



MONTCLAIR STATE
UNIVERSITY

Department of Mathematical Sciences Newsletter

- Spring 2009 -

Professor Bob Dorner Retires

By Mary Lou West

After 41 at Montclair State University, Dr. Robert Dorner retired from Montclair State University on June 30, 2009. Bob taught electronics and robotics in the Industrial Arts Department for many years, and when that department dissolved in the 1990s he was welcomed into the physics group within the Mathematical Sciences Department. Bob taught Gen Ed courses, introductory major courses, coordinated labs for many courses and served as deputy chair. He has been a tremendous asset developing and building equipment for demonstrations and labs.

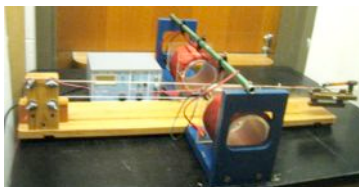
Bob loves fast vehicles from motorcycles to small aircraft, and had a private pilot's license. Bob also loves high voltage electricity and ultra-strong magnets, especially the neodymium ones. His intellectual hero is Michael Faraday, titan of 19th Century electricity and magnetism who pushed the idea of lines of force. Bob emulated Faraday's concern with teaching, learning, with clear explanations in both text and visual. Bob was always designing and building equipment to use as demonstrations in physics classes. If particular note is one apparatus where he used an oscillating Plexiglas blade with a sleek LED display unit to show the phase shift at resonant frequency. This demonstration won a



prize for best apparatus from the American Association of Physics Teachers in 1998. He published two articles jointly with Ludwik Kowalski and Mary Derengowski-Stein about the apparatus which appeared in the *American Journal of Physics*. Bob favored demonstrations using real equipment not just computer simulations or videos, sometimes with noisy bangs or roars. He made extensive use of the PASCO GLX explorer hand-held data collectors with various probes in class labs. His article "RC Time Constants for Measuring Instruments" was published in the

Spring 2008 PASCO Newsletter. Bob is able to repair almost anything, or at least lend you the proper tool to do the job and instruct you on how to use it.

In the 1970s Bob served on the Montclair State College Board of Trustees and was active in the budding faculty union. His children Roby, Wendy, and Meredith are grown now and have given him several grandchildren. We trust he will enjoy them and educate them as he has generations of MSU students.



Bob has seen many changes at MSU, taught many students and has made many friends who will miss him. We wish him a very happy new phase of life.

Evan Maletsky Honored for Commitment to Math Education

By Ken Wolff

Evan Maletsky, professor emeritus, was awarded a Lifetime Achievement Award for Distinguished Service to Mathematics Education by the National Council of Teachers of Mathematics on April 23 at the NCTM 2009 Annual Meeting and Exposition in Washington, D.C. The award is given annually to recognize NCTM members who have demonstrated a lifetime of achievement in mathematics education at the national level. Evan has made many contributions to the mathematics education community, most notably through his studies of visualization, geometry and fractals.



Evan began his career as a mathematics and physics teacher at Pascack Valley Regional High School in Hillside, New Jersey. He taught mathematics and mathematics education courses at Montclair State University since 1957. He has also served as an instructor for middle school mathematics teachers in an extensive algebra initiative program for teachers in Newark, NJ, and a NSF-funded summer leadership program in discrete mathematics at Rutgers University, and several NSF-funded summer teacher enhancement institutes on fractal geometry at Florida Atlantic University.

“Students love him, teachers love and admire him, and colleagues admire and respect him”, wrote one nominator. “He epitomizes

outstanding and effective teaching of mathematics and mathematics education at the university and through his writing, speaking, professional development, and grant work.”

He has taught a wide variety of courses that demonstrate his great range of interests. He particularly continues to enjoy teaching an honors class titled “fractals and Infinity” a junior-level course on probability for mathematics majors, and a master’s level course on materials for mathematics teachers. Evan has authored or co-authored many chapters, books and textbook series. He was also a contributor to NCTM’s Navigations Series – in particular, *Navigating Through Measurement in Grades 9-12*.

Evan has been a member of NCTM and the Association of Mathematics Teachers of New Jersey (AMTNJ) for over 50 years. He continues to be a frequent speaker at national and state conferences. Evan also served on the Executive Council of the Association of Mathematics Teachers of New Jersey (AMTNJ) and as editor of its quarterly journal, the *New Jersey Mathematics Teacher*. He is a past editor of the “Activities Section” of *Mathematics Teacher* and designed and served as the first editor of Student Math Notes. At Montclair he received the Teachers in Excellence Award and the Distinguished Teacher Award and was named Outstanding Mathematics Educator by AMTNJ.

GK-12 Project update

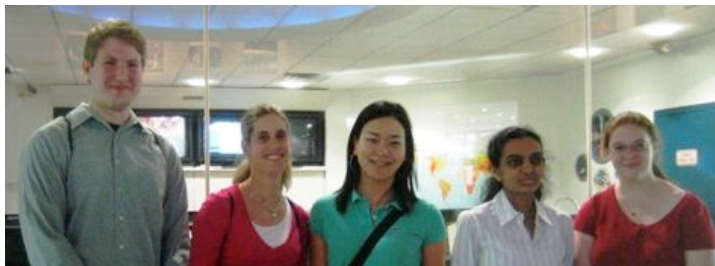
By Mary Lou West, Mika Munakata, and Ken Wolff

The MSU GK12 STEM *Fellows in the Middle* Program is well into its second year, supporting eight graduate students in mathematics and sciences. This semester we continued our international component with China. We

organized two virtual field trips (web conferences) with scientists in the Panama rainforest and with astronomer Jim Bell at Cornell about the Mars Rovers. Upcoming real trips to the Buehler Challenger Science Center in

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Paramus and to MSU for all 200 middle school students will round out our year of planetary science. Six of the eight original



graduate students have now completed their master's degrees, and five new Fellows are starting in late May. In March we had one of the largest and most active teams at the GK12 national meeting at NSF in Washington, DC. Our website www.csam.montclair.edu/gk12 has many innovative interdisciplinary lessons for grades 6–8.

China/US Activities:

The second year of the GK12 international component took place from December 26, 2008 through January 8, 2009. Fellows Tomasz Kurcon (chemistry), Barbara Soares (biology), and Jennifer LaPoma (earth and environmental sciences), Kearny middle school teachers Antonio Moyano (mathematics), Patricia Hester-Fearon (science) and Mary Goffredo (mathematics), and grant personnel Aihua Li and Mika Munakata (both of mathematical sciences) traveled to Beijing and Shandong, China. During their two-week visit, Fellows and teachers gave presentations and interdisciplinary lessons, participated in discussions about research and teaching, and met with many Chinese colleagues. Of course, no trip to China would be complete without climbing the Great Wall and visiting notable sites such as the Forbidden City, and Mt. Tai in Shandong.

From April 29—May 6, we hosted two middle school teachers from Beijing, Fangyuan Fan and Xiuge Wang. They visited Jefferson School in Lyndhurst, Franklin School in Kearny, and attended many CSAM-based events such as a GK12 workshop, classes, Physics Club, MSU student research symposium, and PRISM's Connected Mathematics workshop. Through their visit, we were able to continue collaborative



projects with our partners in Beijing. Most notable, during their visit to Kearny's Franklin school, our visitors were presented with a bound collection of recipes

contributed and written by the 8th grade students. Appropriately, the diversity of the recipes reflected the diversity of the student population there.



NSF national meeting in Washington DC:

In March sixteen members of the MSU team attended the national NSF GK12 STEM meeting, including Fellows, middle school teachers, external evaluators, PIs, and a school superintendent. We were especially pleased that Cathleen Dale was one of only 25 graduate students (out of a thousand) chosen to present her research at NSF headquarters.



MSU people spoke on panels as well as presented lessons.

Fellows:

At the MSU Student Research Symposium in April, Marie McCrary, Barbara Soares, and Tomasz Kurcon gave presentations on their NSF supported research. At the NJ Academy of Sciences meeting Barbara Soares won an award for best student poster. We are also proud of Fellows Sara Saber and Mai Soliman in biology, Cathleen Dale and Jennifer LaPoma in geosciences, and Daniela Kitanska and Kasia Sieminska in statistics for completing their master's degrees.

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Leslie Cheteyan, Jin Park, Matthew Vieira, Caitlin Ament, and Chitra Hindnavis will join our GK12 team as new Fellows for the 2009-2010 academic year. We are very pleased and excited to have them join us, and we hope that they find their experience in the GK12 program both rewarding and valuable. Their fields of research will involve mathematics (Leslie, Jin, and Matthew) and molecular biology (Caitlin and Chitra). Matthew is from St. Peter's College in Jersey City and is our first Fellow from beyond MSU.



Field Trips:

Mrs. Tulloch's students at Franklin School in Lyndhurst found it very exciting to talk directly with Jim

Bell, head of the camera team for the rovers still working on Mars. We are all looking forward to the "Mission to Comet Halley" coming up in a few weeks at Beuhler Challenger Space Center. We are very grateful for everyone who has volunteered to give a talk or workshop for middle school Math/Science Day in June.



We were also favored with a site visit by the NSF program director Sonia Ortega and her team.

Physics News Spring 2009

By Mary Lou West

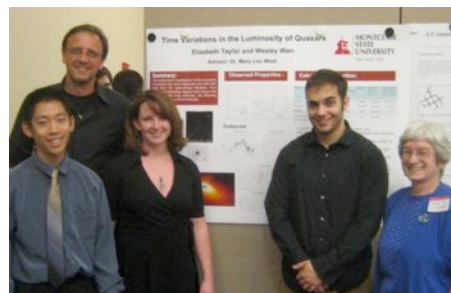
The Physics group has been busy this year. Bob Dorner retired after 41 years and Ashwin Vaidya will join the department in September. Faculty and students are active doing research and participating in the activities of the physics and astronomy clubs. We also offer congratulations to Kwang Jae Bae, the outstanding physics graduating senior, who is going to graduate school in physics at



Case Western Reserve University in Cleveland, Ohio.

Dr. Ashwin Vaidya is coming to MSU from the University of North Carolina in Chapel Hill. He says that he has been passionate about physics, math, and astronomy since his undergraduate days and likes hands-on learning and student research. His research is in complex fluids and applied mathematics and he will have a fluids laboratory. We look forward to having him join our group in September.

Research projects this semester included an analysis of the brightness variability of four distant quasars by Liz Taylor and Wesley Wan, the measurement of lunar heights from shadows by Eric Sonnenwald, an autonomous vehicle project by Sam Petrocelli, non-linear magnetic resonance and the approach to chaos by Oscar Avendano and Craig Lapiere, and a Taylor



column in a rotating fluid by Sam Petrocelli. Some of these were presented at the MSU Student Research Symposium. Mary Lou West continues radio monitoring of the sun and the ionosphere and collaborated on a poster at the THEMIS (Time History of Events and Macroscale Interactions during Substorms) meeting in Boulder.

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The Electricity and Magnetism class learned a lot on a tour of the local NJ Network TV facility.

Wesley Wan is excited about being chosen for an REU at the University of Michigan's Space Physics Research Lab this summer. We look forward to hearing about his experiences there.



This year the activities of the Physics Club included Bob Dorer demonstrating a Jacob's ladder and big capacitors, Ann Frechette imparting communication skills, Dean Hamden demonstrating the

Segway Human Transporter, and student talks by Kaitlyn Murphy on her REU in San Diego last summer, Will Daley on Superfluid Helium II, Sam Petrocelli giving an autonomous vehicle overview, Nathaniel Frissell telling about SuperDARN radar observations of aurorae, and Jose Barrios introducing photons in quantum optics.

Astronomy club activities (NJAG) included Sam Tun (NJIT) on storms in space, Mary Lou West on Mars: beautiful but hostile, teacher Lori Ann Michel and Mike Wallace on their astronomy activities with students at Banyan School, presentations of MSU student research, and

outreach to Astronomy Day in Warren County. Spring's Public Telescope Nights featured Saturn, the Moon, nebulae and double stars as well as the occasional satellite. The new StellaCam video eyepiece was very popular playing on the large TV. Unfortunately the



International Year of Astronomy's "100 Hours of Astronomy" festival was clouded out in Montclair except for one determined 6 year old who insisted on seeing the moon through a telescope. His mother was amused at Tim Buli's solution.



Department News

Professor Qing Wu from Beijing Jiaotong University visited our department from September 2008 to February 2009. During her visit, she collaborated with Drs. Cutler, Li, and Munakata on research projects in graph theory and mathematics education. Several papers on interlace polynomials are in progress. Professor Wu also participated in some classroom activities and taught two experimental classes to pre-service teachers.



In the summer of 2008, our department hosted a six-week REU program in Mathematics. Four

undergraduate students participated in the program. Three of them are from MSU: Elizabeth Arango, math major; Emel Demirel, math major; and Dornel Wilson, math and biology double major. The fourth student is Chinua Umoja from Morehouse College, a math and computer science double major. Directed by Dr. Li, the students worked

on four research projects: two in number theory, one on a time series problem in biology, and one on a conductive path problem in graph theory.

Student Activities

Maria Morales, an undergraduate pursuing the Mathematics degree with a Concentration in Statistics, spent six weeks this summer in Boston Massachusetts learning the principles of applied biostatistics, meeting practicing biostatisticians, epidemiologists, and statistical geneticists, and working with actual data collected in internationally recognized studies that have been funded by the National Heart, Lung, and Blood Institute. Her participation was fully funded by NIH as part of the Summer Institute in Biostatistics (SIBS) program at Boston University. Only 75 students nationwide were awarded the opportunity to participate in the program.

Rushita Desai and **Rocio Duchesne** both pursuing the Master's in Statistics degree, were two of 20 students to be awarded scholarships from SAS Institute to participate in the SAS Global Forum 2009 conference held on March 22-25 at the Gaylord Convention Center in the



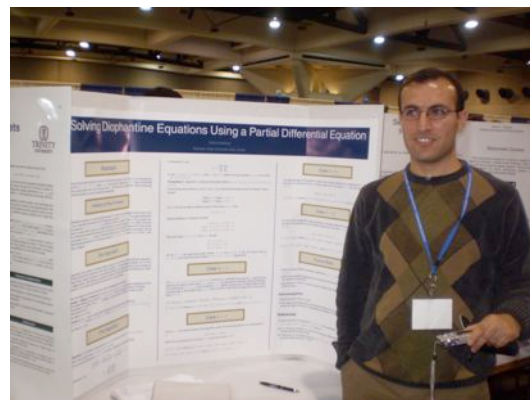
National Harbor, MD. SAS Institute is the leader in business analytics software and services and the largest independent vendor in the business intelligence market. The SAS Global

Forum is the Institute's most important global event for SAS users, IT and business-users. Rocio and Rushita were able to expand their knowledge of the software, investigate applications of statistics to areas such as genetics and data mining, and to network with other SAS software users and potential employers.

Math Major **Cihan Karabulut** participated in an REU program in mathematics at SUNY Postdam-Clarkson REU during the summer of 2008

Congratulations to the REU fellow **Elizabeth Arango** who gave an oral presentation at the MAA MathFest Student Paper session and won the best speaker prize in her session. Her research poster, "The Behavior of DS-Divisors of Positive Integers", was also selected for presentation the 2009 Posters on the Hill in Washington D.C.

Congratulations to Cihan Karabulut who received a five-year scholarship from CUNY's Graduate Center to pursue Ph. D. in algebra/number theory.



Faculty Activities

Dr. Lora Billings had the following papers appear:

* Ira B. Schwartz, Lora Billings, Mark I. Dykman, and Alexandra Landsman, "Predicting extinction rates in stochastic epidemic models" Journal of Statistical Mechanics: Theory and Experiment (2009) P01005.

<http://pages.csam.montclair.edu/%7Ebillings/re>

[search/jstat2008.pdf](#)>

* Lora Billings, Ira B. Schwartz, and Mark I. Dykman, "Thermally activated switching in the presence of non-Gaussian noise," Physical Review E 78 (2008) 051122.

Dr. Billings gave the following two presentations this semester:

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* March 20, 2009, Contributed talk, “Interstate switching induced by non-Gaussian noise,” American Physical Society March Meeting, Pittsburgh, PA.

* March 17, 2009, Invited talk, “Interacting Systems in Noisy Environments,” ARO System of Systems Analysis Workshop, Physical Sciences Laboratory, New Mexico State University.

Dr. Jonathan Cutler had the following paper appear:

* J. Cutler, Trees through specified vertices, *Discrete Mathematics* 309 (2009), 2749–2754.

Dr. Cutler gave the following presentations this semester:

* “Entropy inequalities,” SIAM Minisymposium on Graph Theory, AMS-MAA Joint Meetings, Washington, DC, January 2009.

* “Extremal problems for counting homomorphisms,” Special Session on Extremal and Probabilistic Combinatorics, AMS Sectional Meeting, Urbana-Champaign, IL, March 2009.

* “Negative dependence and Srinivasan’s sampling process,” 22nd Cumberland Conference, Bowling Green, KY, May 2009.

In March, **Dr. Aihua Li** was invited to participate in the CURM Spring conference held in Brigham Young University.

In January, Dr. Li participated in the MSU GK-12 activities in China. She was also invited to give a presentation, “Undergraduate Research in the United States – Enhancing Teaching and Learning through Research”, in the College of Science, Beijing Jiaotong University.

During spring 2009, Dr. Li reviewed three articles for *Math Reviews*.

In December 2008, Dr. Li participated in *The International Conference of Tradition and Innovation on Curriculum and Instruction for 21st Centenary*, held in Beijing Normal University. In the special session, “The Ways and Methods of Curriculum and Teaching”, Dr. Li made a joint presentation with Dr. Mika Munakata that is titled “Bringing Cutting-Edge Research to the Middle School Classroom”. Also in December, Dr. Li gave an invited presentation in the special session on Combinatorics and Discrete Dynamical Systems of the First AMS Joint Meeting with Shanghai Mathematics Society.

In November, Dr. Li participated in the MAA-NJ Sectional meeting and was elected to be the

secretary of the NJ section, starting from November 2008.

Dr. Li hosted a visiting professor from Beijing Jiaotong University, Professor Qing Wu, for six months during the 2008/2009 academic year. In November 2008, Dr. Li presented a joint paper with Professor Wu in the “Graph Theory Day 56” Conference. The title is “Interlace Polynomials of Certain Graphs”.

In August, Dr. Li gave an invited presentation, “Tracing n-dimensional Space points”, in the special session on *Research with Undergraduates* held in MAA MathFest, Madison, Wisconsin.

Dr. Li had the following articles appear:

* Joseph P. Brennan, Aihua Li, Qun Huo, “Advancing Lattice Path Models for Nanoparticle Percolation of Conductivity in a Non-conductive Matrix”, *Journal of Computational and Theoretical Nanoscience*, Volume 6, Number 3, March 2009, pp. 519-524(6).

* **Mika Munakata**, Aihua Li, “Reflections on Montclair State University–Beijing Connection”, *MAA Focus – the New Magazine of the Mathematical Association of America*, Vol. 8, Number 8, Nov. 2008.

* John Wang, Dajin Wang, and Aihua Li, “Goal Programming and Its Variants”, in Adam, F. (ed.), *Encyclopedia of Decision Making and Decision Support Technologies*, Vol. 1, A–Im, Information Science Reference, Hershey, PA, 2008.

* Xiaoying Teng, Aihua Li, “Bilingual Teaching – an Important Component for Education Globalization”, *Proceeding of the World Conference of Systemics, Cybematics, and Informatics*, Orlando, 2008.

Recently, Dr. Li was awarded a CURM (Center for Undergraduate Research in Mathematics) grant from NSF, subcontracted with Brigham Young University.

Dr. Li is the recipient of a Small Grant for Undergraduate Research sponsored by the Investors Savings Bank Charitable Foundation and CSAM that supported a research project with an undergraduate math major, Cihan Karabulut.

CURM grant for 2009-2010

Drs. Aihua Li and David Trubatch were awarded a grant for Academic Year 2009-2010 by the Council for Undergraduate Research in Mathematics. This NSF grant, subcontracted

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with Brigham Young University, will provide stipends and travel expenses for a group of 5-6 undergraduates who will work on individual and joint research projects and present their results at the CURM Spring Meeting in March 2010. The grant will also provide faculty stipend for the academic year 2009-2010 and faculty training in the summer 2009.

Dr. Arup Mukherjee had two papers accepted:

* A. Mukherjee and B. Mukherjee, "Freedericksz Transition in Nematics: Effects of Non-Linear Shear Profile and Elastic Anisotropy," *GMCL Molecular Crystals and Liquid Crystals*.

* A. Mukherjee and Katarzyna Sieminska, "Freedericksz Transition in Couette Flow of Nematics," *International Journal of Applied Mathematics & Statistics*.

Dr. Bogdan G. Nita received the J. Clarence Karcher Award from the Society of Exploration Geophysicists for the year 2009. The award is given in recognition of significant contributions to the science and technology of exploration geophysics by a young geophysicist (under 35) of outstanding abilities. Dr. Nita was selected for the award for his research on inverse scattering methods applied to seismic imaging.

Dr. John G. Stevens and his colleagues, John T. Farrell of ExxonMobil Research and

Engineering and Long Liang of Reaction Dynamics, have had their article, "The use of dynamic adaptive chemistry in combustion simulation of gasoline surrogate fuels," accepted for publication in *Combustion and Flame*.

Dr. Diana Thomas had the following papers accepted, one of which was co-authored by a student, **Ashley Ciesla**.

* Diana Thomas, Marion Weederemann, **Lora Billings**, Joan Hoffacker, Robert Washington-Allen, "When to Spray: A Time Scale Calculus Approach to Controlling the Impact of West Nile Virus," *Ecology and Society, Special Feature: Catastrophic Thresholds, Perspectives, Definitions, and Applications*.

* Diana Thomas, Ashley Ciesla, James A. Levine, **John G. Stevens**, Corby K. Martin, "A Mathematical Model of Weight Change with Adaptation," *Mathematical Biosciences and Engineering*.

Dr. David Trubatch gave an invited seminar talk at the CUNY Graduate Center on April 24, 2009 with the title "Inverse-scattering transform and vector solitons for vector NLS with Nonvanishing Boundary Conditions: a Different Approach". After the main talk, he briefly introduced and showed some video of ferrofluid bubbles attracting one another, just to show what else people are doing here at Montclair.