basic four-line ad. Additional lines are $14 each. See the AWM website for *Newsletter* display ad rates.

Newsletter Deadlines
Editorial: 24th of January, March, May, July, September, November
Ads: Feb. 1 for March–April, April 1 for May–June, June 1 for July–Aug., Aug. 1 for Sept.–Oct., Oct. 1 for Nov.–Dec., Dec. 1 for Jan.–Feb.

Addresses
Send all queries and all *Newsletter* material except ads and material for media and book review columns to Anne Leggett, leggett@member.ams.org. Send all book review material to Marge Bayer, bayer@math.ku.edu. Send all media column material to Sarah Greenwald, greenwaldsj@appstate.edu and Alice Silverberg, asilverb@math.uci.edu. Send everything else, including ads and address changes, to AWM, fax: 703-359-7562, e-mail: awm@awm-math.org.

LETTERS TO THE EDITOR

To the editors:

I enjoyed Marge Murray's Media Column [September–October 2012] about Wikipedia's effect in shaping our collective consciousness of the history of mathematics. A related concern I'd like to share is the lack of visibility of *contemporary* women mathematicians on Wikipedia.

I was recently surprised to notice that many (male) mathematicians have Wikipedia profiles, but relatively few comparable women mathematicians do. I actually wrote to Wikipedia to raise my concern. Their response was immediate and in some ways reassuring: they said that Wikipedia is essentially a community written resource and urged me to become an author. They also directed me to a meta-wiki concerning Wikipedia's own internal dialog on the problem of the lack of women's voices: http://meta.wikimedia.org/wiki/Gender_gap.

The seriousness of this issue struck me after overhearing some undergraduates using the existence of a Wikipedia profile as their main source of evidence to judge contemporary mathematicians' prominence. There is no question that this is affecting girls' and boys' views of who is doing mathematics today, and ultimately their views of their viable career options.

Young people interact with the Internet in ways we old-timers can barely fathom, and it is shaping their identities from a very early age. Many overwhelmingly use the Internet—mainly Wikipedia—as their primary source of information. There is a gap between boys' and girls' computer-fluency that is not only affecting the skills needed to access certain careers, but even more tragically, women's visibility in all fields. Even the AWM president does not appear to have a wikipage!

AWM might be in a good position to help. Perhaps AWM staff can systematically create and contribute to pages for female ICM speakers, prize winners, and certainly for its own leadership? Perhaps AWM workshops can encourage (and teach!) high school or college-age women to become Wikipedia authors, starting with the bios they write for the AWM essay contest? Or publish information on how Wikipedia works, and how mathematicians can get involved?

The problem of women's representation on Wikipedia goes far beyond our own profession, but at least we can begin to take responsibility for our own piece of it. Because Wikipedia is a community created resource, we can—and should—fix this!

Sincerely,

Karen E. Smith
Keeler Professor
University of Michigan

To the Editor:

I read with interest Lillian Pierce's "self-interview" in the latest issue, about math and motherhood. I loved the photo, and the very end: this cute preschool

kid already thinks of a_2 as a *number*! I think it's great that this mathmom shares her math with her kids.

My experience as a mathmom has been different from Lillian's. Many years ago I thought it wouldn't be. I thought I'd be a mathprof mom with a tenure-track, then tenured, position, at least one paper a year, and two kids in daycare, then school. Things didn't work out that way, partly because of life stuff and partly because *I'm* not quite that way. It began with the PhD. I was young, not very practical, in some ways not very mature, in love with the math I was doing and had been doing since early high school, and not thinking about things like finding an advisor. The dissertation was soon written but my school—I could have predicted this *now*, but not then—couldn't provide an advisor, someone who knew my topic. It took my husband and me three years to find someone outside my school who understood and approved my thesis. (I'd thought about transferring but, as I said, I wasn't very practical.) As luck and pluck would have it, that advisor was Laurent Schwartz, in absentia of course (France), so I got the PhD "in style," as some math friends put it; the defense was a bit weird, nobody understood the thesis so nobody could think of any good questions to ask me.

I wasn't taking the usual path and that mattered. Schwartz wasn't around to help or mentor me. He wrote recommendation letters and I got mostly adjunct positions. I didn't have or seek math research friends, colleagues, or collaborators. I was isolated and didn't care except, again, I didn't have a full time position. My husband soon got tenure (as a physicist) so I was limited in where I could work. It wasn't my style to be in a long-distance marriage, especially since—back to motherhood—I had a new baby (born five months before my thesis defense—my advisor was in absentia but my baby wasn't!).

Over the years I got hooked on having babies! I just couldn't be politically correct in the stopping at two arena and we wound up with four, widely spaced, spanning 16 years from first to last birth. And I have to say that, unlike Lillian, I *cannot* "verify ... that parents of n children think that parents of n-1 children have no idea what an easy time they have." For me, once $n = 4$, that just wasn't true. I literally breezed through Devin's infancy, doing everything that was not-Devin with Devin around, either breast-feeding or doing his own thing, and of course there were my three other children around much of the time and a husband who, being a professor, was able to be home a lot. Lillian has written that, for example, "When I sit down at my desk at 9:30 [am] and I've already been awake for 3–5 hours, that's when it hits me that life is complicated…." By $n = 3$ I did not feel that way. I could easily have managed $n = 5$ but chose not to, partly because a friend with four children reminded me that, when the kids *grow up*, that's so many people to continue to relate to and in some ways mother. Also, now that the kids are grown, I realize that more children could entail more grandchildren.

I'm also a poet/writer, and one very good thing was that babies and children inspired me, both mathematically and literarily—because they inspired me emotionally. They put me in touch with my tender, vulnerable, and curious side. The year I had Marielle, my first, I did a huge amount of math research while she napped. With Devin, as I have said, I didn't even have to wait 'til he napped. Even though math is more important to me than writing, a lot of my writing is inspired by math (and the kids). One of my poetry books is about the experience of math; *Crossing the Equal Sign* was written while I was working on a particularly maddening problem which I didn't realize at the time was in graph theory. Some of the poems in that book are about math as it relates to motherhood, and vice versa; for me, both come from the same emotional place.

Another very good thing was, I was happy. This reserve of happiness proved to be essential. Besides my math "career," two other aspects of life didn't work out as expected. I've survived two big tragedies—the loss at birth of the middle of my five babies and the diagnosis, that same winter, of my husband's multiple sclerosis. I was 34. My writing was very helpful then, to me and to my readers. It continued to be helpful as the years and decades that followed brought paralysis, at-home caregiving, nursing home, dementia, verbal and financial abuse, and eventually (*very* eventually) his death and a new love (in reverse order). So writing became more and more of a focus for me. My writing was also more useful to the world than "my" math, and that probably affected the role math played in my life. I adjuncted on and off, probably mostly on, usually when the babies were no longer babies, and I did math research when ideas came to me.

Another thing probably different from Lillian is the nature of my research. I might even put "research" in quotes, at least for some of it. I'm definitely more of a theory creator than a problem solver. Most of what I do math-wise (often in abstract algebra) is not published. My thesis isn't published (yet). Some of my favorite math work isn't published. One could count my math publications on the fingers of just a

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little over one hand. My publications are indeed many, including 20 books, but they're mostly literary rather than mathematical. (Some are both, in particular my reviews of math books, about 35 of them.)

I think my attitude toward life has always been kind of unusual, probably from childhood on. I try to have as few meaningless-to-me responsibilities as possible, so that I can be free to do the creative things I want to do, and also the relaxing things I like to do (e.g., thrift-shopping), and to put energy into family and friends. I feel that my writing and my math feeds on all this.

In elementary and high school, despite being "school smart," I didn't take "extra" courses, math or otherwise, and I didn't seek out things like university summer courses for young math geeks. I very possibly would not have liked the many competitions and math circles that are available today, even the math friendships described in the "Math Girls" series. Right or wrong, emotionally healthy or not, in some way I liked being the only "Math Girl" in high school. I think I liked having math for myself, at least for a while. I'm not that way any more. Nowadays I describe myself as being both introvert and extrovert. About ten years ago I made a *conscious* commitment not to be "busy," in the sense of *too* busy. In math especially, I believe that accomplishment is very often not directly proportional to time specifically put in. I've learned not to get too bogged down on any math problem; "one lemma is enough for one afternoon" could be my mantra. I'm sure that I think both consciously and unconsciously about math and writing while, for example, thrift-shopping; in fact, I bring along empty paper to work on while riding the buses and trains en route.

For a long time, while I was birthing and raising babies and children, writing, breast-feeding for years at a time, and not teaching full time, I had feelings of guilt. I "should" be a "real" mathematician; I should be like Lillian! But I couldn't get a full-time position, and after a while I didn't really want to. I had this luxury, with a husband tenured at the University of Pennsylvania. I was also aware that, if this were not the case, I would have been able to relocate and work anywhere in the world, and probably would have gotten a full-time and later tenured position. As things were, I felt caught in some middle. Still, the more successful I was in my own way—the more books published, the more letters received from people who were helped by these books, and also the more satisfying motherhood became—the more centered I felt, and the less guilty. It happened gradually, over a couple of decades.

Certainly my path has been different from Lillian's. One good thing was that, *through* learning how to network and promote my writings, I learned, and acquired confidence in, doing the same with math. When my youngest was six, it felt like time to pursue math more seriously as at least a part time career, to think in *terms* of career. When he was ten, and I fifty-four, I was unexpectedly offered something full-time. It wasn't tenure track but I didn't need tenure at that time of life. The teaching load was nice, varying from 8 to 10 contact hours a week, only three courses. I was told I didn't *have* to do research, so I could and did continue to do it for fun, enjoyment, and passion.

Four years later there were internal changes in my school and, along with others, I was let go. It meant and still means something to me, to have had the full-time experience. And I still think in terms of career. At age 70 I'm doing what many do at this age, I'm partially retiring. (I can afford to, because of my first husband's pension plus a little of my own.) I was planning to completely retire, meaning retire from teaching, but I seem to have developed a well-appreciated course at Arcadia—Mathematics in Literature. At this time in my life, the course nicely brings together my two main "talents," math and writing. It has also, along with writing book reviews, provided me with the opportunity to convey some of my more unusual beliefs and practices concerning math, education, and life.

Actually, I pretty much *feel* as though I've lived a life like Lillian's, in that math has played a huge part in it. I feel, though this took awhile, like a "real" mathematician"—real enough. And, by giving me time and space to develop in ways meaningful and comfortable for me, motherhood helped.

Sincerely,

Marion Cohen, mathwoman199436@aol.com

Morel Wins Inaugural AWM-Microsoft Research Prize

The Association for Women in Mathematics will present the first AWM-Microsoft Research Prize in Algebra and Number Theory to Sophie Morel, Professor of Mathematics at Princeton University, at the Joint Mathematics Meetings in Baltimore, MD in January 2014. Established in 2012, the AWM-Microsoft Research Prize recognizes exceptional research in algebra and number theory by a woman early in her career. The award is made possible by a generous contribution from Microsoft Research. The biennial presentation of this prize serves to highlight to the community outstanding contributions by women in the field of algebra and to advance the careers of the prize recipients.

The inaugural 2014 AWM-Microsoft Research Prize in Algebra and Number Theory is awarded to Sophie Morel in recognition of her exceptional research in number theory. Morel received her DEA (French MA) from l'Université Paris 6 and her PhD from l'Université Paris-Sud. Her thesis advisor for both the DEA and PhD theses was Gérard Laumon.

Morel is a powerful arithmetic algebraic geometer who has made fundamental contributions to the Langlands program. Her research has been called "spectacularly original, and technically very demanding." Her research program has been favorably compared to that of several Fields medalists. She accomplished one of the main goals of the Langlands program by calculating the zeta functions of unitary and symplectic Shimura varieties in terms of the L-functions of the appropriate automorphic forms. To achieve this, she introduced an innovative t-structure on derived categories which had been missed by many experts. Her book *On the cohomology of certain non-compact Shimura varieties* published in the Annals of Mathematics Studies series is described as a tour de force. Professor Morel found another remarkable application of her results on weighted cohomology. She gave a new geometric interpretation and conceptual proof of Brenti's celebrated but mysterious combinatorial formula for Kazhdan-Lusztig polynomials, which are of central importance in representation theory.

Sophie Morel

Before coming to Princeton University Morel held positions at the Institute for Advanced Study in Princeton, the Clay Mathematics Institute, Harvard University and the Radcliffe Institute for Advanced Studies. After her appointment to Harvard, Jeremy Bloxham, dean of science in Harvard University Faculty of Arts and Sciences said of Morel: "Sophie Morel is among the world's most promising young mathematicians working in number theory, algebraic geometry, and representation theory. Her doctoral thesis was extremely demanding and stunningly original, solving a problem that had been intractable for more than 20 years."

In 2012, at the 6th European Congress of Mathematics, ten young mathematicians were bestowed with the European Mathematical Society's (EMS) research prize. Sophie Morel was one of two women who received the prize that year.

The 2014 Joint Mathematics Meetings will be held January 15–18 in Baltimore, MD. For further information on the AWM-Microsoft Research Prize, visit www.awm-math.org.

AWM Slate Announced! See page 3 for details.

Mayboroda Wins Inaugural AWM-Sadosky Research Prize

Svitlana Mayboroda

The Association for Women in Mathematics will present the first AWM-Sadosky Research Prize in Analysis to Svitlana Mayboroda, Associate Professor of Mathematics at the University of Minnesota, at the Joint Mathematics Meetings in Baltimore, MD in January 2014. Established in 2012, the AWM-Sadosky Research Prize recognizes exceptional research in analysis by a woman early in her career. The award is named for Cora Sadosky, a former president of AWM, and is made possible by generous contributions from Cora's husband Daniel J. Goldstein, daughter Cora Sol Goldstein, and friends Judy and Paul S. Green. The biennial presentation of this prize serves to highlight to the community outstanding contributions by women in the field of analysis, to advance the careers of the prize recipients, and to evoke the memory of all that Cora Sadosky exemplified as a mathematician, mentor and friend.

The inaugural 2014 AWM-Sadosky Research Prize in Analysis is awarded to Svitlana Mayboroda in recognition of her fundamental contributions to harmonic analysis and PDEs. Mayboroda received the equivalent to a Master's degree in Applied Mathematics from Kharkiv National University, Ukraine, before coming to the United States. She received her PhD from the University of Missouri at Columbia under Marius Mitrea's guidance.

Mayboroda's research has centered on boundary value problems for second and higher order elliptic equations in non-smooth media. Elliptic equations in non-smooth media model a variety of physical systems and thus play a central role in science and engineering. Her research addresses fundamental problems aimed at understanding how irregular geometries or internal inhomogeneities of media affect the behavior of the physical system in question. Her talent and imagination which have been praised by world leaders in the field is also evident in her recent work with Vladimir Maz'ya on regularity in all dimensions for the polyharmonic Green's function in general domains and of the Wiener test for higher order elliptic equations, which in turn relies on a

CALL FOR NOMINATIONS

The 2015 Noether Lecture

AWM established the Emmy Noether Lectures in 1980 to honor women who have made fundamental and sustained contributions to the mathematical sciences. In April 2013 the lecture was renamed the AWM-AMS Noether Lecture, and starting in 2015 will be jointly sponsored by AWM and AMS. This one-hour expository lecture is presented at the Joint Mathematics Meetings each January. Emmy Noether was one of the great mathematicians of her time, someone who worked and struggled for what she loved and believed in. Her life and work remain a tremendous inspiration.

The mathematicians who have given the Noether lectures in the past are: Jessie MacWilliams, Olga Taussky Todd, Julia Robinson, Cathleen Morawetz, Mary Ellen Rudin, Jane Cronin Scanlon, Yvonne Choquet-Bruhat, Joan Birman, Karen Uhlenbeck, Mary Wheeler, Bhama Srinivasan, Alexandra Bellow, Nancy Kopell, Linda Keen, Lesley Sibner, Ol'ga Ladyzhenskaya, Judith Sally, Olga Oleinik, Linda Rothschild, Dusa McDuff, Krystyna Kuperberg, Margaret Wright, Sun-Yung Alice Chang, Lenore Blum, Jean Taylor, Svetlana Katok, Lai-Sang Young, Ingrid Daubechies, Karen Vogtmann, Audrey Terras, Fan Chung Graham, Carolyn Gordon, Susan Montgomery, Barbara Keyfitz and Raman Parimala.

The letter of nomination should include a one-page outline of the nominee's contribution to mathematics, giving four of her most important papers and other relevant information. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be submitted by **October 15, 2013** and will be held active for three years. If you have questions, phone 703-934-0163 or email awm@awm-math.org.

new notion of capacity in this case. This is the first result of its kind for higher order equations, showing remarkable creativity and deep insight. For higher order elliptic operators the situation on non-smooth domains is quite different than in the second order case and much less is known. Mayboroda's contributions have opened up fundamental new paths in this uncharted territory and she has been a major driving force behind it.

A Sloan Research Fellow, Mayboroda has given numerous invited talks both nationally and internationally. Funded by an NSF CAREER grant, Mayboroda ran a Workshop for Women in Analysis and PDE in 2012 and plans to run another one in the next couple of years. This workshop is targeted towards women at the early stages of their careers in mathematics. It was designed by Mayboroda to support them through the crucial passage from graduate school to a postdoctoral position or to a faculty position. Statistically this is one of the stages at which a particularly high percentage of women leave academia. The workshop is a focused educational and research program in a chosen area of analysis and PDE, which brings together outstanding senior female mathematicians and junior researchers. It includes main lectures, invited and contributed talks, and panel discussions regarding career development issues.

The 2014 Joint Mathematics Meetings will be held January 15–18 in Baltimore, MD. For further information on the AWM-Sadosky Research Prize, please visit www.awm-math.org.

Kenschaft Named 2013 AWM-MAA Falconer Lecturer

The Association for Women in Mathematics and the Mathematical Association of America are pleased to announce that Patricia Clark Kenschaft will deliver the Etta Z. Falconer Lecture at MathFest 2013. Dr. Kenschaft is Professor Emerita of Mathematics at Montclair State University.

Kenschaft earned her AB in Mathematics from Swarthmore College and her PhD from the University of Pennsylvania.

For several decades Kenschaft has dedicated much of her time to math education in K–12, in particular at the elementary level. She has been the PI on numerous grants aimed at strengthening the mathematical skills of elementary school teachers. She has been a champion for women and minorities in mathematics. Two of several authored, co-authored, or co-edited published books, are directly related to these two areas: *Change is Possible: Stories of Women and Minorities in Mathematics* and *Math Power: How to Help Your Child Love Math Even If You Don't.* The latter is the only book by a mathematician for parents of children age one through ten.

Kenschaft co-edited the book *Environmental Mathematics* with Ben Fusaro. For six years she moderated a radio talk show "Math Medley" on WARL broadcasting from Providence, RI, and/or KFNX from Phoenix, interviewing

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CALL FOR NOMINATIONS (Note earlier deadline beginning this year.)

Alice T. Schafer Mathematics Prize

The Executive Committee of the Association for Women in Mathematics calls for nominations for the Alice T. Schafer Mathematics Prize to be awarded to an undergraduate woman for excellence in mathematics. All members of the mathematical community are invited to submit nominations for the Prize. The nominee may be at any level in her undergraduate career, but must be an undergraduate as of September 15, 2013. She must either be a US citizen or have a school address in the US. The Prize will be awarded at the Joint Prize Session at the Joint Mathematics Meetings in Baltimore, MD, January 2014.

The letter of nomination should include, but is not limited to, an evaluation of the nominee on the following criteria: quality of performance in advanced mathematics courses and special programs, demonstration of real interest in mathematics, ability for independent work in mathematics, and performance in mathematical competitions at the local or national level, if any.

With the letter of nomination, please include a copy of transcripts and indicate undergraduate level. Any additional supporting materials (e.g., reports from summer work using math, copies of talks, recommendation letters from professors, colleagues, etc.) should be enclosed with the nomination. All nomination material is to be submitted as ONE PDF file via MathPrograms.Org with a copy of transcripts included at the end of the file. The submission link will be available 45 days prior to the deadline. Nominations must be received by **September 15, 2013**. If you have questions, phone 703-934-0163, email awm@awm-math.org, or visit www.awm-math.org.

KENSCHAFT *continued from page 9*

over 300 people about their relationship to mathematics, including presidents of mathematical organizations, elementary school teachers, and those in apparently unrelated fields.

As a member of the American Mathematical Society, National Council of Teachers of Mathematics (NTCM), National Association of Mathematicians, Women in Mathematics Education, Benjamin Banneker Association, AWM and MAA, Kenschaft has served these societies in numerous ways. She chaired the NCTM Equity and Diversity Integration Task Force and the MAA Committee on Mathematics and the Environment, and she was the first chair of the MAA Committee on Participation of Women. She served two terms as a member of the Joint Committee on Women, the first term as a representative from AWM and the second as a representative from MAA.

Kenschaft's lecture at MathFest is entitled "Improving Equity and Education: Why and How." Drawing on both the speaker's own experiences and research and that of others, this talk will explore ideas and behaviors that would improve equity and education, especially in mathematics. She will emphasize the importance of elementary school teachers' knowing the mathematics they are supposed to teach. Why are some powerful people so opposed to teaching them the requisite mathematics?

Patricia Clark Kenschaft

MathFest 2013 will be held July 31–August 3 in Hartford, CT. The Falconer lectures were established in memory of Etta Z. Falconer (1933–2002). Her many years of service in promoting mathematics at Spelman College and efforts to enhance the movement of minorities and women into scientific careers through many forums in the mathematics and science communities were extraordinary. Falconer lecturers are women who have made distinguished contributions to the mathematical sciences or mathematics education. Previous recipients of this honor include Karen King, Dawn Lott, Ami Radunskaya, Kate Okikiolu, Rebecca Goldin, Katherine St. John and Trachette Jackson.

CALL FOR NOMINATIONS

The 2014 Kovalevsky Lecture

AWM and SIAM established the annual Sonia Kovalevsky Lecture to highlight significant contributions of women to applied or computational mathematics. This lecture is given annually at the SIAM Annual Meeting. Sonia Kovalevsky, whose too-brief life spanned the second half of the nineteenth century, did path-breaking work in the then-emerging field of partial differential equations. She struggled against barriers to higher education for women, both in Russia and in Western Europe. In her lifetime, she won the Prix Bordin for her solution of a problem in mechanics, and her name is memorialized in the Cauchy-Kovalevsky theorem, which establishes existence in the analytic category for general nonlinear partial differential equations and develops the fundamental concept of characteristic surfaces.

The mathematicians who have given the prize lecture in the past are: Linda R. Petzold, Joyce R. McLaughlin, Ingrid Daubechies, Irene Fonseca, Lai-Sang Young, Dianne P. O'Leary, Andrea Bertozzi, Suzanne Lenhart, Susanne Brenner and Barbara Keyfitz. Margaret Cheney will deliver the 2013 lecture.

The lectureship may be awarded to anyone in the scientific or engineering community whose work highlights the achievements of women in applied or computational mathematics. The nomination must be accompanied by a written justification and a citation of about 100 words that may be read when introducing the speaker. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be received by **November 1, 2013** and will be kept active for two years.

The awardee will be chosen by a selection committee consisting of two members of AWM and two members of SIAM. Visit www.siam.org/prizes/sponsored/Kovalevsky.php and www.awm-math.org/kovalevskylectures.html for more details.

AWM – Joan & Joseph Birman Research Prize Announced

The Executive Committee of the Association for Women in Mathematics has established the AWM – Joan & Joseph Birman Research Prize in Topology and Geometry to highlight exceptional research in some area of topology/geometry by a woman early in her career. The prize will be awarded every other year with the first prize presented at the AWM Reception at the Joint Mathematics Meetings in San Antonio, TX in January 2015. The recipient will receive a cash prize and an honorary plaque and will be featured in an article in the AWM *Newsletter*.

The prize is made possible by a generous contribution from Joan Birman, whose work has been in low dimensional topology, and her husband Joseph, a theoretical physicist whose specialty is applications of group theory to solid state physics. Joan Birman says:

> Mathematical research has played a central role in my own life, and has been a source of deep personal satisfaction. In addition, some of my closest friendships have come about through joint work. Finally, as a teacher I felt privileged to be there when my students had their own "aha" moments. From my own life I know that creative research in mathematics can present special difficulties when women have young children. I felt the conflict personally, when my young children were pulling at my clothing to get my attention, but I was in "math mode." Everything I know suggests that women have greater difficulty handling this particular conflict than men. I also know that children grow up and develop interests of their own, and when that happens the conflict slowly diminishes, also if you have experienced the rich satisfaction of creative research at an early career time, you never forget it, moreover the math community will almost certainly be welcoming if you have taken a break, but then start to have good research ideas again. Those are the reasons why it was an easy decision for us to use money that we'd set aside, to encourage research by talented young women through this AWM early career prize. What better use could we find for our money?

When reviewing nominations for this award, the field will be broadly interpreted to include topology, geometry, geometric group theory and related areas. Candidates should be women within 10 years of receiving their PhD or having not yet received tenure. For full consideration, nominations should be submitted by **February 15, 2014**.

For further information on the AWM – Joan & Joseph Birman Research Prize and nomination materials please visit www.awm-math.org.

MEDIA COLUMN

In addition to longer reviews for the media column, we invite you to watch for and submit short snippets of instances of women in mathematics in the media (WIMM Watch). Please submit to the Media Column Editors: Sarah J. Greenwald, Appalachian State University, greenwaldsj@appstate.edu *and Alice Silverberg, University of California, Irvine,* asilverb@math.uci.edu.

All the Mathy Ladies (on Twitter)

Evelyn Lamb, freelance writer

In the last AWM media column, Anne Carlill of Leeds wondered where all the female mathematicians are on Twitter: "I am sure there are great female mathematicians around who do tweet; I just need help finding them." I'm so glad she asked!

Even though there are thousands of female mathematicians, people still think there aren't many of us, and I think the same thing happens on Twitter. There are probably hundreds or thousands of people who tweet about math, and hundreds of them are women. But it can be hard to find them, and because some of the most prominent math tweeters are men, we think there aren't many women.

I think Twitter can be a great professional tool, especially for discussing ideas about math education and finding interesting math blogs. Within the mathematical Twitterverse, I've noticed that the barriers between researchers and educators kind of come away. We're all interested in talking about math with each other and finding good ways to explain it to our students and the general public. There is a great dialogue between people at all levels of mathematics instruction, sharing ideas about teaching strategies and venting about the inevitable challenges.

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After I read Carlill's column, I sifted through the approximately 120 mathy-type people I followed and found 29 women. I wrote a blog post about my list, asking people to suggest other women to add. Within the first few days, the list had grown to over 60, and I'm still updating it as I find more mathy ladies to follow.

Danica McKellar (@danicamckellar) and Vi Hart (@vihartvihart) are the two most followed women who tweet about math. McKellar, who played Winnie on *The Wonder Years*, has written several books about math for girls, and Vi Hart makes fun math videos on YouTube, such as the popular "Doodling in Math Class" series. Jennifer Ouellette (@JenLucPiquant) and Natalie Wolchover (@nattyover) are two nonmathematicians who write about math and physics, and they help me keep up with math and physics in mainstream media. Ouellette has written a popular book about math, and Wolchover works for *Simons Science News,* one of my favorite sources for general interest articles about math and science.

There are tons of middle and high school math teachers who tweet about math, and many of them are women. Among Ph.D. mathematicians, Kate Owens (@katemath) of the College of Charleston and Eugenia Cheng (@DrEugeniaCheng) of the University of Sheffield are two of my favorites. I also follow some operations researchers and statisticians, including Laura McLay (@lauramclay), who writes the Punk Rock OR blog, and Hilary Parker (@hspter), who has some interesting statistical blog posts, including one about the rise and fall of the name Hil(l)ary.

You can find the full list of "mathy ladies" I follow on Twitter in the list section of my account, which is @evelynjlamb, or by following a link on my blog post (blogs.scientificamerican.com/roots-of-unity/2013/04/24/mathy-ladieson-twitter/).

I'm really glad I made this list. It's already helped me connect with more than 50 interesting new people, both men and women, and I think it can help female mathematicians and math teachers connect with each other. There's also potential for the hashtag #MathyLadies to catch on as a way for us to talk about issues we face as women in math. (It's already been used to start a parody of Beyoncé's "All the Single Ladies.")

If you tweet and I didn't already put you on the list, please contact me, and I'll add you!

Blog on Math Blogs

Media Editors' note: Evelyn Lamb, the author of the above article, is also a co-editor of a new AMS Blog on Math Blogs, which is available at http://blogs.ams.org/ blogonmathblogs. The AMS announcement of the blog follows.

The American Mathematical Society is pleased to announce the Blog on Math Blogs—Two mathematicians tour the mathematical blogosphere. Editors Brie Finegold (University of Arizona) and Evelyn Lamb (freelance math and science writer) blog on blogs related to math in the news, mathematics research, applied mathematics, mathematicians, mathematics education, math and the arts and more. Finegold and Lamb, both past AAAS-AMS Mass Media Fellows and PhD mathematicians, will select and write their thoughts on interesting blogs from around the world, as well as invite reactions from readers.

WIMM Watch: Mathematical Talent in *The Secret Life of the American Teenager*

Sarah J. Greenwald

By the time this is published the Family Channel's nighttime drama *The Secret Life of the American Teenager* will have aired its series finale. The show, which began in 2008, is part after school special and complete soap opera fluff. I have thoroughly enjoyed it, although I feel somewhat ashamed to admit to it in print. Does it seem more academic if I mention that I grade with the show on in the background? My husband will attest to the fact that the plots make me laugh but he wonders how I can possibly stand what we both acknowledge as preachy and repetitive dialogue. I will let you judge for yourself, as the second half of the episode "Shiny and New" contains an interesting twist on women in mathematics issues [1]. The writers have consistently showcased academically talented male and female students, but I do not recall mathematics being a focus in the past. The mathematical plot line continues for a number of episodes and revolves around freshman high school algebra students Kathy and Ethan. When Ethan admits that he was caught cheating on a math test, Kathy disapproves and offers help. Ethan refuses and they discuss gender and success in mathematics:

Kathy: Why? Cause I'm a girl?

Ethan: No. Don't be ridiculous—I know girls can be good at math.

Kathy: Then why don't you let me help you?

Ethan: Because you're not just any girl who's good at math. You're my girlfriend. I would find that humiliating.… I'm just going to accept that math is just not my thing and I'm never gonna be good at it so I'll just fail.

Both his foster parents have already tried to tutor him, without success, so Ethan feels that additional help would be useless. Kathy is frustrated that Ethan has given up and mentions algebra 1, algebra 2 and calculus as important courses. She then tries to motivate him by explaining that mathematical success is something that he can work towards and is fundamental for critical thinking in high school and college.

Kathy moved to the area to be with her grandmother while she was pregnant and she met Ethan then. Her parents recently consented to allow her to remain for the year, so when Ethan notes that he has no plans to attend college, Kathy tries a guilt trip tactic:

Kathy: Well I do [plan to attend college]. And frankly that's kind of horrifying that I stayed here to be with you and you don't even want to even try to be good at math.

That does not work so she leaves and Ethan then approaches senior student Amy for help. The show centers on Amy, Ricky and their family and friends. Ricky is now in his first year of college and Ethan and Ricky both had the same foster-parents. Amy tells Ethan that she is OK but not great at math, but suggests that he should ask Ricky for help because he is a "math genius." Back at their home, Amy and Ricky find it strange that Ethan does not want Kathy to help him.

Amy: Does he really not want her to help him just because she's his girlfriend?

Ricky: He finds it emasculating.

Later, Ricky works with Ethan for hours, but Ethan hasn't made much progress.

Ricky: What's your answer? $x = ?$

Ethan: Kathy. The answer to all this is Kathy. You know I should have let her tutor me.

Kathy does eventually tutor Ethan during the episode "Money For Nothin" [2]. At the beginning of that episode Kathy asks him for two even consecutive integers that sum to 26, but he is unable to answer her. Ethan then finds out that Kathy's father also had problems with algebra. It makes Ethan feel better to find that there are people who are no smarter than he is. By the end of the episode, with his confidence up, Ethan is able to recite the definition of integer and respond correctly to Kathy's question (12 and 14).

The algebra plot line continues in "Interference" [3]. Instead of studying for his midterm, Ethan procrastinates by surveying adults, as he hopes to remove algebra from the curriculum by proving that it is not useful in daily life. Ethan's foster mother admits that she doesn't use algebra but lists professions that do, such as accounting and engineering. Ethan has already interviewed 32 adults, all of whom say they do not use algebra. Kathy joins him, and when they knock on a door Danica McKellar, playing herself, answers. Ethan mistakes her for a stripper so Kathy explains that Danica is an actress and mathematician and then lists the titles of her four math books. Next Kathy and Danica discuss the challenges that teenage girls can face if they are successful in math and Ethan chimes in too:

Danica: I had the same problem with guys in high school. Girls not being good at math and science is such a stereotype.…

Ethan: You can't look like that and be good at math. It just doesn't add up. Get it.

Danica McKellar does not appear again, although she is indirectly mentioned when Kathy asks Ethan whether she is "hotter than Miss Math Books." In what I viewed as a very strange turn, the show has abruptly ended the women in mathematics theme here and instead expands on the idea of erotic dancers, with Kathy and Ethan eventually affirming that they each think the other is good looking enough to be a professional stripper. Women and mathematics is not mentioned again, although the algebra plot line is found in additional episodes when Ethan takes the algebra midterm. He only misses one question and obtains an A. Even after that success, he continues working to improve in algebra.

Overall I enjoyed the twists on the standard stereotypes for mathematics, although I did not enjoy the show's take on beauty and mathematics. In approaching race and

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gender, Ethan, who is white, is originally failing algebra, while Kathy, who is Latina, is very good at math. In addition, one recurring theme throughout the series has been teen pregnancy, and Amy and Kathy are two of the three teens who were pregnant during the run of the show. So I also found it interesting that these teen mothers are seen as reasonable (Amy) to very good (Kathy) at mathematics. I wish that the show had elaborated on the usefulness of algebra in daily life—in that context, I felt that Danica McKellar's role was not very inspiring. However, I did like the overall message about the importance of asking for help and succeeding in mathematics and the role that hard work can play in that success. While the Nielsen ratings have declined, in much of its run the show was touted with such accolades as cable's top telecast for females between the ages of 12 and 34 [4]. Even in its final season I expect that there are many young female viewers. Farewell *Secret Life*. I will miss you.

[1] "Shiny and New," *The Secret Life of the American Teenager.* ABCFamily.com. Season 5 Episode16. Original airdate 4/8/13.
http://beta.abcfamily.go.com/shows/secret-life-american-teenager/episode-guide/5016-Shiny-and-New

[2] "Money For Nothin," *The Secret Life of the American Teenager*. ABCFamily.com. Season 5 Episode 18. Original airdate 4/22/13.
http://beta.abcfamily.go.com/shows/secret-life-american-teenager/episode-guide/5018-Money-for-Nothin

[3] "Interference," *The Secret Life of the American Teenager.* ABCFamily.com. Season 5 Episode 19. Original airdate 4/29/13.
http://beta.abcfamily.go.com/shows/secret-life-american-teenager/episode-guide/5019-Interference

[4] Seidman, Robert. *"The Secret Life of the American Teenager" and "Make It or Break It" Set Records for ABC Family.* January 5, 2010.
http://tvbythenumbers.zap2it.com/2010/01/05/the-secret-life-of-the-american-teenager-and-make-it-or-break-it-set-records-for-abc-family/37729/

BOOK REVIEW

Book Review Editor: Margaret Bayer, University of Kansas, Lawrence, KS 66045-7523, bayer@math.ku.edu

I Died for Beauty: Dorothy Wrinch and the Cultures of Science. Marjorie Senechal. Oxford University Press 2013. 312 pages. ISBN: 9780199732593-13.

Reviewer: Sandra Z. Keith, emerita, St. Cloud State University, St. Cloud, MN

In Emily Dickinson's poem, an entombed soul speaks out that she died for beauty; another soul, that he died for truth. The two softly talk until the moss reaches their lips and covers up their names. This book is a biography of Dorothy Wrinch (1894–1976), Oxford's first female science graduate, who invented and held stubbornly to a mathematically based explanation for the structure of protein. The theory had intriguing Platonic beauty, but unfortunately, peripheral truth. And if the author has anything to say about it, neither will moss cover up the name of Dorothy Wrinch. Marjorie Senechal is a Smith professor emerita and the editor of *The Mathematical Intelligencer* but was just a young Smith faculty member contemplating a course in symmetry when she first visited Wrinch, who in her white-haired 70s was lodged in an office above her own, stuffed to bursting with polyhedral models. Thus began a working-together relationship and a friendship that would culminate in this engaging, cheerful and often humorous book, which unravels the life and discoveries of this clever, enterprising, and ornery mathematical scientist in a fascinating time period in science history.

The book opens with the events of a 1938 conference described as if one might have been there, with the momentous question of the times being, what constitutes protein? A tentative floating conjecture by Astbury was that they were stringy fibers. But with X-ray crystallography in its infancy, the explanation would require subtle guesswork, and if correct, would assure the scientist of the Nobel Prize. Enter Dot Wrinch. A young, stiffish but pleasant, woman might not be all that notable as an up and coming student, but if raised in a cultural soup brewing the likes of Bertrand Russell and Hardy at Oxford, she will probably come out of the experience with a great amount of edification and also, backbone. Women in fact did inhabit the terrain of biology—

a fellow friend, Dorothy Crowfoot Hodgkins, credited with advancing protein crystallography, would eventually win a Nobel Prize (1964) and was interviewed by the author. Wrinch on her part had studied enough mathematics, philosophy and chemistry and biology to paddle in the scientific ocean with the greats, although her lack of experimental background was ultimately to be fatal to her ability to garner the experimentalists about her that she needed. "She's a woman—give her something and she would then only ask for more!" to paraphrase one of her superiors. Bringing her mathematical love of symmetry and polyhedral models to the big question (the book has a wonderful quote about Smithies with their models!), her big guess in 1936 was a mathematically simple and pretty one. Proteins are hexagonally laced fabrics, nets comprised of hexagonal cells dubbed "cyclols." These then fold up like origami into blobs. She was wrong, but it was a fair guess. This argument served several other ongoing theories of the time—the hexagon hypothesis seemed to serve the (incorrect) observation that amino acid residues came only in products of 2s and 3s. And her theory held the attention of such players as Niels Bohr. It was the dogged Linus Pauling, using thermodynamics and improved crystallography, who would prove to be Wrinch's nemesis, and their ongoing dispute, in one place humorously and briefly caricatured in this book as acts from an opera, would continue until 1969. Although Wrinch stuck to her guns for too long, many would say that even with his two Nobel Prizes, including one for the correct unraveling of the protein structure, Pauling hung on too long with his Vitamin C as a cure for cancer theory.

Scientifically speaking, what is protein? What we now know is that an actual blob of protein consists of a string of "amino acids" attached by "peptide linkages" in a repeated, rope-like structure. This rope then stickily or magnetically

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NSF-AWM Travel Grants for Women

Mathematics Travel Grants. Enabling women mathematicians to attend conferences in their fields provides them a valuable opportunity to advance their research activities and their visibility in the research community. Having more women attend such meetings also increases the size of the pool from which speakers at subsequent meetings may be drawn and thus addresses the persistent problem of the absence of women speakers at some research conferences. The Mathematics Travel Grants provide full or partial support for travel and subsistence for a meeting or conference in the applicant's field of specialization.

Mathematics Education Travel Grants. There are a variety of reasons to encourage interaction between mathematicians and educational researchers. National reports recommend encouraging collaboration between mathematicians and researchers in education and related fields in order to improve the education of teachers and students. Communication between mathematicians and educational researchers is often poor and second-hand accounts of research in education can be misleading. Particularly relevant to the AWM is the fact that high-profile panels of mathematicians and educational researchers rarely include women mathematicians. The Mathematics Education Research Travel Grants provide full or partial support for travel and subsistence for

- mathematicians attending a research conference in mathematics education or related field.
- researchers in mathematics education or related field attending a mathematics conference.

Selection Procedure. All awards will be determined on a competitive basis by a selection panel consisting of distinguished mathematicians and mathematics education researchers appointed by the AWM. A maximum of $1500 for domestic travel and of $2000 for foreign travel will be funded. For foreign travel, US air carriers must be used (exceptions only per federal grants regulations; prior AWM approval required).

Eligibility and Applications. These travel funds are provided by the Division of Mathematical Sciences (DMS) of the National Science Foundation. The conference or the applicant's research must be in an area supported by DMS. Applicants must be women holding a doctorate (or equivalent) and with a work address in the USA (or home address, in the case of unemployed applicants). Please see the website (http://www.awm-math.org/travelgrants.html) for further details and do not hesitate to contact Jennifer Lewis at 703-934-0163, ext. 213 for guidance.

Deadlines. There are three award periods per year. Applications are due **February 1**, **May 1**, and **October 1**.

folds up into itself to become a blob. The sequence of DNA gives the directions for the sequence of amino acids on the protein's peptide chain to determine the kind of blob it folds into—voila! Proteins explained. Nevertheless, while proteins don't use them, Dorothy's cyclols occur elsewhere in nature, for example in alkaloids. This is not so surprising. Wrinch's major accomplishment was not the structure of the protein but a serious answer to the question: why do proteins fold? She and the scientist Irving Langmuir laid the basis for the hydrophobic effect. Since the ropes don't tie themselves to each other, how can we explain why the rope doesn't just fall apart like a wet noodle and why each rope forms its specific blob? More scientifically, what is the physics that explains why a chain of amino acids always seems to fold into the same shape? That big question took many years to understand (some scientists still work on the margins of this topic) and the answer is: the *hydrophobic* effect—briefly, a protein that lives in a watery background will try to fold its oily parts into its center with its watery parts outside.

At the time, it was written of her, "W is a queer fish, with a kaleidoscopic pattern of ideas, ever shifting and somewhat dizzying. She works, to a considerable extent, in the older English way, with heavy dependence on `models' and intuitive ideas" (p. 144). This book too is kaleidoscopic, and at times almost dizzying, with the plot unfolding like a denatured protein—something I can say with my newly acquired knowledge, some picked up from my frequent trips to Wikipedia as my fascination grew. A denatured protein is what you get when you whip up an egg white. The analogy is not too far off. The book is a palimpsest of Wrinch's complicated life, with details of lantern slides, the British exam system and British dorms, philosophical paradoxes and politics, polyhedral symmetries, quarrels among the sciences, crystals, the life of a college wife, and gossipy tales about that old Mad Hatter Bertrand Russell and the "evolution-is-random" philanderer HG Wells. Who would not want to read such a book, especially one so well-written?

In my own online reading (see, for example, http://www.ch.imperial.ac.uk/rzepa/blog/?p=3746, for a clear picture of a cyclol), I found Dorothy Wrinch mentioned quite frequently: she is often congratulated as a female with persistence. Statistician George Box would remark, "All models are wrong, but some are useful." And perhaps, it was *indeed because she was a woman* that Wrinch managed to magnetize scientists to the topic and energize the field, although Wrinch is admirable in refusing to let herself be ignored.

Conrad said, writing is like peeling an onion—peel away, but don't look for a seed of truth; the truth is in the entire onion. So with this book, about a controversial woman by an author who not only understood her but understood her ways of working, taught with her ways of working, and very much cared. This extremely interesting book would be the perfect fodder for a television series; there are messages here for all of us. *Se non è vero è bene trovato.*

EDUCATION COLUMN

The Decline of the Tenure Track

Mary Morley, Ocean County College, Toms River, NJ

Over the last 40 years there has been a large decrease in the percentage of college faculty who are on the tenure track, with a corresponding increase in full-time non-tenure track and an even larger increase in the number of part-time faculty. In 2011, less than one fourth of college faculty was tenured or tenure-track and the current percentage is probably less than that. In 1974, tenure-track and tenured faculty made up over 45.1% of faculty, but by 2011 they were down to 24.1%. Over the same period full-time non-tenure track faculty increased from 10.3% to 15.4%, while part-time faculty accounted for the largest increase: from 24.0% to 41.3%. This part-time percentage does not include graduate students: their percentage has been relatively flat at around 20%.[1] Overreliance on adjuncts is often thought of as a community college issue, but many four-year colleges and universities have come to depend on their labor as well; the figures above are for all degree-granting institutions in the United States, not just community colleges. The trend of decreasing tenure or track-faculty and increasing temporary and/or part-time faculty may be good for the bottom line short-term, but it

[1] AAUP. "Trends in Instructional Staff Employment Status, 1975–2011." March 2013. http://www.aaup.org/sites/default/files/files/AAUP_Report_InstrStaff-75-11_apr2013.pdf (Accessed on May 23, 2013). (This data was compiled by AAUP from the IPEDS fall survey data.)

can have a negative impact both on students and on the adjuncts themselves.

Adjuncts have always played an important role in college instruction: the high school teacher who taught College Algebra at night, an applied mathematician in industry who taught a course in their specialty, or a parent primarily staying home for child care who taught a couple of courses at the local college. A certain percentage of part-time faculty is probably good for colleges, bringing in real-world experience and a different perspective and providing more flexibility in the scheduling of courses. However, the current adjunct work force has gone well past including only people who want to work part-time. Many of those employed as adjuncts today would prefer full-time employment, but there is very little of that available—if all faculty now employed full-time retired, there would still be more adjuncts than openings by the official numbers. Over three-fourths of adjuncts say they would probably, or would, accept a tenure-track position. A similar percentage of adjuncts are either looking for full-time employment, or have done so recently, or are planning to do so soon. In addition, the median pay per three-credit course for adjuncts at all colleges is only $2,700; even at research universities the median is only slightly higher at $3,400.[2] In order to make a living on $2,700 per course, adjuncts may end up teaching three courses at one college and two at another. If they are lucky enough to get this many courses for both fall and spring semesters, they may earn $27,000 for the year, without any benefits. Spending so much time traveling and teaching means not being around to interact with students. Median-pay faculty may not even have an office or any support services in either location. And they are often hired only at the last minute, when the colleges make the final decision on what courses will run.

The most vulnerable students are the ones most likely to have part-time faculty. Even as far back as 2001, 67% of remedial courses at community college were taught by part-time faculty.[3] This percentage has probably gone up significantly in the last 12 years given that in 2001 part-timers were only 36.5% of all faculty. This is unfortunate, as students in remedial courses require a significant amount of support. As mentioned above, part-time faculty play an important role at colleges, but when they constitute too high a percentage of the faculty, students can suffer. Part-time instructors may be just as talented and just as devoted as full-time instructors, but if they are teaching classes in multiple colleges they do not have as many opportunities for out-of-class interactions with students. This may be aggravated by either total lack of an office, or being put in a large and crowded office shared by many adjuncts. It is often the out-of-class interactions that are most influential for students. In addition, adjuncts who are hired at the last minute do not have much time to prepare for the class. (On the other hand, they could spend weeks preparing for a class that gets cancelled or is given to a full-time instructor at the last minute.) But for whatever reasons, studies have shown a lower retention rate and lower graduation rates for the students with more exposure to part-time faculty.[4] In addition, community college students with more exposure to part-time faculty were less likely to transfer to a four-year college.[5]

The tenure system encouraged faculty members to spend much, if not all, of their career at the same institution. This meant that they became very experienced with the courses and students at that college. They often taught all the different courses in a given sequence, and understood, for example, that the parts of Calculus I that didn't seem terribly important in that course, and did not show up in Calculus II, could be critical to understanding Calculus III. It is not hard to prepare students for one final; it is more difficult to prepare students for subsequent courses, both in mathematics and in other disciplines. One important paper, by Carrell and West, investigated the difference in outcomes on long-term learning of being taught by more versus less experienced faculty. This study demonstrated that the most experienced, full-time faculty did a better job in instilling long-term knowledge. "More experienced and highly qualified professors produce students who perform better in the follow-on related curriculum."[6] The study is unique and probably could not have been done elsewhere. The authors had access to ten years of data

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[2] Coalition on Academic Workforce. "A Portrait of Part-time Faculty Members." June 2012. http://www.academicworkforce.org/CAW_portrait_2012.pdf (Accessed on May 24, 2013).

[3] Shults, C. "Remedial Education: Practices and Policies in Community Colleges." American Association of Community Colleges, June 2001. http://www.aacc.nche.edu/Publications/Briefs/Pages/rb06052001.aspx (Accessed on May 22, 2013).

[4] Eagan, M. K. and A. Jaeger. "Effects of Exposure to Part-time Faculty on Community College Transfer." *Research in Higher Education*, 2009. 50: 168–188.

[5] ibid.

[6] Carrell, S. and J. West. "Does Professor Quality Matter? Evidence from Random Assignment of Students to Professors." *Journal of Political Economy,* 2010. 118(3): 409–432.

from the Air Force Academy, where students were assigned instructors randomly, and they could follow students through several mathematics courses. The researchers could also link course evaluations to performance both in that class and in subsequent classes. Since students were randomly assigned to instructors, there was no effect from better students preferring one instructor over another. This study was able to compare the results from students taught by less experienced, less qualified faculty, with those of students taught by the most experienced, full-time faculty. The students of the less experienced faculty did well on the common final, got good grades, and gave their instructors high evaluations. In fact the less experienced faculty got higher evaluations than those given to the more experienced faculty. But their students did not do as well as the students taught by the most experienced faculty in subsequent courses; they had not gained deep knowledge. And the aim of college should be to promote deep knowledge. The purpose of Calculus I is not just to pass Calculus I. It is to understand it and to be able apply it elsewhere, both in and out of the classroom.

It was interesting that the more experienced faculty got lower student evaluations, even though their students did better longer term. Tenured faculty may have the freedom to teach in such a way that they get lower student evaluations, but that their students learn more and do better later. Faculty hired year-by-year or even course-by-course do not have that luxury. Even academic freedom may be at stake if all college instructors are temporary, or worse just hired course-by-course.

A tenure or tenure-track faculty is an asset to a college, but unfortunately is viewed as very expensive, and the amount of money to be saved by hiring a part-time or temporary workforce may be too great for colleges to pass up. An experienced part-time faculty could also be a great asset. If colleges are going to continue decreasing tenure and tenure-track faculty, then it is critical that they offer support to the type of faculty that they are hiring. The low pay and lack of support for some adjuncts is appalling, and this lack of support affects students. One survey of adjuncts found: "Professional support for part-time faculty members' work outside the classroom and inclusion in academic decision making was minimal."[7] The evidence suggests that well-supported adjuncts do better than those who are not supported by the college. A study on student retention found that students taking courses taught by full-time non-tenure track faculty or those taught by adjuncts well supported by their institution did better than those taught by adjuncts that were not well supported.[8] A part-time instructor, who has been teaching at the same college for years, has a contract for *n* courses per year, and feels valued and supported can be an asset to the college and to the students. Someone trying to make a living teaching at three or four different colleges many miles apart, hired at the last minute, needs our support to become an asset.

[7] Coalition on Academic Workforce. "A Portrait of Part-time Faculty Members." June 2012. http://www.academicworkforce.org/CAW_portrait_2012.pdf (Accessed on May 24, 2013).

[8] Jasckik, S. "Adjuncts and Retention Rates." Inside Higher Ed, June 21, 2010. http://www.insidehighered.com/news/2010/06/21/adjuncts (Accessed on May 23, 2013).

A Conversation with Sybilla Beckmann

Interviewer: Katharine Ott, University of Kentucky

Sybilla Beckmann is Josiah Meigs Distinguished Teaching Professor of Mathematics at the University of Georgia (UGA). She is the author of *Mathematics for Elementary Teachers* (Pearson), now in its fourth edition, and co-founded the Mathematics Teaching Community online at https://mathematicsteachingcommunity.math.uga.edu/. I recently spoke with Sybilla on the phone about her career and, in particular, her involvement in mathematics education.

KO: What does the title Josiah Meigs Distinguished Teaching Professor of Mathematics signify?

SB: I won a teaching award at the University of Georgia. It is UGA's highest teaching award.

KO: Can you give a brief overview of your educational and career trajectory, from graduate school on?

SB: I went to graduate school at the University of Pennsylvania and worked with David Harbater and studied arithmetic geometry. I guess back then we weren't calling it arithmetic geometry but that is what it is called now. After that I had a postdoc at Yale, I was a Gibbs Instructor for two years there. Then I came here to UGA and I have been here ever since.

KO: You have made a transition in your career from arithmetic geometry to math education. When did your interest in math education begin and when did the transition to research in math ed start? Where they at the same time?

SB: They were at very different times. The interest really started after I had kids, and as my kids were heading into school I started to think about the fact that we taught these math courses for elementary teachers, and it just sort of dawned on me that these courses are actually really important. They seemed like a somewhat neglected part of our curriculum. I started teaching them and thinking more about them. It kind of snowballed […] beginning with a growing interest that started because of my kids and then continued to suck me in because I thought it was interesting. This was surprising to me; I wasn't expecting to find it really interesting.

For a bunch of years I was doing lots of math ed projects: I wrote my math for elementary teachers book, I was on lots of national committees, and so on, but that is not really the same as math ed research. A few years ago I started realizing that I needed to have that research component again. I realized that I had to do this in math education not math. I always assumed I'd go back to do more math research. But it didn't make sense for me. As an author of *Mathematics for Elementary Teachers*, which I take really seriously and that needs to be of high quality, I feel like it makes the most sense to be engaged in math ed research that will help that book get better with every edition.

KO: Can you briefly describe your math ed research?

SB: I am working with a colleague in math education, and we are looking at prospective teachers' reasoning about ratio and proportional relationships, and also associated multiplicative ideas—multiplication and division with fractions, and so on. Those are all tightly intertwined ideas. [We are interested in questions such as] what is harder for the teachers, what is easier, and how do they think about those ideas?

A number of years ago I realized that there are actually two types of ratios and proportional relationships that fit with the two types of division. There is a "how many in each group" type of division and a "how many groups" type of division. It turns out that there is a parallel situation for ratios and proportional relationships. This didn't seem to be in the literature that I had seen (that recognition). One of the things that we are exploring is how do the teachers understand the two different definitions or versions of ratios and proportional relationships.

KO: Do you see any way that your training in arithmetic geometry is helping you with this type of research?

SB: Not explicitly, but something that I have noticed about myself, that may be different from other people in math or math ed, is at this point I have thought pretty carefully about math across a really wide range—all the way from pre-K through graduate level. I think that it really does shape how I think about stuff, and I think that it is a different perspective that I can bring that to my research and to my interactions with people.

KO: Do you think that more mathematicians (at colleges and universities) should be interested in K–12 math education, and why?

SB: I think that more should be interested in what is going on in K–12 math. I feel strongly that all of us who teach math need to see ourselves as part of this big community that spreads across kindergarten through college and even graduate level math teaching. We are all intertwined. Whatever you want to teach at the college level, well that

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depends on what happens at previous levels. At the college level we are preparing teachers, so they cycle back to those earlier levels. I think it is important for us to realize that we're part of this bigger system. That is not currently the way people are talking about education. Most of the conversations are about K–12 as its own separate thing and college as its own separate thing. I think we need to think more from a disciplinary perspective. I think that would be positive for math teaching at all levels.

That being said, I don't think that it is necessary for more mathematicians to be involved in math ed research, per se. That is really its own separate thing. I didn't realize when I started doing this [math education research] how much there is to know. It is a different discipline, and there is a lot to learn. Just because you have taught math, that doesn't mean that you know a lot about education more generally, or even about what is known for math education. I think that mathematicians should be cautioned that the math ed world is a little more difficult to get into than you might think. But mathematicians could be better consumers of the existing education research. I think that could happen more if there were better connections across all of math teaching.

KO: Is there a way for graduate students who are interested in K–12 math education to get involved?

SB: Yes. Graduate students can learn to teach math courses for teachers. I should have said that about the general mathematician also. A natural connection [between K–12 math and college math] is these courses for teachers. One of the things that I do is to train graduate students who are doing PhDs in math to teach these math courses for elementary and middle grade teachers.

KO: You recently started an online forum called the Mathematics Teaching Community with a colleague. Can you talk about how this began, and what its purpose is?

SB: Actually, the idea started way back before I even thought about the Mathematics Teaching Community. I was wondering why is it that math research is really vigorous and math teaching is not, in comparison. I thought about what are the factors that make math research so vigorous and so vibrant, and one of the big things I think about math research and probably any research community, is it's a community where people work really hard because they are trying to impress their peers. That, together with building on what has gone before. It seemed to me that we needed a similar set-up in math teaching. We needed some kind of community that will support dialogue and building on ideas. I had an idea of something, maybe electronic, that might be a step in that direction. Obviously, the Mathematics Teaching Community alone can't do this whole job of the community. But it's a little idea that fits into that general, bigger idea of developing a community of teaching across all levels of math. I had a graduate student line available to me, and I invited Jacob Hicks [a graduate student at UGA studying number theory] to collaborate on this project.

Ideally this [the electronic forum] will eventually become kind of a self-organizing journal where articles get published after enough peer review. [An article] could get published if there are enough positive comments by highly rated people in the community, and the negative comments have been overcome or dealt with in some suitable way. But for now it is an open forum of discussion where people are posting stuff about teaching and getting replies and comments. It's been chugging along and hopefully readers will see this and be interested and join in as well. There are some teachers on there, some teacher educators on there, and some people teaching college level math on there. It is a mix, and that's what we are hoping for. We want more of everybody!

KO: You also have a Twitter account.

SB: I do! I started. I figured I'd better get on Twitter. I know that there is a whole blogosphere out there with K–12 teachers. I joined Twitter to see if I could get a little more traffic to the Mathematics Teaching Community that way.

KO: Looking at your resume, I see that you spent a year teaching sixth grade, which seems like a very brave thing to do.

SB: Yeah, let me tell you, it is way brave.

KO: What do you remember most from that experience?

SB: Well, the most lasting thing is that wow, it's incredibly hard to teach sixth graders. The kids are so different at that age. And my daughter was that age at that time, so it's not like I didn't have any clue about kids that age. But I never caught on to the discipline. Every day the lesson kind of fell apart at some point into chaos. I only taught first period every morning, and then I went in and did all of my university stuff. I was so exhausted at the end of that year. It was overwhelming.

KO: I feel that I only ever hear what is wrong with our K–12 math education. Is there anything that is right, or changes being made that are exciting right now?

SB: That's a good question. It is easier to pick out the wrong things. Personally, I'm happy about the common core standards. I worked on them and I think that they are really

good. I talked about my sixth graders that I taught, and they were a rambunctious bunch, but that's kind of a good thing, too. They had a lot of spunk and spirit, and they weren't beaten down.

KO: Did they have a positive attitude about math?

SB: They had a surprisingly positive attitude about math. I thought I would see more fear of it or dislike of it, and I didn't see any of that actually. And they would seem interested in stuff that you wouldn't necessarily predict for sixth graders. I remember I came in one day with a printout of a whole bunch of digits of pi, and they thought that it was really cool that the digits just keep going on. You would think they only want applications, or if it's not useful for their real life then they're not going to care, but that wasn't the case at all.

KO: You are married to a mathematician, correct?

SB: Yes.

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ASSOCIATION FOR WOMEN IN MATHEMATICS

AWM Workshop for Women Graduate Students and Recent PhDs

For many years, the Association for Women in Mathematics has held a series of workshops for women graduate students and recent PhDs in conjunction with major mathematics meetings.

WHEN: Pending funding, an AWM Workshop is scheduled to be held in conjunction with the SIAM Annual Meeting, Chicago, IL, July 7-11, 2014.

FORMAT: The workshop will consist of a poster session by graduate students and two minisymposia featuring selected recent PhDs, plus an informational minisymposium directed at starting a career. The graduate student poster session will be open to all areas of research, but the two research minisymposia will focus on numerical and theoretical approaches for nonlinear partial differential equations. Pending funding, AWM will offer partial support for travel expenses for between fifteen and twenty participants. Departments are urged to help graduate students and recent PhDs obtain supplementary institutional support to attend the workshop presentations and the associated meetings. All mathematicians (female and male) are invited to attend the program.

MENTORS: We also seek volunteers to act as mentors for workshop participants. If you are interested in volunteering, please contact the AWM office.

ELIGIBILITY: To be eligible for selection and funding, a graduate student must have begun work on her thesis problem, and a recent PhD must have received her degree within approximately the last five years, whether or not she currently holds a postdoctoral or other academic or non-academic position. All non-US citizens must have a current US address. All selected and funded participants are invited and strongly encouraged to attend the full AWM two-day program.

All applications should include:

- a cover letter
- a title and a brief abstract (75 words or less) of the proposed poster or talk
- a concise description of research (one-two pages)
- a curriculum vitae
- at least one letter of recommendation from a faculty member or research mathematician who knows the applicant's work is required for graduate students and recommended but not required for recent PhDs. In particular, a graduate student should include a letter of recommendation from her thesis advisor.

Applications must be completed electronically by **November 1, 2013**. See http://www.awm-math.org/workshops.html.

KO: What are the benefits or downsides of having a partner in the same field?

SB: My husband is Will Kazez; he is a topologist. We met at Penn where he had his first postdoc and I was a senior grad student. When we were first looking for jobs, we had postdocs on opposite coasts. I was a Gibbs instructor at Yale, and at the same time he was a postdoc at Caltech. We were surprised that we got a bunch of joint job offers. I think that it doesn't hurt you for your partner to be in the same discipline. Maybe it was a plus that he was in topology and I was in arithmetic geometry. You might think that it's not good to have two people in the same field, but somehow, because I think a department can decide if it wants to try to go for the two people at once, it does seem to make people attractive or at least not unattractive in our experience. Plus, it was great when the kids were little. If there were times when I was home with the kids, he could still bring mail home or tell me what was happening at the department. It was easier to be more connected.

KO: Have you ever in your career faced any challenges that are particular to you being a woman?

SB: I often ask myself that. I am not really sure. Every so often I think to myself, 'I wonder if it would be different if I were a man?' But there's probably no way to know. One thing that has crossed my mind, I wonder if some of the math wars stuff [disagreements about reforms in mathematics education proposed by mathematics education researchers] is actually at its root almost a gender issue because many people in math ed are women and many mathematicians are men. Of course, who knows?

KO: Is there a higher percentage of women in math ed compared to math?

SB: Yes, definitely there is.

KO: Do you have any idea why?

SB: I don't know. Why are more women drawn to education things? Maybe if you have kids or if you are a child bearer maybe you are more interested in education? That is pure speculation.

KO: What are you most proud of in your career to this point?

SB: My mathematics for elementary teachers book is definitely what I'm most proud of. I worked incredibly hard on it. It has been a horrendous amount of work; if I had known how much it was going to be going in, I am not sure I would have done it. I don't regret doing it, nonetheless.

KO: Is there anything else that you would like to share with the AWM community?

SB: A piece of advice I'd like to give young mathematicians is not to be afraid to take a different career path, if that is what you want to do, and not to be afraid to ask for what you want. When my kids were young, I asked to be allowed to work part-time, and I taught-part time for about nine years, while holding onto my tenured position. I think there were three different department heads over that time period and not one of them ever said no. I will be forever grateful to my department for that.

KO: Thank you very much for your time.

MATHEMATICS + MOTHERHOOD

Anita Layton Interview October 2012, Duke University

Lillian Pierce, University of Oxford

Anita Layton is an Anne T. and Robert M. Bass Associate Professor of Mathematics at Duke University, working in mathematical physiology, scientific computing, multiscale numerical methods, and fluid-structure interactions.

LP: Tell us a little about your field of research.

AL: I am an applied mathematician. I work in scientific computing and also mathematical biology. In scientific computing, I look at problems where you have some sort of structure immersed in a fluid and how these interact with each other—for example, a parachute flapping in air or blood pumping in the heart. I develop methods that can solve model equations that describe these systems. In mathematical biology, I develop systems that model aspects of the rat kidney, such as how it produces a concentrated urine and how it controls blood flow.

LP: As this is a series on mathematics and motherhood, I'll just dive right in and ask about your children.

AL: I have two very sweet ones. My daughter Laura is 9, in 4th grade, and my younger son Nathaniel is 5 years old and is in kindergarten. They are very happy kids, and low maintenance.

LP: One of the typical concerns young women have is about the timing of children relative to career.

AL: That is so tricky. There is really no good time, if you're really worried about your career. Honestly, children are not good for your career, because they take so much time. But I don't think our life is just about career—if it were, it would be extremely sad. I had Laura when I was a postdoc at UNC Chapel Hill. I think it worked well. I was still able to work. The good thing was that my advisor at the time was not saying "OK, come in at 9 and get out at 5 and punch your time card," which would have been hard because I was breastfeeding the kid, so that's going to be tricky. As long as I wrote enough papers, which I suppose I did, he was perfectly happy. I had Laura in the summer, so that also helped a little bit. Nathaniel was born just before I became tenure track, after I spent three years at Duke with an NSF ADVANCE grant as an assistant research professor. So I had him the last year I was an assistant research professor, in April, so right before summer.

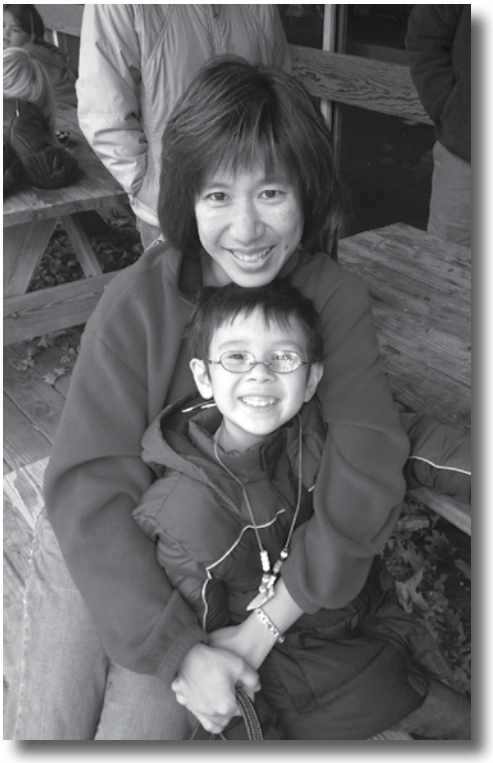
LP: Was there a difference between having a baby as a postdoc vs. as a faculty member?

AL: The difference if you have a kid when you are tenure track vs. as a postdoc, is that you have better benefits. As a postdoc, I had basically no maternity leave, maybe six weeks. Also I didn't really look into it too much because I was still working. So I didn't really take it off. As a regular faculty member, I had benefits. Officially I had one semester off of teaching, although I do remember coming in for one PhD defense, which was ok, that's no big deal. At Duke, as a male or female parent, you can stop your tenure clock for one year. The biggest issue is maybe psychological, especially for mothers. I know people who don't take maternity leave, or don't stop the clock, because they want to prove themselves. This may be more so for mothers than for dads. It's really about how to change perception, either in the mom or in other people.

LP: It's interesting that your semester of maternity leave was your first official semester as a tenure track faculty member.

AL: Some people worry about "if it looks like I don't do work, will my colleagues think badly of me because I take one semester off and add a year to my tenure clock." That is hard to say. I decided not to worry about it and took leave the first semester. I think I'm productive enough. You can't really see a gap in my resume.

You need some sort of leave, because when the kids were born—I slept a couple hours at a time, I never slept more than five hours, because guess what? they eat every two hours. I could do routine things, I could write. There was certain research I could do. But it affects your productivity. It doesn't really show in mine because I arranged it so I had a lot of the groundwork done so that I was at the writing stage—I can write when I am sleepwalking.



Anita Layton and son Nathaniel

LP: Was there anything that surprised you about having children?

AL: How sweet they are! I didn't know what to expect—I had no idea! I was a kid myself once, I'm sure, but I don't remember!

LP: Was there any advice that people gave you that you took, or that you ignored?

AL: You have to understand I don't take a lot of advice. I am not an advice-seeking person. I think before I had Laura, people said "Maybe you should have your mom over." At the time, I didn't always get along with my mom so well—we are both very strong-willed. So I had her come one week and then I shooed her off. But then I realized that after I had Laura we actually got along a lot better. Maybe because I have a different perspective or maybe because my mother just loves kids. So with the second kid, she came to visit for six weeks, which was really fortunate because at that time, my husband was in the hospital for a week, precisely

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when my son was three weeks old and I was running a birthday conference for a colleague. Without my mom, my world would have collapsed. So I kind of learned from that experience.

LP: It's interesting that some conventional wisdom about the arrival of a baby can be spot-on, while some of it might not square with our goals as professionals.

AL: When I was pregnant with my first kid people would ask "are you going to come back to work?" which I guess was an implicit suggestion of "well maybe you should stay home." But obviously I didn't take their advice! I asked my husband, "Does anyone ask you whether you're going to come back to work? Why not? Is that not your kid?"

LP: Is there something distinctive about being a mother and a mathematician, compared to some other intensive career that involves travel and work?

AL: It's better for the mathematical development of the kid! You set an example, especially for the girls, of "Mommy can do this, so can you." Or maybe "Mommy does this, so it's not cool." I'm not sure which! I try to tell them what I do. I've let my daughter read the abstract and the introduction of some of my math biology papers. She asks me—"what does this mean?" It's good—if you can explain something to a nine year old, you can give a good talk.

LP: Are there advantages to having math as a career, while you're a mother of young children?

AL: Let's say academics. As a professor, we do have a more flexible schedule, which is good. As long as I work and I produce research then nobody really questions whether I'm in my office or not—seriously, nobody cares. That's also the case with other jobs you can do remotely or you can have a flexible schedule. A flexible schedule is good if you're the kind of person who is self-motivated. I know other people who tend not to work as much if they have really flexible schedules. So as long as you can motivate yourself and not slack with nobody watching your back, then it's a plus.

LP: Your publication record shows that you are incredibly productive. What makes it all work?

AL: The children growing up. But you can't really rush that. Being able to manage your time well. You hear a lot from people about spending so many hours on work. Honestly after the kids, I don't spend nearly as many hours on my job. I love my job, so before the kids came I used to spend all my hours on work. Seriously, I'd eat, I'd sleep, I'd work. I don't do that any more. I think for a while I kind of missed that and now I don't. I feel like I know I come in at 8, I have this many hours, I'm leaving at 4:30, and I really work every single minute. If you really focus, it's ok.

LP: So you aim to keep clear demarcations between your work and time with your children.

AL: I think when they were very little, work and children were mutually exclusive. When I was spending time with them when they were little, I felt bad since I wasn't answering email or working on my paper. When I was working, I felt like "I'm just sitting them in front of the TV, I'm a bad mom." Now I don't beat myself up as much these days. Maybe it's because it's been nine years since my first one was born, so I know how to deal with this. So I know how to spend quality time—real quality time, and not just an hour and then say I have to get back to work. I try to really enjoy it.

LP: Is there any advice you'd give someone contemplating having children.

AL: They should! I mean, they spend time eating, right, they spend time sleeping—it's part of life. Let me qualify this: they should have children, only if they want to. Some people don't want to have children and that's fine; some people don't want to get married and that's totally fine too. It's not necessary. But I really don't believe in saying "ok, I'm not going to do this because of my job."

LP: I feel like there's an irony here—if we want to show that being a mother needn't change our career as mathematicians, it's tempting to bar any signifiers of motherhood from our work persona. But at the same time it is valuable to be a visible role model.

AL: Now my kids come to my office and sit there, and as long as they are not too noisy I don't feel bad about it. My husband is also a mathematician and works in the same department. A few years ago I actually said to him, "OK, don't bring Laura to my office. If you bring her to my office it's going to be 'Anita's kids,' not your kids. And they'll think Anita's babysitting, not working." I think similar thinking might affect women on the decision of whether they need to prove that they're supermom and don't need

a year added to the tenure clock. But now, the last couple of years, I no longer care if I have the kids running around. Yes, Anita has two kids—they're well behaved, take a look at them! (I never get anything but nice comments, anyway.) It used to worry me, but something changed! "If you don't like it, that's fine! I don't like the color of your shirt either!" In fact, this summer I am bringing Laura with me to a conference in Shanghai. That will be the first time she travels outside of this continent, so naturally she is very excited. Her whole school knew the day after we agreed on this. I am looking forward to that trip.

Grandma Got STEM

Rachel Levy, Harvey Mudd College

Perhaps you are tired of hearing people say "how would you explain that to your grandmother?" when they probably mean something like "How would you explain that to a novice?" You may also have heard the phrase, "That's so easy, my grandmother could do it." Where do these phrases originate? Einstein is quoted as saying something like "you don't really understand something until you can explain it to your grandmother." The Einstein reference (true or not) may encourage people to perpetuate these phrases, but it is time to find alternatives to the notion of the grandmother as archetypal novice.

After thinking about this issue for several years and observing people use similar phrases, I have come to the conclusion that people don't say these things out of malice. Often they really do want people to explain things more clearly. Sometimes they are trying to be funny. They probably haven't thought much about what these statements imply about gender + maternity + age and what impression the phrases make on their audience. For example, how do assumptions about "grandmothers" affect hiring practices?

To provide a new perspective, I decided to collect pictures and names of grandmothers in STEM-related fields. STEM stands for Science, Technology, Engineering and Mathematics. To my surprise, people started sending me stories with the pictures and what I intended to be a collage turned into a blog called Grandma Got STEM (http://ggstem.wordpress.com). The daily posts feature a "STEM-ma": her name, pictures, stories and remembrances. Ideally the post is written by the woman herself or someone who has met her, so that the post is personal, rather than what you might see in a CV or publication.

People have been delighted to share their own stories, as well as those of their relatives, mentors and colleagues. Many people have said "I think my grandmother may have done something related to STEM—let me get back to you!" Thus the project has encouraged people to get in touch with fabulous women and to talk with them about their work experiences. In the process, some have discovered bits of their own family history or the history of their field. The posts are categorized by field, so you can browse the archives, or read a group of stories by women in a particular area.

Here's an example of the kind of story you might hear when you take the time to ask a woman about her work. I have known my friend Katie Leiva since high school. I knew her mother Miriam at one time was President of the National Council of Teachers of Mathematics. What I didn't

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know (until Katie submitted a post about her mother for this project) was that Miriam came to the US from Cuba at age 13. Because she was tall, Miriam was put into high school classes even though she was just getting used to life in English. She was delighted to finally walk into a class where everything on the blackboard was written in "Spanish"—that was her mathematics class! Miriam Leiva became the first Hispanic woman in the US to earn a PhD in mathematics and mathematics education.

Of course, there are many ways to make contributions in the world besides working in STEM. A buddy said, "Don't forget the arts! STEAM!" But people rarely are skeptical of women's involvement in the very important arts and humanities. So for now, the focus remains on STEM. However, the project employs a broad definition of the word STEM and a broad view of the word grandmother. Kebokile Dengu-Zvobgo, Associate Dean of International Programs at Pitzer College, taught me that in Zimbabwe, a "grandmother" is someone who has earned a certain level of respect in the community. The term is less a function of age or maternity than a title granted to those who serve in a leadership role. Thus Grandma Got STEM features some women who are not technically grandmothers but whom we celebrate and respect because of their contributions to STEM fields.

Within two months Grandma Got STEM had readers from over 100 countries. People are getting the message. IT professionals, professors and scientists have written that while they have used the grandmother line in the past, they now plan to check their use of such language. When new instances of the same old phrases appear online, people have responded with links to Grandma Got STEM. Geeky grannies are establishing a presence online and in dialogue about STEM.

In order to post a STEM-ma a day, the project needs lots of submissions! I have been surprised at how many women have asked me if their story "counts." Ordinary and personal stories from all kinds of perspectives are welcome. One challenge has been to gather international submissions, even though the readership is quite broad. If you would like to contribute to Grandma Got STEM, you can send the name of the person (who could be yourself!), stories, remembrances and at least one picture to Rachel Levy at ggstem@hmc.edu.

In Memoriam

Lu Lingzi, 1989–2013

Lu Lingzi, a 23-year-old graduate student in the Department of Mathematics and Statistics at Boston University (BU), was tragically killed on April 15 during the bombings at the Boston Marathon. A native of Shenyang, China, she attended the Beijing Institute of Technology before beginning a master's program at BU last year. She had hoped to be a financial analyst.

Lingzi finished taking her comprehensive examinations in statistics just a few days before her death. On the day before the marathon Lingzi learned that she successfully completed the first portion of the qualifying exam. She had also passed the final portion, but she would never find that out—it was graded after her death.

A scholarship has been set up in her name: https://www.bu.edu/alumni-forms/forms/lu-lingzi-fund/.

Twin WiMSoCal

Alina Bucur (UCSD) and Kristin Lauter (Microsoft Research), Organizers; www.math.ucsd.edu/~alina/twims/

WiMSoCal, http://research.pomona.edu/wims/, is an annual conference which has gathered women in math in Southern California annually in the Los Angeles area for the last five years, organized by Alissa Crans (Loyola Marymount), Cymra Haskell (USC), and Ami Radunskaya (Pomona). Following up on the success of the fabulous WiMSoCal, this spring we kicked-off a Twin WiMSoCal annual meeting in the San Diego area. With this twin event, we hoped to create an additional opportunity for female mathematicians in SoCal to gather, have fun, and present their research. This regional model for math conferences for women could potentially work well in many other densely populated regions around the country, and we encourage others to organize such events in cooperation with AWM! It is a fun and low-cost way to build community among professional women in mathematics.

Twin WiMSoCal was a one-day meeting run in cooperation with AWM on Sunday, April 21, at UCSD. It was very successful with 40 registered participants and featured

30 talks: 2 plenary talks by Professors Audrey Terras (UCSD) and Elena Mantovan (Caltech), 7 special sessions, and a special talk on mathematical modeling in the pharmaceutical industry from Dr. Mary Spilker, a research scientist at Pfizer. The special session talks were given by professors and graduate students from schools in the local area.

The conference was sponsored through funding from the UCSD Dean's Office and Microsoft Research, which provided coffee breaks, lunch and a reception. There were plenty of opportunities to chat and to get to know each other and share good advice. Fun moments included Ami Radunskaya (Pomona) teaching everyone the hand signals for Women Math Warriors. Lunch included an informative career discussion with thoughts from academic faculty and input on non-academic career options. Volunteers were solicited for hosting future WiMSoCal/Twin WiMSoCal conferences and Julie Bergner (UC Riverside) and Perla Meyers (University of San Diego) volunteered to host the two meetings next year. We passed out AWM postcards and some copies of the newsletter, and encouraged participants to apply for AWM travel and mentoring grants and to be involved in AWM.

Audrey Terras

Elena Mantovan

STUDENT CHAPTER COLUMN

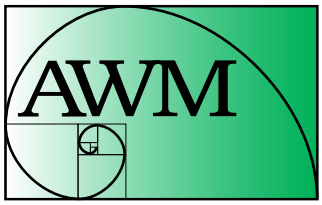
AWM Luncheon at Santa Clara University

Quynh Nguyen, Chapter President

On March 16–17, 2013, Santa Clara University hosted AWM Research Symposium 2013. The newly formed student chapter of AWM at Santa Clara took this opportunity to organize a special luncheon sponsored by the SCU Mathematics and Computer Science Department on Saturday, March 16. To make it more convenient for the participants, the event was held in the student common room, the Sussman Room, housed in the building where the talks were taking place.

The purpose of this gathering was to allow student members to meet and speak with the department's women faculty. We had a great turnout of eight faculty members, which consisted of two full professors, one associate professor, and five lecturers; an alumna, Rebecca Glover, who is finishing up her PhD at University of North Carolina; and five undergraduate students. Thus, students were able to ask questions and hear about the challenges and joys of graduate school first-hand from someone currently experiencing it. In addition, students were also able to participate in the events and talks put on by the AMW Symposium, getting a glimpse into the wide applications of mathematics through the different research topics presented at the symposium that day.

AWM Luncheon at Santa Clara University



ASSOCIATION FOR
WOMEN IN MATHEMATICS

AWM Workshop for Women Graduate Students and Recent PhDs at the 2014 Joint Mathematics Meetings

Application deadline: August 15, 2013

For many years, the Association for Women in Mathematics has held a series of workshops for women graduate students and recent PhDs in conjunction with major mathematics meetings. We have received support from the National Science Foundation for the AWM Workshop to be held in conjunction with the Joint Mathematics Meetings in Baltimore, MD in January 2014.

FORMAT: The new format, which started in 2013, presents research talks focused on a research theme that changes from year to year. In addition, a poster session for graduate students includes presenters from all fields of mathematics. The AWM Workshop talks in Baltimore in 2014 will focus on image analysis, computational geometry, and computer vision. Participants will be selected in advance of the workshop to present their work. Recent PhDs will join senior women in a special session on image analysis, computational geometry, and computer vision where they will give 20-minute talks. The graduate students will present posters at the workshop reception and poster session. AWM will offer partial funding for travel and hotel accommodations for the selected participants. The workshop will also include a reception and a luncheon. Workshop participants will have the opportunity to meet with other women mathematicians at all stages of their careers.

All mathematicians (female and male) are invited to attend the talks and posters. Departments are urged to help graduate students and recent PhDs who are not selected for the workshop to obtain institutional support to attend the presentations.

MENTORS: We also seek volunteers to act as mentors for workshop participants. If you are interested in volunteering, please contact the AWM office at awm@awm-math.org by **September 15, 2013**.

ELIGIBILITY: To be eligible for selection and funding, a graduate student must have begun work on her thesis problem, and a recent PhD must have received her degree within approximately the last five years, whether or not she currently holds a postdoctoral or other academic or non-academic position. All non-US citizens must have a current US address. All selected and funded participants are invited and strongly encouraged to attend the full AWM two-day program.

All applications should include:

- a title of the proposed poster or talk
- an abstract in the form required for AMS Special Session submissions for the Joint Mathematics Meetings
- a curriculum vitae
- one letter of recommendation from a faculty member or research mathematician who knows the applicant's work; in particular, a graduate student should include a letter of recommendation from her thesis advisor.

Applications (including abstract submission via the Joint Mathematics Meetings website) must be completed electronically by **August 15, 2013**. See http://www.awm-math.org/workshops.html for details.

Announcements

WhAM! Workshop

An IMA Special Workshop, WhAM! (Women in Applied Mathematics) Research Collaboration Workshop: Dynamical Systems with Applications to Biology and Medicine will be held September 9–13, 2013 at the Institute for Mathematics and Its Applications (IMA), Minneapolis, MN.

Many questions about biological processes can be phrased in terms of dynamical systems. The evolution of these processes and the stability of their long-term behavior can be studied in terms of dynamical systems theory. In this workshop we will pose problems from a range of biological and medical applications that can be interpreted as questions about system behavior or control. The overarching goal is to help build a strong collaboration network of women working on dynamical systems in biology by facilitating the formation of new collaborative research groups and encouraging them to continue to work together after the workshop.

This workshop will have a special format designed to maximize these opportunities for collaboration. There will be up to eight senior women researchers working in mathematical biology; each will present a problem and lead a research group. Each leader will choose a more junior co-leader, preferably someone with whom they do not have a long-standing collaboration, but who has enough experience to take on a leadership role. Other team members will be chosen from applicants and invitees. We anticipate five people per group. It is expected that each group will continue their project together and obtain results to write a submission to the proceedings volume for the conference.

The benefit of such a structured program with leaders, projects, and working groups planned in advance is that senior women will meet, mentor, and collaborate with the brightest young women in their field and junior women and students will develop their network of colleagues and encounter important new research areas to work in, thereby improving their chances for successful research careers.

To view project descriptions and to apply, please go to: http://www.ima.umn.edu/2013-2014/SW9.9-13.13/.

e-Mentoring Network in the Mathematical Sciences Blog

The American Mathematical Society is pleased to announce e-Mentoring Network in the Mathematical Sciences (http://blogs.ams.org/mathmentoringnetwork/), a blog edited by Ricardo Cortez, Tulane University, and Dagan Karp, Harvey Mudd College. The blog will address relevant questions that students, postdoctoral researchers and junior faculty may have regarding their advancement in mathematics. The first posts include "Questions to ask when visiting potential graduate programs" and "Building a community of mentors," both by Cortez. The goal of the blog is to reach and engage as many readers as possible, especially those who may not have sufficient mentoring at their current institution, and to connect students and mentors—to ask questions, provide feedback, and share links on meetings, networking and research opportunities, articles, non-academic career information, and other helpful resources. Contributing bloggers will be Erika Camacho, Arizona State University; Rebecca Garcia, Sam Houston State University; Edray Goins, Purdue University; Herbert Medina, Loyola Marymount University; Talithia Williams, Harvey Mudd College and Robin Wilson, Cal Poly Pomona.

Math Department at University of Texas Arlington Receives AMS National Award

The AMS has announced that the Mathematics Department at the University of Texas at Arlington is the 2013 recipient of the AMS Award for an Exemplary Program or Achievement in a Mathematics Department. The UT Arlington department is honored for making "a concerted and highly successful effort over the last decade to build a doctoral program whose composition reflects the demographics of our increasingly diverse nation."

Phil Kutzko of the University of Iowa, who served as chair of the award selection committee, said: "The committee was very impressed with the math department at UT Arlington. Departmental faculty are truly dedicated to training a culturally and ethnically diverse group of students with the potential to thrive in our profession, and they have had great success. This commitment on the part of a significant percentage of the faculty is what sets departments

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like the one at UT Arlington apart from other departments with similar goals."

Over the past several years, the UT Arlington Mathematics Department has transformed itself by putting as its top priority the growth and development of its graduate program. That emphasis led naturally to expansion and improvement in other things the department does, such as serving undergraduate students, providing mentoring, and reaching out to community schools. To support these activities, the department took a strategic and highly successful approach to securing outside funding. Today each mathematics faculty member has opportunities to contribute in ways that suit his or her individual interests and talents. The result is a department with a positive, can-do environment where contributions to research, teaching, and service are all valued and recognized.

In 2005, the UT Arlington mathematics department had 23 PhD students, including 5 women and 1 from an underrepresented minority group. By 2010, the number of PhD students had grown to 52, the number of women to 20, and the number from underrepresented minorities to 8.

Doctorate production also climbed substantially, from 2–3 per year in the years preceding 2005, to an average of 6 per year today. Of the 26 who received doctorates between 2005 and 2010, 7 were from underrepresented minorities and 8 were women.

UT Arlington is a large state university, but the Mathematics Department has managed to create a warm, close-knit atmosphere more akin to that of a small college. Mentoring sessions help students feel welcome and supported, fostering a bond between students and faculty and ensuring that setbacks are addressed early. Interspersing faculty and graduate student offices has led many to leave their office doors open, thereby boosting informal interactions. With a large office where students can hang out and plan activities, the undergraduate student association has a real home in the department.

The department's efforts have greatly increased the attractiveness of the mathematics major: The number of majors has jumped from about 100 in 2005 to about 300 today. With good job opportunities open to math majors in the Dallas-Fort Worth area, the department hopes to continue to increase the number of majors.

Nebraska Conference for Undergraduate Women in Mathematics Honored

Women in Mathematics (NCUWM) has been chosen to receive the "Mathematics Programs that Make a Difference" award of the American Mathematical Society. NCUWM, held each year at the University of Nebraska—Lincoln, is honored for its remarkable contribution to the national effort to produce more women PhDs in the mathematical sciences. The annual award was created by the AMS Com-mittee on the Profession to recognize outstanding programs that successfully address the issue of underrepresented groups in mathematics.

Abigail Thompson of the University of California, Davis, who serves as chair of the Committee on the Profession, said, "The Nebraska Conference for Undergraduate Women in Mathematics has been making a difference since 1999. As confirmed by many enthusiastic program alumnae, this three-day conference, focused around the opportunities for and achievements of female mathematicians, has provided a life-changing experience."

Since its founding 14 years ago, the annual NCUWM has touched the lives of more than 2,600 women undergraduates, stimulating their motivation and interest in mathematical sciences research. The three-day conference boosts participants' self-confidence and sense of community through a carefully planned set of activities. Participants leave the conference energized and inspired by interactions with other undergraduates, accomplished women graduate students, and prominent women mathematicians.

The conference features plenary lectures by women mathematicians, panel discussions on issues such as choosing a PhD program and building a career, breakout sessions for smaller group interactions, and talks and poster sessions by the undergraduate students. Current mathematics graduate students—many of them past participants in NCUWM—are invited to the conference to serve as role models for the undergraduates. Careful choices are made to ensure multiple role models from outside academia, for example the National Security Agency. Informal interactions are stimulated through several social events, such as the opening banquet and Saturday pizza dinner.

Because the conference draws together women at a variety of educational and career stages, there is a good deal of "vertical integration" of mentoring. The younger

undergraduates are inspired by the older ones who give talks and present posters, who are in turn inspired by the graduate students. Students at all levels have the opportunity to observe and interact with experienced and successful women mathematicians. Seeing themselves in these mentors is enormously empowering for the students.

The growth of the conference has been tremendous. In 1999, 53 undergraduates attended, with 30 schools represented. In 2013, there were 257 undergraduates and 107 schools represented. The frequent—and glowing—reports about the NCUWM in mathematics department newsletters show that the conference has become a highly valued and much-anticipated event for departments across the nation. Registration fills up soon after opening in October each year.

The NCUWM is sponsored by the Department of Mathematics at the University of Nebraska – Lincoln. The department is a national leader in producing female PhDs in the mathematical sciences and is known for its inclusive atmosphere and nurturing approach.

International Mathematics Education for the Future Conference 2014

The 2014 International Mathematics Education for the Future conference will be held in Montenegro, September 21–26, 2014. The title/theme of the conference will be The Future of Mathematics Education in a Connected World. We now welcome proposals for papers and workshops in all areas of innovation in mathematics, science, computing and statistics education. We would especially like to help research students/lecturers by offering free double-blind peer review for formal research papers sent to us in good time by registered participants. The proceedings will be published as a DVD for each participant and will also be available on-line. In addition there is a possibility of selected papers being published as a book after the conference.

Write Alan Rogerson at alan@cdnalma.poznan.pl for further information.

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