

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.

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PRESIDENT'S REPORT

The AWM Nominating Committee has announced the slate of candidates for the December election. Details can be found on page 5 of the newsletter.

In September 2008, the German Mathematical Society (Deutsche Mathematiker Vereinigung or DMV for short) held its annual meeting in Erlangen, birthplace of Emmy Noether. Noether received her Ph.D. degree from the University of Erlangen in late 1907, and the main results of her doctoral thesis were published in 1908. In commemoration of the 100th anniversary of the publication, there was a special lecture in Noether's honor given by Professor Karin Erdmann of Oxford University. The steering committee of the DMV decided afterwards to make the lecture a regular event at its annual meetings. The DMV Noether Lecture joins AWM's Noether Lecture, given annually at the Joint Mathematics Meetings, and the Emmy Noether Lecture at the International Congress of Mathematicians in paying tribute to a woman whose life and work remain a tremendous inspiration.

This year marks the 90th anniversary of Emmy Noether's famous 1919 Habilitation. Noether first presented her Habilitation in 1915 shortly after arriving in Göttingen at the invitation of David Hilbert and Felix Klein. Emmy later remarked, "Even the local geographer attended [my Habilitation lecture] though he found it abstract. The faculty doesn't want to buy cats in a sack." The Habilitation degree would have enabled her to become a Privatdozent, then university professor, and ultimately a member of the faculty senate. But the 1908 Privatdozentenverordnung had ruled that only males were eligible for the Habilitation. Hilbert's argument that the senate was not a bathing establishment and, therefore, women should be admitted to it fell on deaf ears, and the petition for Emmy to obtain her Habilitation degree failed. For the next four years Noether continued her research and taught courses, with no pay and always under Hilbert's name, as she held no faculty position at the University of Göttingen. A typical announcement for her course read:

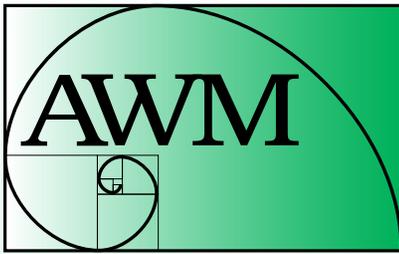
Mathematical Physics Seminar,
Theory of Invariants

Prof. D. Hilbert, with the Assistance of Fr. Dr. E. Noether
Mondays 4–6 p.m., no tuition



Georgia Benkart

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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.

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Jacqueline Dewar, Education Column
Sarah Greenwald, Media Column
Alice Silverberg, Media Column

A postwar Germany saw the relaxation of rules, and in 1919 Emmy Noether successfully obtained her Habilitation degree. Noether chose her paper “Invariante Variationsprobleme,” which had been published the year before, for her Habilitation thesis and presented it to the University of Göttingen along with twelve previously published papers and two additional manuscripts, one of which contained many significant results that influenced the development of modern abstract algebra. At the heart of “Invariante Variationsprobleme” was a theorem now called Noether’s theorem. Roughly speaking, it says that there is symmetry if and only if there is a conservation law, that is, a conserved quantity. As the 2004 book *Symmetry and the Beautiful Universe* by Nobel Laureate Leon M. Lederman and Christopher T. Hill emphasizes, this ground-breaking result brought to the forefront the fundamental role of symmetry in physics. It tied together the physical world with the mathematical world of invariant theory that Felix Klein, Emmy Noether, and others had developed over a long period of time.

Rotational symmetry, or invariance under rotations, occurs exactly when angular momentum is conserved; translational symmetry occurs when (linear) momentum is conserved. Physicists had such unwavering faith in Noether’s result that even in the face of what seemed to be a glaring anomaly, they insisted on its validity. When a neutron transforms or translates into a proton and an electron, electrical charge is conserved as the plus of the proton cancels with the minus charge of the electron. But the momentum of the neutron is not equal to that of the proton and electron, and this was cause for alarm. To get around this conundrum, and with very little hard evidence to go on, Wolfgang Pauli postulated the existence of the neutrino, a particle with no electrical charge, but with just the right momentum to balance the momentum budget. Later experiments confirmed Pauli’s faith in Noether’s theorem; the neutrino did in fact exist. Noether’s theorem has been called the cornerstone of quantum physics, and Einstein is reported to have commented, “It’s really through her that I became competent in the subject.” Physicists know Emmy Noether from Noether’s theorem; mathematicians know her from her foundational work in abstract algebra. It is truly mind-boggling to realize this is one and the same person whose work revolutionized both disciplines.

Frustrated by the lack of women speakers at conferences, in 1980 AWM instituted the AWM Noether Lecture, a plenary expository talk given at the Joint Mathematics Meetings every January. Now in its 30th year and still going strong, the Noether Lecture Series honors women who have made fundamental and sustained contributions to the mathematical sciences in the spirit of Emmy Noether. The 2010 AWM Noether Lecturer will be Professor Carolyn Gordon of Dartmouth College. Gordon is recognized worldwide for her deep insights and substantial contributions to spectral geometry, the study of how the geometry of an object is related to its natural frequencies. Gordon’s reputation for exposition stems from her well-known articles addressing Mark Kac’s 1966 question, “Can you hear the shape of a drum?” These papers discuss what information can be inferred about the shape of a drumhead from the sound it makes. President of AWM from 2003 to 2005, Carolyn has also found time to serve on a gazillion AWM committees.

The AWM-MAA Etta Z. Falconer Lecturer at MathFest 2009 will be Professor Katherine (Kate) Okikiolu of the University of California San Diego, a world-renowned mathematical analyst who, like Carolyn Gordon, has made ground-breaking contributions to spectral geometry. In 1997, Okikiolu became the first

African-American to be awarded a Sloan Research Fellowship in mathematics, and that same year she also won a prestigious Presidential Early Career Award for Scientists and Engineers. Okikiolu comes from a mathematical family; her father is a prominent Nigerian mathematician and inventor, and her mother is a high school mathematics teacher. In 1996, Okikiolu gave a plenary talk at the 25th anniversary celebration for AWM. She serves as the faculty advisor to the San Diego Student Chapter of AWM. Kate Okikiolu is one of 18 mathematicians featured in *The Math Life*, a documentary by Wendy Conquest, Bob Drake, and Dan Rockmore funded by the National Science Foundation with additional support from Dartmouth College. This 2002 film highlights the human dimension of mathematics through interviews with leading mathematicians.

The National Academy of Sciences recently announced the election of eight new members in the mathematical sciences, and among them is Professor Sun-Yung Alice Chang of Princeton University, who is recognized for her distinguished and continuing contributions in original research on partial differential equations and applications to differential geometry. Her long list of awards includes Sloan and Guggenheim Fellowships, the AMS Ruth Lyttle Satter Prize, and being chosen as a plenary speaker at the 2002 International Congress of Mathematicians. Chang was thesis co-advisor (the other being John Garrett) of Falconer Prize winner Kate Okikiolu. Joining Chang in the honors department are Maria Klawe, President of Harvey Mudd College, and Ruth Williams, Professor of Mathematics at the University of California San Diego, who were recently elected to the American Academy of Arts and Sciences. Williams has made fundamental and important contributions to probability theory, stochastic processes, and applications to communications and stochastic networks in traffic control. Klawe is an influential educational leader known for her distinguished research in computer science and her often-cited work on algorithms for solving geometric optimization problems and on the effects of gender on electronic game-playing. Prior to becoming the first woman president of Harvey Mudd College, Klawe was Dean of Princeton's School of Engineering and Applied Sciences. She has been active in many organizations promoting women in science and technology and is currently chair of the board of the Anita Borg Institute for Women and Technology.

AWM salutes all these prize winners for their many remarkable achievements.

In *The Math Life*, Dartmouth's Dorothy Wallace (the 2000 New Hampshire Professor of the Year) recalls that as a schoolchild, she was labeled as "slow" because of her lack of facility with fractions. One of the film's creators Dan Rockmore commented in a 2003 interview in *Connect Magazine*:

The road to a career in math can be, and often is, a meandering one. Along the way we discuss some of the things that attract people to mathematics. As Wallace's story shows, mathematics is done by all kinds of people with all sorts of different skills and aptitudes—not just the quiet kid in the back who got all the multiplication problems right. Those with a talent for picturing things find their way to subjects like geometry and topology. A love of numbers leads others to become number theorists. A fascination with randomness is the first step on a road to probability and statistics. A desire to understand the workings of the world can be the hook to becoming an applied mathematician.

Indeed, Wallace's story is but one of several cautionary tales for educators embedded in *The Math Life*. Cornell's Steven Strogatz recalls almost "being derailed" by a classroom experience. Microsoft's Michael Freedman (winner of the Fields Medal, mathematics Nobel Prize equivalent) reminds us that an aptitude for

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Student, unemployed, developing nations: \$20

Friend: \$1000 **Benefactor:** \$2500

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See the AWM website for details.

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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 \$110 for a basic four-line ad. Additional lines are \$13 each. See the AWM website for *Newsletter* display ad rates.

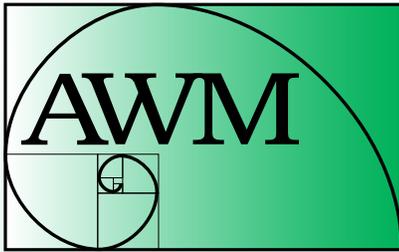
Newsletter Deadlines

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.

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Send all **Newsletter** material **except ads and book review material** to Anne Leggett, e-mail: leggett@member.ams.org; phone: 773-508-3554; fax: 773-508-2123. Send all **book review** material to Marge Bayer, e-mail: bayer@math.ku.edu; fax: 785-864-5255. Send all **media column** material to Sarah Greenwald, e-mail: greenwaldsj@appstate.edu; and Alice Silverberg, e-mail asilverb@math.uci.edu. Send everything else, **including ads and address changes**, to AWM, fax: 703-359-7562; e-mail awm@awm-math.org. Visit www.awm-math.org for snail mail addresses.



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Online Ads Info

Classified and job link ads may be placed at the AWM website.

Website

<http://www.awm-math.org>

AWM DEADLINES

Sonia Kovalevsky High School
Mathematics Days: August 4, 2009

AWM Workshop at JMM: August 15, 2009

NSF-AWM Travel Grants: October 1, 2009
and February 1, 2010

Alice T. Schafer Prize: October 1, 2009

AWM Noether Lecturer: October 15, 2009

AWM-SIAM Sonia Kovalevsky
Lecture: November 1, 2009

Ruth I. Michler Memorial Prize:
November 1, 2009

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PRESIDENT'S REPORT *continued from page 3*

mathematics is reflected less in “getting A’s on all the tests,” than in having a “quirky” mind, able to produce a different reason to explain why something is true. Many of the mathematicians we interviewed told horror stories of being browbeaten for not getting the right answer in the “right” way.

When teaching, we need to be continually vigilant against shoehorning students’ intellect into a one-size-fits-all template as well as being continually supportive of creative and nonstandard problem-solving techniques. It is important, especially in the early years, to remember that different children do have different ways of learning. There are a variety of ways in which one can acquire the basic understandings and skills necessary to solve, and enjoy solving, mathematics. Many an educator has told me that in spite of most people’s recollection of that last “killer” math course that caused them to abandon ship, the early mathematical experiences are by and large enjoyable and intoxicating. Children relish the chance to think about a problem on their own as well as the right/wrong nature of their answer.

Offering an enjoyable mathematics experience, the University of California Los Angeles welcomed more than 270 middle and high school students from 15 Los Angeles–area schools to its Julia Robinson Mathematics Festival this past April. Students investigated areas of mathematics not ordinarily encountered in the classroom, and not the garden-variety multiplication problems either, by challenging their skills at hands-on activities involving problems, games, and puzzles. They were treated to a talk by UCLA mathematician and Disney consultant Joseph Teran, who explained the role of mathematics in creating visual effects for movies, video games, and other media. The festival, founded in 2007, is named for Julia Hall Bowman Robinson (1919–1985), the first woman mathematician elected to the National Academy of Sciences and first woman president of the American Mathematical Society, who is well known for her work on Hilbert’s Tenth Problem. [See the Media Column in this issue for a review of a film about this work.]

The American Mathematical Society’s Committee on the Profession has announced the designation of two *Mathematics Programs that Make a Difference* for 2009, the Department of Statistics at North Carolina State University and the Department of Mathematics at the University of Mississippi. “These two departments have outstanding records in recruiting members of underrepresented groups and mentoring them to successfully complete their graduate degrees,” said Professor Alejandro Adem of the University of British Columbia, chair of the selection committee for the award. Both of the honored departments have made diversity of students and faculty a top priority. That the University of Mississippi, known for the struggle surrounding its integration in 1962, has become a national leader in nurturing and mentoring African-Americans in doctoral study gives special meaning to this award.

Georgia Benkart

Georgia Benkart
Madison, WI
May 21, 2009

LETTER TO THE EDITOR

I am writing in response to an item in the most recent (May–June) edition of the newsletter. On page 21, a column called “Recent Books” briefly recommends several books, one of which is a biography of Emmy Noether, and two of which deal with the struggle of career vs. family for women in academics. These three books all seem like appropriate recommendations to your audience of women in mathematics. The first two books in this list, however, are insulting. Why exactly are *Crocheting Adventures with Hyperbolic Planes* and *Making Mathematics with Needlework* appropriate books for your readership? The only reason I can come up with is that crocheting and needlework are considered “female” domestic activities. Come on, AWM! I thought this organization was trying to break down gender barriers, not reinforce them! Next time don't bother with the knitting (or baking, or vacuuming), no matter how cutely math-related it might seem.

Lily Silverstein
University of Massachusetts- Boston
lilysilverstein@gmail.com

Ed. reply: Obviously our intent was not to reinforce gender barriers. One of the books was edited by AWM members, who it appears wish to show that needlework is not (or need not be) just “women's work.” Both books continue in the spirit of several earlier works that show that “female domestic activities” can be highly mathematical in nature (for example, earlier authors have investigated patterns in basket weaving, quilt making, and potting).

Bill Thurston wrote in the foreword to *Crocheting Adventures*:

These models have a fascination far beyond their visual appearance. As illustrated in the book, there is actually negative curvature and hyperbolic geometry all around us, but people generally see it without seeing it. You will develop an entirely new understanding by actually following the simple instructions and crocheting! The models are deceptively interesting. Perhaps you will come up with your own variations and ideas. In any case, I hope this book gives you pause for thought and changes your way of thinking about mathematics.

Making Mathematics with Needlework has received wonderful reviews; see <http://www.akpeters.com/product.asp?ProdCode=3318>.

Although we disagree with you in this instance, we certainly appreciate your concerns!

Sloan Fellowships

The Alfred P. Sloan Foundation is pleased to invite nominations for the 2009 Sloan Research Fellowships. The deadline for receipt of nominations is **September 15, 2009**. Candidates must be members of the regular faculty of a college or university in the United States or Canada and be nominated by a senior scientist. For further information, visit www.sloan.org/fellowships.

AWM Slate Announced!

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

President-Elect:

Jill Pipher (Brown University)

Clerk:

Rebecca Segal (Virginia Commonwealth University)

Members-at-Large (four to be elected):

Karen Brucks (University of Wisconsin Milwaukee)

Kari Hag (Norwegian University of Science and Technology, NTNU Trondheim)

Cymra Haskell (University of Southern California)

Trachette Jackson (University of Michigan)

Chawne Kimber (Lafayette College)

Irina Mitrea (University of Virginia)

Ami Radunskaya (Pomona College)

Marie Vitulli (University of Oregon)

Nominations by petition signed by 15 members are due to AWM president Georgia Benkart (benkart@math.wisc.edu) by September 1, 2009.

Thanks to the Nominating Committee (Barbara Keyfitz, chair, Lily Khadjavi, Marianne Kortén, Tong Li, Susan Montgomery, Jennifer Ryan, and Karen Saxe) for their efforts in producing this fine slate of candidates.

AWM Essay Contest

Congratulations to all the winners of the 2009 AWM Essay Contest: Biographies of Contemporary Women in Mathematics! And big thanks to an anonymous donor for sponsoring the contest this year and to Victoria Howle, Texas Tech, who organized it. The contest is intended to increase awareness of women's ongoing contributions to the mathematical sciences by inviting students from sixth-graders through college seniors to write biographies of contemporary women mathematicians and statisticians in academic, industrial, and government careers.

The Grand Prize was awarded to **Wai-Ting Lam**, St. Francis College, Brooklyn, NY for "The Charm of Topology: Dr. Joan Birman: Mathematics Is Very Beautiful!" Lam also

won First Place at the Undergraduate Level. Other winners were: First Place, High School, **Christina Bax**, National Cathedral School, Bethesda, MD, for "Dr. Mahlet Tadesse: A Mathematician's Quest from Ethiopia to the United States"; Honorable Mention, High School, **Lena Sizikova**, Mission San Jose High School, for "Music + Math = Linda Kadis" and **Carmen Ng**, Monte Vista High School, Danville, CA for "Dr. Laura Gunn: Family Misfit"; Winner, Middle School, **Angela Pham**, Francis of Assisi School, North Tustin, CA for "Maria Droujkova: Beautiful Math is All about the People"; and Honorable Mention, Middle School, **Nur Kose**, Kose Homeschooling, New Castle, DE for "Falls in Love with Math and Science: Biography of Dr. Shaheen Rab."

The grand prize essay appears below. To see all the prize-winning essays, visit <http://www.awm-math.org/biographies/contest/2009.html>.

The Charm of Topology: Dr. Joan Birman: Mathematics Is Very Beautiful!

Wai-Ting Lam

The American mathematician Dr. Joan Birman was born in 1927. She is a leading expert in topology and among today's foremost experts in braid and knot theory. Her book *Braids, Links, and Mapping Class Groups* was for many years the standard monograph for beginning researchers in the subject. As a testament to her contributions to her field, she has received numerous awards and much recognition for her work. Birman is currently a Research Professor Emerita at Barnard College, Columbia University, where she has been a professor since 1973. Birman is a member of the European Academy of Sciences. She was a co-founder of the non-profit publishing house Mathematical Sciences Publishing, which publishes a number of mathematical journals. She has been actively involved in human rights issues and is a member of the New York Academy of Sciences Human Rights of Scientists Committee.

Birman's father emigrated from Russia, and her mother was a native New Yorker. Birman started liking mathematics as early as elementary school. Both of her parents encouraged their four daughters to acquire an education, and all four completed college. Joan and her sister Helen were math majors, Ruth was a physics major (who later switched her interests to plant physiology) and Ada became a kindergarten teacher.

After earning the B.A. degree from Barnard in 1948, Birman was hired by a firm that manufactured microwave frequency meters and needed help in solving a mathematics problem they had encountered. That was the start of a fifteen-year detour away from academia. During that time she became aware of the needs of engineers and learned that the more mathematics you knew, the better equipped you were to tackle the varied mix of industry-related math problems that arose. However, as her home responsibilities increased (she had 3 children), even part-time work became difficult. It seemed natural to use whatever time she could spare to learn more math. With the support and encouragement of her husband, Professor of Physics Joseph Birman, she started graduate studies, part-time, in mathematics. Her first course (Linear Algebra) began in January 1961, when her youngest child was 3 weeks old. She went to New York University, where her husband was a faculty member (so that her tuition was free). There were some, but not many, women students. The faculty and staff in the department were very helpful, giving her a fellowship and giving her limited TA responsibilities.

After passing the basic qualifying exams, Birman had to take a series of more specialized exams for admission to research. She passed those exams too and began to look around for an advisor. Professor Wilhelm Magnus knew her and was particularly encouraging. He had noticed that

Birman loved topology, but he was an algebraist, so he met her halfway and gave her a paper to read by Fadell and Neuwirth about mapping class groups of surfaces, including braid groups. It was a terrific topic.

Geometric braids can be organized into groups. The group operation is defined by composing the first braid with a second braid on the same number of strands. But in the Fadell-Neuwirth paper, braid groups were given a different mathematical interpretation, as the fundamental group of certain configuration spaces. It took Birman a very long time to understand the definition. Finally, she was happy and satisfied because she understood it, and Magnus became her mentor.

At that time, Magnus had worked on the mapping class group of a twice punctured torus, and he suggested that perhaps his work could be generalized, through the work of Fadell and Neuwirth. Her thesis was about the mapping class group of a surface of any genus with any number of punctures. She proved that there is a homomorphism (the “point-filling homomorphism”) from the mapping class group of a punctured surface to that of a closed surface, induced by filling in the punctures. She worked out the exact sequence that identified the kernel of the homomorphism, which was closely related to braids. What is now known as the “point-pushing homeomorphism” and the “Birman exact sequence” had their origins in that work. She didn’t know a presentation for the image of the point-filling homomorphism, the mapping class group of a closed surface, and understood that it was an important open problem.

After being granted her Ph.D., she got a job at Stevens Institute of Technology. Her first year there, she began joint work with Hugh M. Hilden. That work proved to be very rewarding to Birman. For the entire year, she and Hilden talked about the image of the point-filling homomorphism, and together, they finally solved the problem for the special case of genus two. At that point, she was thoroughly involved in mathematics. Two years later, she was invited to give a lecture at Princeton on the work that she and Hilden had done together. Her lectures became the content of her book on braids, links, and mapping class groups.

Around this time, there was a very different paper, by Garside, also about braids, that greatly interested her. She knew that there was a major open problem of classifying knots via braids. When she saw that Garside had solved the conjugacy problem in the braid group, she thought his work might classify knots. She couldn’t have been more mistaken, but the problem grabbed her interest. She began working on Garside’s algorithm too. It led her to

questions in what is now known as complexity theory.

Birman has been influential in theoretical mathematics and has contributed to fundamental developments in topology. Her work has focused on low-dimensional topology: braids, knots, surface mappings, and 3-dimensional manifolds. Mathematical knots are defined as embeddings of a circle in 3-dimension Euclidean space. The concept of a knot has also been extended to higher dimensions. Knot invariants have had a lot of applications to the work of molecular biologists who have been studying the knotted shapes of DNA. One of the problems that she is working on now concerns “Lorenz knots,” which are based on systems of non-linear differential equations. The equations can only be integrated numerically, so her research makes heavy use of computers.

“Mathematics is very beautiful! There is something very lasting about it,” says Birman. These words hold a truth that is difficult to ignore for those who do not shy away from the truth. Mathematics is a beautiful universal language that enables those who practice it and delve into its depths to experience both beauty and immutable truth. The love of mathematics is at best difficult for a woman who wishes to “have it all,” and yet even with her familial obligations, Birman managed to do what she loved. It was really not easy for her to return to school and get back to her field while raising a family. However, she did so and became a pioneer for women and for mathematicians as a whole. She showed her dedication to mathematics, and she is absolutely a great role model for aspiring young women mathematicians!

Resources:

Personal interview

<http://www.ams.org/notices>

<http://knotplot.com/>

<http://www.inst.bnl.gov/>

<http://www.knot-theory.com/>

About the student: My name is Wai-Ting Lam, and I am from Hong Kong. I am currently a senior student at St. Francis College. In 2008, I made a research presentation at the Spuyten Duyvil Undergraduate Mathematics Conference and a poster presentation for the New York Women in Mathematics Graduate Conference. I did my research on the application of linear algebra to Fibonacci numbers and the application of topology in defining relationships of the areas of different knots. Being given the opportunity to explore mathematics ensured my interest in mathematics, and I am planning to pursue a graduate degree in mathematics.

Kate Okikiolu Named 2009 Falconer Lecturer

The Association for Women in Mathematics and the Mathematical Association of America are pleased to announce that Kate Okikiolu will deliver the Falconer Lecture at MathFest 2009. Okikiolu, a professor of mathematics at the University of California, San Diego, was selected for this honor because of her contributions to mathematics and mathematics education.

Okikiolu earned her B.A. in mathematics from Cambridge University before coming to the U.S. in 1987 to attend graduate school in mathematics at the University of California, Los Angeles. There, she worked with two mentors, Sun-Yung (Alice) Chang and John Garnett, and was able to solve a problem concerning asymptotics of determinants of Toeplitz operators on the sphere and a conjecture of Peter Jones, characterizing subsets of rectifiable curves in Euclidean n -space. She earned her Ph.D. at UCLA in 1991.

In 1991, Kate went to Princeton University, where she was an instructor and then assistant professor until 1995. From 1995 through 1997 she was a visiting assistant professor at MIT as an NSF postdoc. Since 1997, she has been on the faculty in the Mathematics Department of the University of California, San Diego, rising to the rank of professor in 2004. In 1996, Okikiolu delivered the 25th Anniversary Lecture at the celebratory AWM luncheon. In 2002, she gave the NAM Claytor-Woodard Lecture at the Joint Mathematics Meetings. In June 1997, Kate Okikiolu was the first African-American mathematician to win a Sloan Research Fellowship, a prestigious award for young mathematics researchers in the United States.

Okikiolu is a mathematical analyst, and most of her research is in the area of spectral geometry. In the last eight years, she has worked mostly on the spectral

zeta function, which is an infinite sum of powers of the eigenvalues. In particular, she has worked on the zeta-regularized determinant, which is used in topology, quantum field theory, and string theory.

Recently, she has been very interested in the sum of squares of the wavelength of a surface, which is related to all kinds of different things including vortex theory.

Her lecture topic will be “The Sum of Squares of Wavelengths of a Closed Surface.”

Okikiolu comes from a mathematical family; her father is a mathematician and inventor and her mother is a high school mathematics teacher. She is married to mathematician Hans Lindblad. For her work aiding inner-city children, Okikiolu plans to make a series of videos depicting model teaching lessons that emphasize real-world perspectives.

MathFest 2009 will be held August 6–8 in Portland, OR. The lecture honors Etta Z. Falconer (1933–2002), whose 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. The Falconer Lecturer is chosen on the basis of distinguished contributions to the mathematical sciences or mathematics education. Recent Falconer lecturers include Bozenna Pasik-Duncan, Fern Hunt, Trachette Jackson, Katherine St. John, and Rebecca Goldin.



Kate Okikiolu

Workshop Mentors Needed

Are you looking for an opportunity to be more active in AWM? Have you considered being a mentor at one of our workshops? We're looking for volunteers to serve as mentors at the January AWM workshop, to be held January 2010 in conjunction with the annual Joint Mathematics Meetings in San Francisco. Being a mentor for a graduate student or recent Ph.D. is incredibly rewarding. If you'd like to help, contact our Executive Director, Maeve McCarthy at mimccarthy@awm-math.org.

Nagurney Speaks at World Science Festival

University of Massachusetts, Amherst, May 2009

Professor Anna Nagurney, the John F. Smith Memorial Professor of Operations Management and Director of the Virtual Center for Supernetworks at the Isenberg School of Management at the University of Massachusetts Amherst, spoke at the World Science Festival held in New York City June 10–14, 2009. Nagurney joined Princeton biology professor Iain Couzin and architect and Columbia professor Mitchell Joachim in a session “!@#\$\$% Traffic From Insects to Interstates” at NYU’s Kimmel Center on Friday, June 12, 2009. The speakers addressed the question, “Can marching ants, schooling fish, and herding wildebeests teach us something about the morning commute? In a unique melding of mathematics, physics, and behavioral science, this program examines the creative and sometimes counter-intuitive solutions to one of the modern world’s most annoying problems.”

The World Science Festival was founded by Columbia professor Brian Greene and four-time National News Emmy award-winner Tracy Day. Its mission is to cultivate and sustain a general public informed by the content of science, inspired by its wonder, convinced of its value, and prepared to engage with its implications for the future. The World Science Festival, an unprecedented annual tribute to imagination, ingenuity and inventiveness, takes science out of the laboratory and into the streets, theaters, museums, and public halls of New York City, making the esoteric understandable and the familiar fascinating. The Board of Directors of the Festival include Alan Alda, Lee Bollinger, Judith Cox, Tracy Day, Brian Greene, and John Sexton.

The festival began with the June 10th Opening Night Celebration at Lincoln Center’s Alice Tully Hall honoring Explorer, Poet and Champion of the Natural World, Edward O. Wilson, on his 80th birthday. The celebration featured Harrison Ford, Glenn Close, Alan Alda, Marin Alsop, Joshua Bell, Danny Burstein, Anna Deavere Smith, James Naughton, National Dance Institute, and the Inspirational Voices of the Abyssinian Baptist Church.

On June 11–13 over 30 sessions took place at various Manhattan venues including NYU, the New School, CUNY, the Rubin Museum of Art, Hayden Planetarium, the New York Historical Society, the Museum of Arts and

Design, the 92nd Street Y, the Players Club, and the Baruch Performing Arts Center. The festival concluded with the World Science Festival Youth and Family Street Fair on Sunday, June 14, 2009 at Washington Square Park. The extravaganza featured a non-stop program of interactive exhibits, experiments, games, and shows designed to entertain and inspire.

Nagurney has been on the University of Massachusetts faculty for over two decades. She is the author of nine books and over 200 publications and presentations. Her latest book, *Fragile Networks: Identifying Vulnerabilities and Uncertainties in an Uncertain World*, published by Wiley, became available during the Festival. She has received numerous international, national, and university honors including Sweden’s Kempe Prize, two Fulbright Awards, the INFORMS Award for the Advancement of Women in Operations Research/Management Sciences, the University of Massachusetts Award for Outstanding Accomplishments in Research and Creative Activity, and the University of Massachusetts Faculty Fellowship. She is a Fellow of the Regional Science Association International. She received her A.B., Sc.B., Sc.M., and Ph.D. degrees from Brown University.

MEDIA COLUMN

Media Column Editors: Sarah Greenwald, Appalachia State University, greenwaldsj@appstate.edu and Alice Silverberg, University of California, Irvine, asilverb@math.uci.edu

Julia Robinson and Hilbert’s Tenth Problem, DVD, produced and directed by George Paul Csicsery, narrated by Danica McKellar, ZALA Films, www.zalafilms.com, ISBN: 978-097245885-6

Reviewer: Judith Roitman, Department of Mathematics, University of Kansas

First there’s a shot of a young girl arranging small rocks in the desert. Then Constance Reid, the eminent biographer of eminent mathematicians, and the slightly older sister of Julia Robinson, appears. She looks and sounds so much like Julia that it’s a shock. She speaks, as many people in the movie do, of the great pleasure that mathematics can bring to its practitioners. This will be one of the themes.

The structure of the movie is to go back and forth between discussions of the mathematics of Hilbert’s tenth problem (H10 in the movie and in this review), and the life

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of Julia Robinson. The talking heads, besides Constance, are (in order of their first appearance): Lenore Blum, Anna Salamon (the 1998 Julia Robinson mathematics prize winner from San Diego High School, who has a great quote: “When the math fights back, that’s when it’s beautiful”), Steve Givant (one of Tarski’s last thesis students), Dana Scott, Bjorn Poonen, Hilary Putnam, Solomon Fefferman, Anita Fefferman, Martin Davis, Yuri Matijasevich (who completed the solution of H10), Kirsten Eisentrager (Bjorn Poonen’s student), Alexandra Shlapentokh, and Jan Denef. More people are thanked in the credits.

We are all prepared for adult life by our childhoods, but Julia Robinson’s childhood and adolescence seems particularly well designed to have created a woman with the kind of integrity, intellectual passion, and single-mindedness that the adult Julia needed in order to do what she did. Mary Ellen Rudin, another member of this

generation, called it the housewives’ generation, because so many of the few women who received wide recognition for their research spent most of their careers as spouses to mathematicians, without themselves having a steady job. You had to have tremendous confidence to thrive at the institutional margins. On the other hand, if you could do this, you were released from the heavy teaching loads that many women endured (because the expectation was that only men did research) which prevented them from doing research, thus completing a circular argument. Julia herself appreciated the freedom she had to focus on mathematics and other interests, especially politics, beginning with the campaign of her husband’s cousin, Adlai Stevenson.

Julia’s early life had an element of freedom and wildness that contemporary middle-class American children cannot imagine. When she was two, her mother died, and she and Constance were sent to the Arizona desert to live with their grandmother.

A few years later her father remarried, and their new

NSF-AWM Travel Grants for Women

The NSF-AWM Travel Grants program has two objectives: to enable women researchers in the mathematical sciences to attend research conferences in their fields and to foster interaction between mathematicians and mathematics education researchers. Enabling women mathematicians to attend conferences in their fields provides them with valuable opportunities to advance their research and their visibility in the research community.

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.

Travel Grants. Two types of grants are available. 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. The Mathematics Education Research Travel Grants provide full or partial support for travel and subsistence for mathematicians attending a math education research conference or math education researchers attending a math conference. In either case, a maximum of \$1500 for domestic travel and of \$2000 for foreign travel will be applied. For foreign travel, US air carriers must be used (exceptions only per federal grants regulations; prior AWM approval required).

Eligibility. 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 experience) and with a work address in the USA (or home address, in the case of unemployed applicants). Anyone who has been awarded an AWM-NSF travel grant in the past two years is ineligible. Anyone receiving more than \$2000 yearly in external governmental funding for travel is ineligible. Partial travel support from the applicant’s institution or from a non-governmental agency does not, however, make the applicant ineligible.

Applications. All applications must be submitted online via the web-based system which is available through a hotlink at <http://www.awm-math.org/travelgrants.html>. The application requirements and a complete step-by-step process are available at the online site. If you have not already done so, you must first create a user account—this will be the first screen when you access the site. During the application process you will be asked to attach one .pdf file that includes your proposal, CV and current and pending funding information, as applicable. If you have a speaker confirmation letter or e-mail notification, scan the document as an electronic file and attach it as a .pdf. In addition, please complete the application pre-survey administered by an independent evaluator. You may contact Jennifer Lewis at 703-934-0163, ext. 213 for guidance. There are three award periods per year. The next two deadlines for receipt of applications are **October 1, 2009** and **February 1, 2010**.

CALL FOR NOMINATIONS

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 October 1, 2009. 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 San Francisco, CA, January 2010.

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 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 given by members of student chapters, recommendation letters from professors, colleagues, etc.) should be enclosed with the nomination. Send *five* complete copies of nominations for this award to: The Alice T. Schafer Award Selection Committee, Association for Women in Mathematics, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030. Nominations must be received by **October 1, 2009**. If you have questions, phone 703-934-0163, e-mail awm@awm-math.org, or visit www.awm-math.org. Nominations via e-mail or fax will not be accepted.

mother reunited the family and moved them to Point Loma, California, the southwestern tip of San Diego, at the time an empty place (Constance's description) in which the girls could and did wander off at will, along the beach and oceanfront. It sounds—and probably was—idyllic, until Julia came down with scarlet fever, which was followed by rheumatic fever, which was followed by a long bout of chorea (involuntary movements of the muscle, a not uncommon side effect of rheumatic fever) which was treated by a year of bed rest. She was left with serious heart disease which was not successfully treated until much later in her life. Despite this she enjoyed a kind of recreational physicality: horseback riding with her only friend, Virginia Bell, and target shooting with her father.

The years of illness took a social toll. When she tried going back to school she was two years older than her classmates, and her parents—you get the sense that her second mother, an elementary teacher, was both practical and loving—pulled her out and found her a tutor. Julia caught up quickly and joined her age-mates in junior high—it was elementary algebra in ninth grade that solidified her interest in mathematics. But she had no friends until Virginia Bell invited her to the cafeteria table where Virginia ate with her friends—junior high/middle school has not changed in the intensity of its social hierarchies. But Julia seems to have been miraculously unscarred by the experience of being semi-ostracized.

At San Diego High school she was the only girl who took math classes past geometry; she went to San Diego

State College, rooming with Constance, and in her second year their father killed himself over financial losses. Their mother must have been a remarkable woman—supporting the family (there was a third, younger, sister) and sending Julia on to UC Berkeley to finish her undergraduate education.

In her first semester she took number theory from a young professor, Raphael Robinson. They went for long walks. They talked mathematics. They fell in love. They married. There was a miscarriage and Julia, who had wanted children, learned that her heart disease made pregnancy too dangerous; she and Raphael remained childless.

But, as he reminded her, there was always mathematics. And she blossomed. She became Tarski's Ph.D. student. Being female, she was not allowed in the faculty dining room, but Raphael reported to her what Tarski told him. Her thesis was a surprising result—that the first order theory of the rationals was undecidable. Because of nepotism rules she couldn't teach at Berkeley.¹ Raphael had a sabbatical at UCLA and she wanted to teach there, but Tarski overruled her, and he arranged for her to work for a year at the Rand Corporation. Tarski's instinct was a

¹ Lenore Blum has questioned this rationale in her review of the book *Julia: A Life in Mathematics* by Constance Reid. The review appeared in *The American Mathematical Monthly*, Vol. 105, No. 10, pp. 964-972 (December 1998). Blum's review also contains an extensive discussion of the mathematics.

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good one: in that year she solved a major problem in game theory. Her work is still cited as a major contribution. She soon fell in love with H10, and it dominated her life. Occasionally she taught a class or two when some male faculty member was unavailable, but basically she worked from the sidelines: her desk was often in her husband's office. It was only after H10 was finally solved, and she was elected to the National Academy of Sciences, that Berkeley put her on the faculty with a full professorship. I had the good fortune to take mathematical logic from Julia Robinson in 1969–1970, when H10 was solved; I remember her announcing the fact of its solution to the class, and the great happiness with which she made the announcement.

Honors flowed, including election as the first woman president of the American Mathematical Society and a MacArthur Fellowship. A few years later, she died of leukemia at the age of 65. The final photo of her in the movie was taken just a couple of weeks before she died. She is luminous.

But her work remained outside the mainstream of the dominant group in logic at Berkeley, almost as if she were not present in the department. It was a lost opportunity—not to Julia, who was fulfilled in her work, but to the department. And hardly anyone noticed.²

² For more on this, see Lenore Blum's review cited above.

While most of this review is taken up with Julia's personal life, most of the movie is taken up with mathematics, especially her work on H10: Is there an algorithm to determine whether a Diophantine equation with integer coefficients in any number of variables has a rational solution? The names associated with H10's eventual solution are Martin Davis, Yuri Matijasevich, Hilary Putnam, and Julia Robinson. Julia's contribution was two-fold: she realized that H10 would be solved negatively if you could find what she called a Diophantine equation of exponential growth (deceptively familiar in terminology, this is a technical notion, and is now called a Julia Robinson predicate); and she provided one other key piece, a hypothesis (known as JR) using a notion known as synchronization: what is being synchronized is the periodicity of two related sequences. Essentially, Yuri Matijasevich was able to combine JR with a theorem in number theory that had only been published in Russian to find a Diophantine relation of exponential growth. H10 was solved.

The movie focuses on the basics (e.g., what is a Diophantine equation?) carefully, and touches naturally on the technicalities, largely with reminiscences of those who were part of it (Martin Davis, Yuri Matijasevich, and Hilary Putnam), those who were watching (nearly everyone else in the movie over the age of 60), and younger people currently working in the field of mathematics that the negative solution of H10 created. The mathematics appears in short bursts, cycling back with the same point being made by several people, an elegant

CALL FOR NOMINATIONS

The 2011 Noether Lecture

AWM established the Emmy Noether Lectures to honor women who have made fundamental and sustained contributions to the mathematical sciences. 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, Olga 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 and Fan Chung Graham.

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. *Five* copies of nominations should be sent by **October 15, 2009** to: The Noether Lecture Committee, Association for Women in Mathematics, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030. If you have questions, phone 703-934-0163 or e-mail awm@math.umd.edu. Nominations via e-mail or fax will not be accepted.

solution to the problem of how to communicate mathematics to the general public. In this way unfamiliar things begin to seem familiar, and the viewer gets a sense of how mathematics fits together and builds on itself. Even better, the viewer has a sense of how mathematicians work—both the communal and passionate nature of how research mathematics is done are apparent. Even when, as with both Julia and Yuri, key work was done in personal isolation, it is not isolation from the rest of the field. In this movie, no one person is standing on the shoulders of giants. Instead, the giants are mutually supporting each

other in some fantastic array reminiscent of the early pre-sexual days of Cirque du Soleil.

Since I knew Julia, I am a biased reviewer. So I asked my husband—not a mathematician, and who never knew her—to watch the movie and tell me if he liked it and if the mathematics made sense to him. He did, and it did. In fact, the word he used was “semi-fascinating.” Which gives me confidence in unequivocally recommending *Julia Robinson and Hilvert’s 10th problem* not only to mathematicians but to math clubs, student AWM groups, and public outreach anywhere.

NiMBioS Teacher Collaboration Program

The National Institute for Mathematical and Biological Synthesis (NiMBioS) has an objective to provide educational opportunities at the interface of mathematics and biology and to diversify participation in collaborations across these disciplines to enhance the diversity of future researchers. The Teacher Collaboration Program hosted by NiMBioS is intended to provide links between teachers, scientists, and educators with interest in mathematical biology. Math or biology/science teachers interested in making connections between the fields are encouraged to participate. We invite individuals to join the collaboration program, and we will match participants from different communities in a bi-directional partnership to enhance the cross-disciplinary approach to mathematics and biology.

Please visit http://nimbios.org/education/teacher_collaboration to read more about the program. You may also e-mail Suzanne Lenhart at lenhart@math.utk.edu for further information.

Women in Financial Mathematics

Betty Anne Case, Florida State University

That there are widely different percentages of women by mathematical areas is well known;¹ the organizers (E. Bayraktar, T. Leung, B. Rudloff) of the AMS Special Session on Financial Mathematics at the Joint Mathematics Meetings 2009, noting the significant scarcity of women in their area, incorporated a gender-related panel discussion. Birgit Rudloff (ORFE—Operations Research and Financial Engineering, Princeton University) organized and moderated this discussion and framed questions examining opportunities and lives of women in the area. Because of their underrepresentation, the need to facilitate networking is heightened for women who are practitioners in industry and academia. Students in

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Women in Mathematics panel, 2009 JMM (l-r): Xin Guo (UC Berkeley), Aytac Ilhan (Goldman Sachs, London), Birgit Rudloff (Princeton), Thaleia Zariphopoulou (UT Austin), Bettye Anne Case (Florida State University)

¹ Polly Phipps, James W. Maxwell, and Colleen Rose, “2008 Annual Survey of the Mathematical Sciences,” *Notices of the AMS* 56:2, 2009, First Report, 257–267.

the pipeline and faculty who teach and mentor them were included. The organizer and panelists appreciate the support through the NSF RTG grant in Stochastic Analysis & Applications to ORFE, Princeton.

The panelists. Four women joined Rudloff for the discussion. Xin Guo (Industrial Engineering and Operations Research, Berkeley), like Rudloff, is on an engineering school faculty. Thaleia Zariphopoulou, an established authority in the field, is Past President of the Bachelier Finance Society; she is a professor of mathematics at the University of Texas, Austin, where she has built a strong faculty group in the area. Rudloff, Guo and Zariphopoulou, now advisors to Ph.D. students in different types of departments, each have deep roots traced in mathematical genealogy. Aytac Ilhan (she shares near mathematical ancestors with Guo), however, chose to work in industry (Goldman Sachs, London; Ph.D. from ORFE, Princeton) after exploring and receiving academic offers. Bettye Anne Case has written about gender issues in mathematics,² and worked through AWM;

² Bettye Anne Case and Anne M. Leggett, *Complexities: Women in Mathematics*, Princeton University Press, 2005.

she has special interest in Rudloff's questions due to involvement in developing the financial mathematics area within the doctoral program in mathematics at Florida State University.

The questions. What does this area of study, research and application offer in terms of life experiences and career opportunities? Why are women in financial mathematics underrepresented, even among women mathematicians—and how can this be improved? What are the special demands on women (academia, industry, government) rooted in the small headcounts? What special opportunities will be created as the financial industry increasingly recognizes that for consultations and negotiations women need to be adequately represented on its teams, due to dealings with women-owned businesses, as well as more women in top management positions? What about the concerns shared with many professional women and other working families—rearing children and two-body problems? How can good “life information” as well as research advice, mentoring, and networking be made more available both for those women just starting careers and for those women at career junctions?

Data about women in financial mathematics. How many women are there, by count and by proportion, in

CALL FOR NOMINATIONS

The 2010 Kovalevsky Prize Lecture

AWM and SIAM established the annual Sonia Kovalevsky Prize 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, and Dianne P. O'Leary. This year's lecturer will be Andrea Bertozzi.

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. Send five complete copies of nomination materials for this award to the Kovalevsky Selection Committee, Association for Women in Mathematics, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030, or send the materials electronically to awm@awm-math.org. Nominations must be received by **November 1, 2009** 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. Please consult the award web pages www.siam.org/prizes/sponsored/Kovalevsky.php and www.awm-math.org/kovalevskylectures.html for more details.

For-profit Higher Education

Mary E. Morley, Ocean County College

financial mathematics? The available data do not answer this question. Women Ph.D.'s with this thesis field are produced across department and college/school boundaries, and hence have varying professional society allegiances. Further, the classification schemes were set up before the research area attracted the current larger numbers of mathematicians in and outside mathematics departments, and hence attempting to parse the data is not productive. The "2008 Annual Survey of the Mathematical Sciences"³ reports the overall proportion of women in this cohort of new Ph.D.'s as 31% (somewhat down from an Annual Survey high of 34% in 1999, but relatively stable over a decade). By type of producing doctoral department there is wide variation in representation of women, with 52% in Group IV (Statistics) compared to 25% in all other groups combined (and just 17% for the highest ranked private university departments). Of particular interest here, Operations Research departments have evolved in focus and are the faculty home of two of the panelists; these departments have not been included in the Annual Survey in recent years. Ten broad groupings of mathematical topics, termed "field of thesis," are used for the reporting; financial mathematics dissertations are probably classified by doctoral students and their thesis advisors into at least half of those categories. The ranges of representation of women by field of thesis is wide: Of those writing in probability, 10% are women; in applied math, 27%; but in statistics/biostatistics, 51%. Anecdotally, the Special Session organizers and the panelists see very small representation of women among students and colleagues in their own circles in the academy and companies; they hypothesize a count would show women in financial mathematics are near the low end of the proportional ranges—underrepresentation within an already limited segment.

Toronto, June 2010! Women and men who are concerned about the questions and issues of this discussion: Please let us know if you are interested in another networking session at the Bachelier Finance Society⁴ 6th World Congress. Rudloff and Case, with the help of the other 2009 panelists, will organize a session if feasible and would be glad to have your thoughts. (Write case@math.fsu.edu.)

³ Phipps et al., op. cit.

⁴ <http://www.bachelierfinance.org/>; accessed May 2009.

In the last 20 years there has been a large increase in for-profit higher education, both in the number of students and in the number of institutions. This applies not only to two-year schools, but also to four-year colleges and universities. This column will focus on four-year colleges and universities. In 1976–1977 there were only 15 for-profit four-year colleges in the country, in 2005–2006 there were 453, a 2920% increase.¹ The number of degrees awarded is also increasing at a sharp rate. In 2005–2006, the for-profit sector awarded six times as many bachelor's degrees and almost twelve times as many master's degrees as they awarded a decade earlier.² In the fall of 2005, the on-line part of The University of Phoenix had the largest enrollment of any degree-granting campus in the United States.³ The total fall 2006 enrollment in for-profit degree-granting four-year schools was 811,609 according to the *Digest of Educational Statistics 2008*.⁴ This may not seem that large compared to all students in college, but in 1990, the for-profit sector was considered so unimportant that it was not even mentioned in the *Digest of Educational Statistics*. The growth of for-profit higher education could have a profound effect on American education, but many faculty members and perspective faculty members seem unaware of this trend.

Business, on the other hand, is paying attention. They should, there is real money involved. Total revenues for four-year for-profit colleges in 2004–2005 were over 7 billion dollars⁵ and the total revenues and returns

¹ Provasnik, Stephen and Planty, Michael. *Community Colleges: Special Supplement to The Condition of Education 2008*. Statistical Analysis Report. NCES 2008-033, p. 30.

² Schmidt, Peter. "Higher Education Is in Flux as Demographics Change, a Federal Report Shows." *The Chronicle of Higher Education*. May 30, 2008. <http://chronicle.com>.

³ Snyder, Thomas D. et al. *Digest of Educational Statistics 2007*. Statistical Analysis Report. NCES 2008-022, p. 325.

⁴ Snyder, Thomas D. et al. *Digest of Educational Statistics 2008*. Statistical Analysis Report. NCES 2009-020, p. 276.

⁵ Snyder, Thomas D. et al. *Digest of Educational Statistics 2007*. Statistical Analysis Report. NCES 2008-022, p. 494.

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EDUCATION COLUMN *continued from page 13*

on investment were over 9 billion in fiscal year 2006.⁶ It is not hard to find articles on for-profit higher education in business journals. Some of the data in this column comes from a recent article in *Business Week*. Other sources of data include the National Center for Educational Statistics and *The Chronicle of Higher Education*. *The Chronicle of Higher Education* has been following the for-profit sector carefully. They even have an index of for-profit higher education.

For-profit institutions today go well beyond the trade-schools of old. They offer bachelors, masters, and even doctoral degrees. Examples of such institutions include The University of Phoenix (which is part of the publicly traded Apollo Group), DeVry University, Capella University, and Kaplan University. It is important to realize that these schools are accredited and that their students are eligible for federal funds. According to *Business Week*, the Apollo Group received more than three-quarters of its \$3.1 billion in revenue from federal student aid in the fiscal year that ended August 31. In addition, DeVry gets 65% of its revenues from government-backed student aid. Public money going to for-profit institutions can be controversial, however. Governor Corzine of New Jersey is suggesting limiting aid to these colleges as a way of increasing funding for other students. Approximately 5,500 students at for-profit institutions received state aid in New Jersey last year, 7.4% of the grant money given out by the state.⁷

The for-profit colleges are not competing with the countries' top colleges and universities, but they are competing with the less selective public and private colleges, and they are growing. Is the growth of for-profit colleges a good thing? I am not sure. If the for-profits are educating students who would not otherwise go to college, or if they are educating students better than traditional colleges, they may be good for society. However, the answers to these questions are not clear. For-profit colleges typically spend large amounts on recruiting, and many seem to be doing well in the current economy. According to *Business Week*,⁸ in the quarter that ended last November,

⁶ Knapp, Laura G. et al. *Enrollment in Postsecondary Institutions, Fall 2006; Graduation Rates, 2000 & 2003 Cohorts; and Financial Statistics, Fiscal Year 2006*. NCES 2008-173. p. 8.

⁷ Whitely, Brian. *The Star Ledger*, May 13, 2009. http://www.nj.com/news/index.ssf/2009/05/gov_corzines_proposed_budget_c.html. Accessed 21 May 2009.

⁸ Elgin, Ben and Silver-Greenberg, Jessica. "For-profit colleges: Scooping up the Stimulus." *BusinessWeek*. March 12, 2009. http://www.businessweek.com/magazine/content/09_12/b4124020629165.htm. Accessed 21 May 2009.

the University of Phoenix increased its advertising spending by 24% to a total of 88 million dollars, and its enrollment rose in that quarter by 18% to 385,000. The average debt for graduates of for-profit four-year schools is greater than the average debt for graduates of public four-year schools. In the 2003–2004 school year, 73% of students at for-profit colleges borrowed money to attend college. The figures for public four-year and two-year colleges are 45% and 12% respectively.⁹ Graduation rates tend to be lower at for-profit colleges. The six-year graduation rate for bachelor's degree students entering college in 2000 was 61.7% at private not-for-profit colleges, 51.3% at public colleges, and 35.5% at for-profit colleges.¹⁰ Default rates for student loans are also greater at for-profit colleges. The default rates on student loans for the 2006 cohort for four-year colleges are 8.4% for proprietary colleges, 3.4% for public colleges, and 2.4% for other private colleges.¹¹ It is not clear how much the lower graduation rates or higher default rates are due to the difference in colleges and how much is due to a different student population.

The current economic crisis may end up favoring the for-profit colleges. The University of Phoenix reacted to the economic crisis by increasing advertising and enrollment. The state of California's response to the crisis may be to cut enrollment at community colleges by 250,000.¹² If these cuts are made, some of these students will end up in the for-profit sector. If the economic crisis continues to affect public funding of colleges, the for-profits stand to benefit.

If the for-profit sector continues to increase, what will that mean for the faculty of the future? It may not be the profession as we know it today. Faculty unions or even union drives are rare at for-profit colleges. Tenure is also rare among proprietary colleges and universities; less than five percent of the degree-granting institutions in the

⁹ Cunningham, Elisa F. And Santiago, Deborah A. "Student Aversion to Borrowing: Who Borrows and Who Doesn't." Institute for Higher Education Policy. December 2008, p. 15.

¹⁰ Knapp, Laura G. et al. op. cit. p. 11.

¹¹ Direct Loan and Federal Family Education Loan Programs. <http://www.ed.gov/offices/OSFAP/defaultmanagement/instrates.html>. Accessed 21 May 2009.

¹² Keller, Josh. "California Community Colleges May Reduce Enrollment by 250,000 Students." *The Chronicle of Higher Education*, May 21, 2009. <http://chronicle.com>. Accessed 23 May 2009.

sector report having tenure policies.¹³ In addition, the for-profit sector relies (even more than traditional colleges) on part-time positions. In 2003, the percent of faculty that are full time at four-year public colleges was 72%, at private colleges it was 58%, and at community colleges it was 33%.¹⁴ In 2006 the University of Phoenix had 1,263 full-time faculty members and 22,176 part-time: less than 6% full-time.¹⁵

I am not sure if for-profit colleges are good for the country or not. Competition can increase innovation and for-profit colleges have been innovators in distance education. Perhaps they are educating students who could not otherwise attend college. The for-profit sector is better at lobbying,

marketing, and recruiting. But it is not clear they are better or even more efficient at educating.

¹³ Kinser, Kevin. "For Profit Institutions Need to be Classified, Too." *The Chronicle of Higher Education*. March 30, 2007. <http://chronicle.com>. Accessed 23 May 2009.

¹⁴ *Community Colleges: Special Supplement to The Condition of Education 2008*. Statistical Analysis Report. NCEES 2008-033.

¹⁵ Blumsenstyk, Goldie. "The Chronicle Index of For-Profit Higher Education" *The Chronicle of Higher Education*. May 11, 2007. <http://chronicle.com>. Accessed 21 May 2009.

AWM Workshop for Women Graduate Students and Recent Ph.D.'s at the 2010 Joint Mathematics Meetings

Application deadline: August 15, 2009

For many years, the Association for Women in Mathematics has held a series of workshops for women graduate students and recent Ph.D.'s in conjunction with major mathematics meetings. We anticipate support from the Office of Naval Research and the National Security Agency for the AWM Workshop to be held in conjunction with the Joint Mathematics Meetings in San Francisco, CA in January 2010.

FORMAT: Twenty women will be selected in advance of the workshop to present their work; the graduate students will present posters and the recent Ph.D.'s will give 20-minute talks. AWM will offer funding for travel and two days subsistence for the selected participants. The workshop will also include a dinner and a discussion period, a luncheon, and a panel discussion on areas of career development. 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, posters, and panel. Departments are urged to help graduate students and recent Ph.D.'s who are not selected for the workshop to obtain institutional support to attend the presentations and panel.

ELIGIBILITY: Applications are welcome from graduate students who have made substantial progress towards their theses and from women who have received their Ph.D.'s within approximately the last five years, whether or not they currently hold a postdoctoral or other academic position. Women with grants or other sources of support are welcome to apply. All non-US citizens must have a current US address.

All applications should include:

- a cover letter
- 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 concise description of research
- a curriculum vitae
- at least 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, 2009**.

See <http://www.awm-math.org/workshops.html>.

BOOK REVIEW

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

Women in Science: A Social and Cultural History, Ruth Watts, Routledge, London and New York, 2007. ISBN 0415253071

Reviewer: Teri Perl, Ph.D., Expanding Your Horizons Network

Ruth Watts, Professor of History at the University of Birmingham, has produced a most readable and scholarly work that explores the role of women in science over several centuries. Watts places great emphasis on recent feminist research in the histories of both science and education and considers the interrelationship of education, science and gender to be a major focus of her approach.

In the early chapters Watts scans the development of science from the fifth through the sixteenth centuries. Then, dating the seventeenth century as the beginning of the so-called “modern” scientific thinking, she notes wryly that this period, remembered for concepts of objectivity and pure reason, is “also the time of the greatest number of persecutions of witchcraft in European history...” The book continues on to describe the situations of women in science in the eighteenth to twentieth centuries.

Overall the book is quite academic. There are tons of notes (i.e., 200 pages of text and 100 pages of end material ... notes, bibliography and index). Although this is doubtless a book of tremendous value to any person interested in this area of research, even the non-scholar will find it fascinating as Professor Watts traces the roles of women in the various fields of science. As she moves through several stages of history she presents many women players whose backgrounds were previously little known.

The ones I knew from my earlier research on women in mathematics are present ... Hypatia in the distant past, the French Emilie Du Chatelet in the eighteenth century, the British Mary Somerville and Grace Chisholm Young, Young the first woman to officially receive a doctorate in Germany. Though I knew quite a lot about du Chatelet, that she was closely allied with luminaries like Voltaire for example, I hadn't heard that “she discovered that it was easier for a woman to gamble in Paris than enter the Royal Academy or even the cafes where scientific ideas were discussed.”

Watts continually emphasizes the significance of access to education as the key to professional credentialing, education that, until recently, was largely a function of class. She

delineates the roles of Quakers and Unitarians who, because of their leadership in viewing women as humans equal to men and endowed with equal mental capacities, were frequently at the forefront of education for women in general, and consequently for women in science as well. Actually, the fight for educational rights for women in the late nineteenth century paralleled those of their battles for other rights such as property and divorce.

Another area that I found fascinating, one evident from my research on the *Ladies' Diary* [*Historia Mathematica* 6 (1979), 36–53], was that the major thrust of the development of modern science and technology took place away from the most prestigious halls of learning, i.e., Oxford and Cambridge in England. The goal of the educated upper-class scholar was to be fluent in Latin and Greek. The evolution of science and technology, the suspect “modern” stuff, flourished elsewhere. And during this early development of modern science, women actually were not excluded initially.

Watts cites successful popular science books by women, books frequently dealing with subject matter derived from observation of the world around them such as botany, books initially created to teach their siblings, their own children, and other women.

One of the most interesting of these women writers, new to me, was Jane Marcet. Marcet was married to “Alexander Marcet, a Swiss graduate of Edinburgh University who became a physician ... and an enthusiastic chemist.” Because of the prominence of her husband who “pioneered in using chemistry in the explanation and treatment of disease and helped found the forerunner of the Royal Society of Medicine,” Marcet's scientific education continued in the social life of her home, with many prominent scientists among their guests. The death of her father and early death of her husband left Jane a wealthy widow.

By the time of her death at 89, Marcet had published 35 books. Her most famous was a work on chemistry, illustrated by experiments and directed particularly towards females, whose education she said was “seldom calculated to prepare their minds for abstract ideas or scientific language.” Marcet had been educated almost exclusively at home, by the best available tutors. This again highlights the significance of class as well as gender in the education of women, since only the wealthy could afford this kind of education.

An item of interest: Marcet's husband helped Jenner, the inventor of the smallpox vaccine, “to obtain parliamentary grants for his experiments on smallpox vaccination and all the Marcet children being vaccinated by Jenner himself.”

Although most of the Watts book is focused on the situation in Great Britain, several interesting developments in the United States and elsewhere are described. In sparsely populated rural American communities, girls and boys were often educated together since it was cheaper to do so. “Many saw the advantages that accrued to both sexes because of this and the custom spread into the northern and western states and then into newly founded higher education institutions.” By the late 1800s women’s colleges such as Vassar and Wellesley had begun to appear, “all founded by Protestant benefactors eager to educate women highly for their traditional duties.” By 1870, eight state universities accepted women; “41 per cent of colleges in higher education were open to women, either in co-educational or single-sex institutions.”

The story of women and medicine is particularly interesting. Women were natural medical practitioners because of their roles in childbirth, menstruation, and abortion. Certainly as homemakers and guardians of the family health, many were knowledgeable about medicinal herbs and potions.

Writing about London in the 17th century, Watts notes that “Midwifery and the rituals of childbirth also remained mostly the specialty of women.... In London, midwives had an effective, though not institutionalized, guild, and there were some very successful midwives and female practitioners, including several of noble birth.” When it was suggested that a school for midwives and women apothecaries be founded, it proved impossible. Watts writes of the emergence of man-midwifery, particularly among the upper classes ... for “gentlewomen.”

The story here is an old one. As the field becomes more professionalized, the women are forced out. Few if any places allowed women to obtain professional medical training. “Midwives had access to neither the universities where [the process of labor] was taught nor their own teaching hospitals.” So they fell further and further behind as the field became more mature, particularly with the introduction of new techniques, such as the use of forceps in difficult births. Even later, when women were admitted to professional training at colleges and universities, they often could not ultimately qualify in medicine because they were unable to obtain the final requirement, the necessary clinical practice.

Watts compares the situations in several European countries in the late 19th century. “In the 1870s Sweden, the Netherlands, Denmark and Italy began to take women medics, followed by Belgium, Norway, Spain and Portugal in the 1880s.” By 1874, Swiss schools had made medical

In reality, women have always been part of the scientific scene, albeit often offstage or in the wings. They have also been in the audience, supporting the main players and doing the publicity. At times and increasingly in the present, they have taken starring roles, and sometimes written the script. Rarely have they been in the director’s seat. — Ruth Watts

coeducation a reality. There is some headway in Russia, though little or none in Germany, Austria and England.

Other items I recall from a volume dense with notes of interest:

The invention and the use of the microscope in the late 17th century, and with it the identification of the ovum and spermatozoa, refuted the ancient Aristotelian notion of woman being merely an inferior version of man.

Watts cites the significant role of women at the birth of modern astronomy. “A surprisingly large number of German women in particular worked in the field—about 14 per cent from 1650 to 1720—mostly because it derived from a craft tradition and the women worked in family observatories.” However, as the science evolved with the establishment of schools to formalize and teach the subject, women, denied admission to these schools, and thus the formal credentials now required to be a “professional” astronomer, were being pushed out of the field.

I learned that the word “lunatics” comes from the attendees at the Lunar Society, in which many leading prominent pioneer inventors, manufacturers, scientists and educationalists met monthly at full moon to share information and ideas. Women were excluded here.

As I myself concluded from my research on the *Ladies’ Diary*, Watts notes that “so many women in different times and different places have enjoyed doing science despite whatever problems faced them. Time after time evidence has confirmed this.”

Watts ends her book with a paragraph that I found particularly interesting.

In reality, women have always been part of the scientific scene, albeit often offstage or in the wings. They have also been in the audience, supporting the main players and doing the publicity. At times and increasingly in the present, they have taken starring roles, and sometimes written the script. Rarely have they been in the director’s seat. Why this has been the case, why it is important to understand the past and work toward a different future has been the purpose of this book.

Olga Taussky-Todd Lecture 2011: Call for Nominations

ICIAM, June 2009

The Olga Taussky-Todd Lecture is held every four years at the International Congress on Industrial and Applied Mathematics (ICIAM). This honor is conferred on a “woman who has made outstanding contributions in applied mathematics and/or scientific computation.” The lecture is named in tribute to the memory of Olga Taussky-Todd, whose scientific legacy is in both theoretical and applied mathematics, and whose work exemplifies the qualities to be recognized.

The Association for Women in Mathematics, European Women in Mathematics (EWM) and the organizers of the ICIAM07 Congress initiated the Olga Taussky-Todd Lecture in 2005. The first winner was Pauline van den Driessche, who delivered the lecture at ICIAM07 in Zürich. To make this lecture a regular event at ICIAM congresses, AWM and EWM requested that ICIAM take

full responsibility for holding it. At its board meeting in 2008, ICIAM agreed to do so.

The next Olga Taussky-Todd Lecture will be delivered at the ICIAM 2011 Congress in Vancouver, Canada, July 18–22, 2011. The deadline for submission of nominations is **October 18, 2009**.

A nomination will consist of: 1) an explanation of why the individual is being nominated and a description of her work; 2) a brief CV and contact information for the nominee.

The selection process is conducted by the Olga Taussky-Todd Lecture Committee. The Committee for the 2011 Lecture consists of: Pauline van den Driessche (Chair), University of Victoria, Canada; Christine Bernardi, Paris VI, Paris, France; Jill P. Mesirov, Broad Institute of MIT and Harvard, Cambridge, MA; Hans Schneider, University of Wisconsin–Madison; and Robert Tichy, TU Graz, Austria.

Nominations should be sent by e-mail to: pvdd@math.uvic.ca. If e-mail is not possible, nominations may be sent by fax or post, but must arrive by the deadline: Professor Pauline van den Driessche, Department of Mathematics and Statistics, University of Victoria, PO BOX 3060 STN CSC, Victoria, B.C., Canada V8W 3R4; Fax: +1 250 721 8962. Receipt of nominations will be acknowledged by e-mail.

ICWM 2010: First Announcement

The International Conference of Women Mathematicians (ICWM) 2010 will take place in Hyderabad, August 17–18, 2010, the two days before the International Congress of Mathematicians (ICM) in 2010. The meeting is aimed principally at women mathematicians attending the ICM (though men are also very welcome to attend), and in particular at young women mathematicians and women from Asia and from developing countries. The talks will be colloquium style lectures aimed at a general mathematical audience, and it is hoped that participants will be provided with an opportunity to meet other women mathematicians about to take part in the ICM and to find out about some of the areas of research to be covered at the ICM.

ICWM 2010 is being organized with the support of European Women in Mathematics (<http://www.math.helsinki.fi/EWM/>), the European Mathematical Society (<http://www.emis.de/>) and the AWM (<http://www.awm-math.org/>). Financial support is being provided by the National Board for Higher Mathematics (NBHM), India and by Schlumberger. There will be some funding available to support the travel and accommodation costs of women participants from Asian and developing countries, and women from these countries are

encouraged to apply to the local organizing committee.

The ICM Executive Organizing Committee has set up a local organizing committee: Shobha Madan (Indian Institute of Technology, Kanpur), chair; Mahuya Datta (Indian Statistical Institute, Kolkata); S.G. Dani (Tata Institute of Fundamental Research, Mumbai); Jaya N. Iyer (Institute of Mathematical Sciences, Chennai); B. Sri Padmavathy (University of Hyderabad, Hyderabad); Rahul Roy (Indian Statistical Institute, Delhi); and Geetha Venkataraman (St. Stephen's College, Delhi).

The scientific programme is being planned by the EWM/EMS Scientific Committee, along with two mathematicians from India. Scientific committee: Ulrike Tillmann (Oxford, UK), chair; Viviane Baladi (ENS, Paris, France); Eva Bayer (Lausanne, Switzerland); Christine Bernardi (Paris VI, France); Christine Bessenrodt (Hannover, Germany); Antonella Grassi (U Penn, USA); Ursula Hamenstaedt (Bonn, Germany); Dusa McDuff (Stony Brook, USA); Ragni Piene (Oslo, Norway); Mythily Ramaswami (TIFR Bangalore, India); Sujatha Ramadorai (TIFR Mumbai, India); Vera Sos (Renyi Institute, Budapest, Hungary); Nina Uraltseva (St Petersburg, Russia); and Michele Vergne (Ecole Polytechnique, Paris, France).

For more information contact the chair of the organizing committee, Shobha Madan (madan@iitk.ac.in) or the EWM convenor, Frances Kirwan (kirwan@maths.ox.ac.uk).

Sonia Kovalevsky High School Mathematics Days

Through grants from Elizabeth City State University and the National Security Agency (NSA), the Association for Women in Mathematics expects to support Sonia Kovalevsky High School Mathematics Days at colleges and universities throughout the country. Sonia Kovalevsky Days have been organized by AWM and institutions around the country since 1985, when AWM sponsored a symposium on Sonia Kovalevsky. They consist of a program of workshops, talks, and problem-solving competitions for high school women students and their teachers, both women and men. The purposes are to encourage young women to continue their study of mathematics, to assist them with the sometimes difficult transition between high school and college mathematics, to assist the teachers of women mathematics students, and to encourage colleges and universities to develop more extensive cooperation with high schools in their area.

AWM awards grants ranging on average from \$1500 to \$2200 each (\$3000 maximum) to universities and colleges. Historically Black Colleges and Universities are particularly encouraged to apply. Programs targeted toward inner city or rural high schools are especially welcome.

Applications, not to exceed six pages, should include:

- a cover letter including the proposed date of the SK Day, expected number of attendees (with breakdown of ethnic background, if known), grade level the program is aimed toward (e.g., 9th and 10th grade only), total amount requested, and organizer(s) contact information;
- plans for activities, including specific speakers to the extent known;
- qualifications of the person(s) to be in charge;
- plans for recruitment, including the securing of diversity among participants;
- detailed budget (Please itemize all direct costs in budget, e.g., food, room rental, advertising, copying, supplies, student giveaways. Honoraria for speakers should be reasonable and should not, in total, exceed 20% of the overall budget. Stipends and personnel costs are not permitted for organizers. The grant does not permit reimbursement for indirect costs or fringe benefits.)
- local resources in support of the project, if any; and
- tentative follow-up and evaluation plans.

Organizers should send announcements including date and location of their SK Days to the AWM web editor for inclusion on the AWM website. If funded, a report of the event along with receipts (originals or copies) for reimbursement must be submitted to AWM within 30 days of the event date or by June 1, whichever comes first. Reimbursements will be made in one disbursement; no funds may be disbursed prior to the event date. The annual fall deadline is **August 4**, with a potential additional selection cycle with a deadline of **February 4**.

AWM anticipates awarding 12 to 20 grants for Fall 2009 and Spring 2010. Applications must be received by **August 4, 2009**; applications via e-mail or fax will not be accepted. Decisions on funding will be made in late August.

Send *five* complete copies of the application materials to: Sonia Kovalevsky Days Selection Committee, Association for Women in Mathematics, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030. For further information, call 703-934-0163 or e-mail awm@awm-math.org.

AMS Awards to Math Programs

AMS, April and May 2009

Exemplary Program or Achievement in a Mathematics Department

The Mathematics Department at the University of Nebraska-Lincoln has been given the 2009 Award for an Exemplary Program or Achievement in a Mathematics Department. Presented annually by the American Mathematical Society, the award recognizes a college or university mathematics department that has distinguished itself by undertaking an unusual or particularly effective program of value to the mathematics community, internally or in relation to the rest of society.

“This year, the committee received a remarkably strong pool of nominees,” said Steven A. Bleiler, professor of mathematics at Portland State University and chair of the award selection committee. “One can honestly say that every one of this year’s nominees deserves the kind of recognition that an award of this type confers. Yet it was very gratifying to see Nebraska emerge from our review process as a first among equals and receive well deserved accolades for the profound effect their innovation, outreach, and willingness to do things differently have had on their own programs, as well as on the future face of our discipline.”

The Nebraska Mathematics Department has become known for its success in mentoring women Ph.D. students in mathematics. In pursuit of this goal, the department has improved the climate for all of its students and has transformed itself into a place where talented people—women and men, faculty and students—are given the encouragement and support they need to reach their highest potential. Today the department is viewed as a highly desirable place to get a Ph.D. in mathematics or to be a faculty member.

It was back in the late 1980s that Professor W. James Lewis, who had just started a term as department chair, realized that the department was not serving well its women graduate students: Even though women made up 20 percent of the graduate student population during the 1980s, the department awarded no Ph.D.’s to women in that decade. In challenging the department to seriously address this problem, Lewis set the mathematics faculty on a transformational course.

Some of the steps taken were small—making sure that outstanding women undergraduates are encouraged to consider graduate school, having an open-door policy so that students feel comfortable coming for help, supply-

ing cookies for the graduate student seminar. Other steps were larger and more strategic, like improving financial support for graduate students and instituting qualifying examination workshops. The department also set up ways to provide its students with opportunities to build a professional portfolio, such as being in charge of a course or helping to choose textbooks.

In 1998, the department received the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring, specifically for its success in mentoring women Ph.D. students. The department used the \$10,000 from the award to launch the Nebraska Conference for Undergraduate Women in Mathematics, which has now become an annual tradition drawing 200 women students from across the country. Among the other programs in the department are IMMERSE, a summer bridge program for math majors who have just been accepted into graduate school; All Girls All Math, a week-long summer math camp for mathematically talented high school girls; and Math in the Middle, a major teacher development program aimed at improving middle school mathematics education across the state of Nebraska.

These large-scale programs have been extraordinarily successful and have raised the national profile of the department. And they were not gimmicky add-ons designed to draw attention. Rather, they grew organically out of the department’s day-to-day commitment to nurturing students and faculty so that all can excel to their highest potential.

The official announcement of the award, including the selection committee’s citation, appears in the May 2009 issue of the *Notices of the AMS*.

Mathematics Programs that Make a Difference

The Committee on the Profession (CoProf) of the American Mathematical Society (AMS) has announced the selection of two outstanding mathematics department programs to be designated as Mathematics Programs that Make a Difference. For 2009 the honored programs are the Department of Statistics at North Carolina State University and the Department of Mathematics at the University of Mississippi.

“These two departments have outstanding records in recruiting members of underrepresented groups and mentoring them to successfully complete their graduate degrees,” said Alejandro Adem of the University of British Columbia, chair of CoProf and of the selection committee for the award. “The AMS Committee on the Profession was extremely impressed with their accomplishments,

which can serve as a model for other departments in the United States.”

Diversity a Priority: The Department of Statistics at North Carolina State University (NCSU) has made diversity of students and faculty a top priority. Out of 40 faculty in the department, 11 are female, 3 are African-American, and 2 are Hispanic. In the past 10 years, 15 minority students have received master’s degrees and 2 have received Ph.D.’s. The department has about 160 graduate students, including 9 African-Americans and 4 Hispanics; over 50 percent are female.

The department’s approach includes communication with faculty at other institutions, active and sustained recruiting of minority students, and careful mentoring. NCSU has cultivated ties to other institutions, in particular historically black colleges and universities, as well as to organizations such as the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS). Through such connections, NCSU has reached undergraduate students interested in advanced work in statistics and provided them with information to decide whether NCSU is a good fit for them for graduate school. A co-Director of Graduate Programs, Pam Arway travels extensively to various small colleges and summer programs to recruit students and to network and maintain strong relationships with their mentors.

Once students are recruited into the graduate program, they benefit from extensive mentoring from faculty advisors. Each new student is also assigned to a more-advanced student who acts as a mentor, or “stat buddy.” A key figure in the department’s mentoring efforts has been faculty member Kimberly Weems, who organizes many social activities for minority students and meets individually with them to ensure their successful progress through the program. Setting the student-centered tone is department head Sastry Pantula, who has twice been selected for a university diversity award. Other department faculty have received similar recognition, including Weems and Jackie Hughes-Oliver. Recently a graduate student in the department, Anthony Franklin, received a university diversity award for his support of students and for recruiting new students of all backgrounds.

This dynamic department has pursued and received many grants, including two National Science Foundation VIGRE grants that proved crucial in supporting minority students. Recently the department received an S-STEM (Scholarships in Science, Technology, Engineer-

ing, and Mathematics) grant from the NSF, which will provide scholarships for United States undergraduate and graduate students with financial need. The department participates in many existing diversity programs, workshops, and conferences, and also designs and hosts some of its own. Some of the more recent such events are StatFest, Infinite Possibilities Conference, a Pipeline Workshop for Faculty of Women’s Colleges and Minority Institutions, and Building Future Faculty. NCSU’s long-term commitment, with strong support from its administration, is making a difference in diversity in the mathematical sciences.

Nurturing African-American Mathematicians: The southern United States is home to many of the nation’s African-Americans, and yet the universities in that part of the country have not historically been large producers of African-American Ph.D.’s in mathematics. But the University of Mississippi (UM) has started to reverse this trend, becoming a national leader in nurturing and mentoring African-Americans in doctoral study. Over the past decade, 11 African-Americans have received mathematics doctorates from Ole Miss. That the university was once a symbol of educational segregation in the United States gives this success story special importance.

Since 2001, the UM mathematics department has received two GAANN (Graduate Assistance in Areas of National Need) grants from the U.S. Department of Education; the grants provide fellowships for graduate study. The fellowships proved to be transformational for the department, allowing it to quadruple the number of graduate students and to ensure that they are financially well supported. At the same time the department worked diligently to provide more careful nurturing of its graduate student population, both in research and in professional development.

Contributions to these achievements were made by the entire UM mathematics department, including 10 faculty who have served as GAANN dissertation advisors. Among the key leaders have been the co-principal investigators of the GAANN grants, Gerard Buskes and Donald Cole. As an African-American faculty member and assistant to the chancellor for multicultural affairs, Cole has been a role model and mentor for the African-American graduate students, while Buskes serves as advisor and mentor to the GAANN students. Buskes eloquently described the department’s efforts in the article “Mississippi Mathematics Renaissance,” which appeared in the January 2007 issue

continued on page 20

of the *Notices*. This article celebrated a high point in the department's efforts, the awarding of Ph.D.'s to six African-Americans in 2006, which is the largest cohort of African-American mathematics Ph.D.'s ever produced at any university in the United States.

In her nomination letter, Sylvia Bozeman of Spelman College, winner of the 2008 AAAS Mentor Award, wrote this regarding the department's work recruiting and

retaining students from underrepresented groups: "It is this visionary effort, by all involved, and the resulting unprecedented success that deserves to be set forth as a model for other departments who are more hesitant to attempt change. The testimony of the leadership at Ole Miss as to how the influx of minority and female students with high academic goals transformed the department and the atmosphere therein should be amplified as other graduate departments contemplate the call for more student diversity."

House Resolution 1180

H. Res. 1180, Resolution recognizing the efforts and contributions of outstanding women scientists, technologists, engineers and mathematicians in the United States and around the world, was introduced by Rep. Dave Reichart (R-WA) on May 7, 2008 and passed on June 4, 2008 by voice vote. The text of the resolution follows.

Whereas women have been vitally important to the fields of science, technology, engineering, and mathematics and have transformed the world and enhanced and improved the quality of life around the globe;

Whereas the contributions of women are central to progress and to the development of knowledge in many areas, including chemistry, physics, biology, geology, engineering, mathematics, and astronomy, and these contributions boost economic growth, create new jobs, and improve our knowledge and standard of living;

Whereas there is a need to congratulate these women, educate the public about the important role of women in society, and recognize the contributions of women to the scientific, technological, engineering, and mathematical communities;

Whereas it is important to emphasize the extensive variety of careers available in the world of science, technology, engineering, and mathematics and to honor the tremendous women that have contributed and will contribute to the advancement of knowledge in these disciplines;

Whereas in order to ensure our Nation's global competitiveness, scientists, technologists, engineers, and mathematicians from every background and neighborhood in our society to create the innovations of tomorrow that will keep our Nation strong;

Whereas a disproportionately low number of female students are pursuing careers in science, technology, engineering, and mathematics, and it is crucial that we focus attention on

increasing the participation of women; and

Whereas there is a need to encourage industry, government, and academia to reach and educate millions of children on the important contributions women have made to science, technology, engineering, and mathematics: Now, therefore, be it

Resolved, That the House of Representatives—

(1) recognizes the important contributions of women to science, technology, engineering, mathematics, and the health of many industries that have created new jobs, boosted economic growth, and improved the Nation's competitiveness and standard of living;

(2) recognizes the need to increase the number of women participating in science, technology, engineering, and mathematics;

(3) supports the role of women in science, technology, engineering, and mathematics; and

(4) encourages the people of the United States to give appropriate recognition to women scientists, technologists, engineers, and mathematicians who have made important contributions to our everyday lives.

MSRI



The Mathematical Sciences Research Institute in Berkeley, California solicits registration for participation in the upcoming 2009 workshops:

Connections for Women

Symplectic and Contact Geometry and Topology

(August 14, 2009 to August 15, 2009)

Organized By: Eleny Ionel (Stanford University), Dusa McDuff (Barnard College)

Deadline for Funding: June 1, 2009

Tropical Geometry

(August 22, 2009 to August 23, 2009)

Organized By: Alicia Dickenstein (University of Buenos Aires), and Eva-Maria Feichtner (University of Bremen)

Deadline for Funding: June 15, 2009

Introductory Workshop

Symplectic and Contact Geometry and Topology

(August 17, 2009 to August 21, 2009)

Organized By: John Etnyre (Georgia Institute of Technology), Dusa McDuff (Barnard College), and Lisa Traynor (Bryn Mawr College)

Deadline for Funding: June 1, 2009

Tropical Geometry

(August 24, 2009 to August 28, 2009)

Organized By: Eva-Maria Feichtner (University of Bremen), Ilia Itenberg (University of Strasbourg), Grigory Mikhalkin (Genève University), and Bernd Sturmfels (UC Berkeley)

Deadline for Funding: June 15, 2009

Further information can be found at www.msri.org

Students, recent Ph.D.'s, women, and minorities are particularly encouraged to apply. Funding awards are made typically 8 weeks before the workshop begins. Requests received after the funding deadlines are considered only if additional funds become available.

The Institute is committed to the principles of Equal Opportunity and Affirmative Action.

MSRI



The Mathematical Sciences Research Institute in Berkeley, California solicits applications for membership in its 2010-11 programs:

**Random Matrix Theory, Interacting Particle Systems
and Integrable Systems**
(Fall 2010)

Inverse Problems and Applications
(Fall 2010)

Free Boundary Problems, Theory and Applications
(Spring 2011)

Arithmetic Statistics
(Spring 2011)

Apply online:

Research Professorships (Deadline: October 1, 2009)

Postdoctoral Fellowships (Deadline: December 1, 2009)

Research Memberships (Deadline: December 1, 2009)

FURTHER INFORMATION:

www.msri.org

ONLINE APPLICATION:

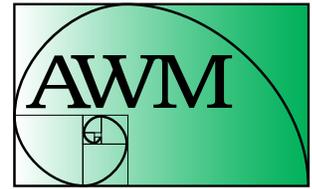
www.mathjobs.org

Students, recent Ph.D.'s, women, and minorities are particularly encouraged to apply. Funding awards are made typically 8 weeks before the workshop begins. Requests received after the funding deadlines are considered only if additional funds become available.

The Institute is committed to the principles of Equal Opportunity and Affirmative Action.

2009-2010 Individual Membership Form

JOIN ONLINE at www.awm-math.org!



ASSOCIATION FOR
WOMEN IN MATHEMATICS

11240 Waples Mill Road
Suite 200
Fairfax, VA 22030
(703) 934-0163

<http://www.awm-math.org>
awm@awm-math.org

LAST NAME _____ FIRST NAME _____ M.I. _____

ADDRESS _____

CITY _____ STATE/PROVINCE _____

ZIP/POSTAL CODE _____ COUNTRY _____

AWM's membership year is from October 1 to September 30. Please fill in this information and return it along with your DUES to:
AWM Membership, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030.

The AWM *Newsletter* is published six times a year and is a privilege of membership. If you have questions, contact AWM at awm@awm-math.net, (703)934-0163, or visit our website at: <http://www.awm-math.org>.

- I do not want my membership information to be listed in the AWM Public Online Directory.
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E-mail: _____ Home Phone: _____ Work Phone: _____

PROFESSIONAL INFORMATION:

Position: _____

Institution/Company: _____

City: _____ State/Province: _____ Zip/Postal Code: _____ Country: _____

If student, check one:

- Graduate Undergraduate

If not employed, leave position and institution blank.

DEGREES EARNED:	Degree(s)	Institution(s)	Year(s)
Doctorate:	_____	_____	_____
Master's:	_____	_____	_____
Bachelor's:	_____	_____	_____

Individual Dues Schedule

Please check the appropriate membership category below. Make checks or money order payable to: Association for Women in Mathematics.

NOTE: All checks must be drawn on U.S. Banks and be in U.S. Funds. AWM Membership year is October 1 to September 30.

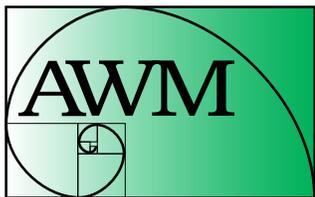
- | | | |
|--|-------|-------|
| <input type="checkbox"/> REGULAR INDIVIDUAL MEMBERSHIP (New Members ONLY)..... | \$ 30 | _____ |
| <input type="checkbox"/> REGULAR INDIVIDUAL MEMBERSHIP..... | \$ 55 | _____ |
| <input type="checkbox"/> 2ND FAMILY MEMBERSHIP..... | \$ 30 | _____ |
| (NO newsletter) Please indicate regular family member: _____ | | |
| <input type="checkbox"/> CONTRIBUTING MEMBERSHIP..... | \$125 | _____ |
| <input type="checkbox"/> RETIRED or PART-TIME EMPLOYED MEMBERSHIP (circle one) | \$ 30 | _____ |
| <input type="checkbox"/> STUDENT or UNEMPLOYED or DEVELOPING NATIONS MEMBERSHIP (circle one) | \$ 20 | _____ |
| <input type="checkbox"/> ALL FOREIGN MEMBERSHIPS (INCLUDING CANADA & MEXICO)....For additional postage, add..... | \$ 10 | _____ |
| All payments must be in U.S. Funds using cash, U.S. Postal orders, or checks drawn on U.S. Banks. | | |
| <input type="checkbox"/> BENEFACTOR [\$5,000+], PATRON [\$2,500] or FRIEND [\$1,000+] (circle one) | \$ | _____ |
| <input type="checkbox"/> CONTRIBUTION to the AWM GENERAL FUND | \$ | _____ |
| <input type="checkbox"/> CONTRIBUTION to the AWM ALICE T. SCHAFER PRIZE FUND | \$ | _____ |
| <input type="checkbox"/> CONTRIBUTION to the AWM ANNIVERSARY ENDOWMENT FUND | \$ | _____ |

Dues in excess of \$15 and all cash contributions are deductible from federal taxable income when itemizing.

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Volume 39, Number 4, July–August 2009

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- Please change my address to:
- Please send membership information to my colleague listed below:
- No forwarding address known for the individual listed below (enclose copy of label):
(Please print)

Name _____

Address _____

City _____ State _____ Zip _____

Country (if not U.S.) _____ E-mail Address _____

Position _____ Institution/Org. _____

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