

For alumni, friends, faculty, and staff of the MSM-UMR-Missouri S&T Physics Department

Materials from the Mind, Not the Mines

Julia Medvedeva, assistant professor of physics at Missouri University of Science and Technology, believes that materials can come from the mind, not just the mines.

Medvedeva is examining how such properties as optical transparency or electrical conductivity depend on how atoms are put together on the microscopic level. In-depth understanding of underlying physical phenomena allows her to design new materials with properties required for a particular application.

“We are experiencing a materials revolution,” Medvedeva says. “Advanced materials have already transformed the lives of millions of people. Now, supercomputers facilitate the progress toward even more high-tech innovations.”

Until recently, scientists concentrated on understanding materials that exist in nature or are prepared in a laboratory. Ever-more-powerful supercomputers and the development of state-of-the-art computational approaches now make it possible for researchers to simulate new materials and manipulate their properties based on knowledge of the atomic composition and the spatial arrangement of the atoms.

Such computational “experiments” allow Medvedeva to speed up the search for materials with optimal performance for a specific application – something that could have taken years to achieve using trial-and-error experimental techniques.

In particular, Medvedeva is interested in a unique class of materials called transparent conductors, which share the contradictory properties of being transparent, like glass, and electrically conductive, like metal. Transparent conductors are vital components in many devices, including solar cells, smart windows, flat-panel and flexible displays, invisible, or “see-through,” electronics and gas sensors. Despite the multitude of applications and the growing demand for such devices, only four materials are known to be good transparent conductors – doped zinc, indium, cadmium and tin oxides. Of the four, only two are used commercially.

Although relatively simple compounds, all of the known transparent conductors require sophisticated preparation techniques to achieve optimal balance between sufficient optical transparency and useful electrical conductivity. Furthermore, the oxides are becoming increasingly expensive, and indium and cadmium are highly toxic.

With financial support from the National Science Foundation (NSF) and the Petroleum Research Fund of the American Chemical Society, Medvedeva is working to develop new transparent conductor materials that are more efficient and environmentally friendly, easier to fabricate, and less expensive. Her preliminary research shows that with proper preparation calcium, aluminum or silicon oxides, the most abundant substances in the Earth’s crust, can be made electrically conductive while maintaining their superior optical properties.



Julia Medvedeva

In this issue:

Memo from the Chair	2
Physics Department Scholarships	3
Report from the SPS	4
Captain Jack Crossproduct	5
2007 Physics Degree Recipients	5
From Alumnus Ryan Rule	6
Story Receives Teaching Award	6
Corporate Support Acknowledged	6
S&T of the USA	7
Vojta Gives Lectures in Korea	8
2007 Physics Academic Scholars	8
Physics Undergrads Win Awards	9
Magnus to Serve on Space Station	9

Your Support Acknowledged	10
Phonathon 2008	11
Class of '57 Honored	11
S&T Students & Alumni: in Press	11
Frey Awarded Professional Degree	12
Alumni Notes	12
Frontiers in Physics	13
Fourteenth Annual Schearer Prize	14
Prize Winner Allison Harris	14
Prize Winner Ola Al-Hagan	14
36 th Annual Fuller Research Seminar	15
Faculty Notes	15
Homecoming 2008	15

Medvedeva has also received grants that give her access to national supercomputer facilities, the National Energy Research Scientific Computing Center and TeraGrid Cluster, supported by the DOE and NSF. Her research has attracted worldwide attention. She recently gave invited talks at the Materials Science and Technology Conference, the International Symposium on Transparent Conducting Oxides, the Toyota Central Research and Development Lab and the Tokyo Institute of Technology.

Memo from the Chair

This year has brought many changes to the department and to the campus in Rolla. The fact that I am writing my first remarks as department chair is indicative of the major changes that have occurred in the department in the last year. Last September **Paul Parris**, who served as chair of the department since September 2000, stepped down as chair of the department. Paul spent the fall semester on a much deserved research leave in New Mexico and France. He has now rejoined the department and resumed his teaching and research activities here in Rolla. I am delighted to report that in my short time in the chair's position I have found that the department was well served during Paul's tenure as chair. The size of the student population in the department has grown during his time as chair, but at the same time the quality of our students has remained as high as ever. Also, in a period where there were numerous retirements, Paul was able to continue to maintain the number and the high quality of the physics faculty. He was extremely effective in guiding the department through some difficult times when resources were often scarce while maintaining the department's vitality and high quality. The department is greatly indebted to Paul for his fine service.

From the campus point of view, as you no doubt already know, the name change from the University of Missouri-Rolla to Missouri University of Science & Technology became official in January. The change is meant to create a stronger identity for the university and to better define the university's role as a leading technological research university. This ends 40 years under the University of Missouri-Rolla banner, and we hope begins a period when the university becomes as well known on a national and international level as it deserves to be.

Another change at the campus level involved the completion of the administrative restructuring that is intended to help the university achieve its goal of becoming one of the top five technological research universities in the country. The restructuring has eliminated the schools and colleges that grouped related academic disciplines. Now each department reports directly to the Provost who is the Chief Academic Officer of the campus. The restructuring has resulted in reassignment of roles and responsibilities across campus, and I think it is fair to say that we are still very much adjusting to how this new structure will work. There have been a few bumps along the way, but no casualties to date.

Returning to changes in the department, this year saw the retirement of Curators' Professor **Ron Olson**. Ron retired effective this January, but still maintains his research when he is not busy golfing or fishing. Ron joined the department in 1981. In January 1987 his contributions to the University of Missouri were recognized by his appointment as a Curators' Professor, and in 1987 he was awarded the University of Missouri Presidential Award for Research and Creativity. Ron has had a very

distinguished career and is recognized as one of the world's experts in atomic collision processes. As chair, I would like to thank Ron, on behalf of the department and the Missouri S&T physics community, for his many years of dedicated service to the department and the university.

During a period of much change, I am grateful that some things remain consistent. I am speaking of the quality of our students, and to their dedication. We consistently have one of the best groups of students on campus. Their energy and enthusiasm for their work are remarkable. A very large fraction of our undergraduates participate in research programs both at Rolla and in summer programs across the U.S. The results of their research consistently win or place high in research competitions on campus and state wide. In December, **Emilio Nanni**, who graduated with a 4.0 GPA in Physics and Electrical Engineering, was chosen to represent the graduating students on the graduation platform during the final UMR commencement ceremony.

Also this December it was my pleasure to meet **Steven R. Frey** who was awarded a professional degree from the physics department at the December 2007 commencement. Steve received his MS from UMR in 1986 and is currently Director of Applied Research and Laser Directed Energy at Lockheed Martin Missiles & Fire Control in Orlando, FL. He and his wife **Michelle** are to be commended for braving a Missouri snowstorm during their visit after residing in Florida for so many years (though I am told their children very much enjoyed the experience). His visit is detailed elsewhere in this edition of *Matter n' Motion*.

Finally I must say that my short time in office has been extremely enjoyable. This department is blessed with tremendous faculty, staff, students, and alumni. The dedication and commitment of all these groups to the department and to the university make this job easier, and interacting with all of you is one of the pleasures of this position.

I extend an open invitation to any and all alumni to visit the department and see first hand the great things that are happening in Rolla, and to share with us the exciting things you have been doing since your graduation.

– Dan Waddill



Physics Department Awards 2007-2008 Scholarships and Fellowships

The following scholarships have been endowed through the generous gifts of the friends of the Missouri S&T Physics Department. Please contact the Physics Department if you would like to add to the endowment fund of these scholarships or would like to establish a new one.

Recipients of the *Harold Q Fuller Scholarship-Loan* were **Mark Herrera**, of Kansas City, Missouri and **Christopher Van de Riet**, of Eureka, Missouri. The \$1,300 scholarship-loan was endowed by the late Dr. **Harold Q Fuller**, chair of the Physics Department from 1948 to 1970 and former Dean of the College of Arts and Sciences, to recognize outstanding achievements among juniors and seniors in physics. One quarter of the scholarship is an interest-free loan that students begin to repay when they start their first jobs.

The recipient of the *Burke H. Miller Memorial Scholarship* was **Michael Hoffman**, of Russellville, Missouri. This \$500 endowed scholarship was established by the Miller family to commemorate the academic achievements of their son, Burke, who graduated with a bachelor's degree in physics in 1969 and later died during the Vietnam War. The award is for promising and dedicated students in physics.

Ryan Hupe of Troy, Missouri, **Lauren Rich**, of St. Joseph, Missouri, and **Dustin Spieker**, of Shawnee, Kansas, were awarded the \$1000 *Ed and Mary Sue Sickafus Endowed Scholarship/Fellowship*, established by **Ed** (BS '55, MS '56) and **Mary Sue Sickafus** in conjunction with the Ford Motor Company and awarded to physics students on the basis of their performance at Missouri S&T.

Lane Martin, of Rogersville, Missouri and **Shellie Huether**, of St. Louis, Missouri received the *Leon E. Woodman Memorial Scholarship*. This \$1000 scholarship was established by the Woodman family in honor of Dr. **L. E. Woodman**, Chair of the Physics Department from 1919 to 1948. It is offered to students in physics who are of good moral character, maintain a satisfactory grade point average, and are in financial need.

The *Richard W. Hannum Endowed Development Fund* was established through a bequest by **Richard Hannum** (PhD '66). The fund is currently used to provide scholarships for outstanding students in Physics. **Quinn Looker**, of Hensley, Arkansas received the \$500 Hannum Scholarship for 2007-2008.

The *Stephen P. Reed Scholarship Fund*, an endowment, provides scholarships to US citizens enrolled in mathematics or physics who are sensitive to a peaceful and humane search for knowledge and solutions to technical problems of mankind. **Elizabeth Fiechtner**, of Sioux Falls, South Dakota and **Ciaran Ryan-Anderson**, of Ellsinore, Missouri received the \$1000 Reed Scholarship for 2007-2008.

The *Richard Anderson Scholarship Fund* is an endowment established in memory of Dr. **Richard Anderson**. **Tara Biggers**, of Marshfield, Missouri received the \$1000 Anderson Scholarship for 2007-2008.

In addition to endowed scholarships, which are usually awarded to juniors and seniors, the department awards special *Physics Department Scholarships*, funded from the annual phonathon, to students who earn a grade point average of 3.5 or higher. This past year, department scholarships ranging from \$500 to \$1000 were awarded to **Christopher Bellavia**, of St. Louis, Missouri, **Nicholas Brackley**, of Memphis, Tennessee, **Joshua Cardenzana** of Reeds Springs, Missouri, **Brian Derickson** of Farmington, Missouri, **Michael Hoffman**, of Russellville, Missouri, **David Kimzey**, of Arnold, Missouri, **Gena Robertson**, of Ellsinore, Missouri, **Ciaran Ryan-Anderson**, of Ellsinore, Missouri, **David Skinner**, of Kansas City, Missouri, **Bradley Towery**, of St. Charles, Missouri, **Jake Walker**, of Kansas City, Missouri, **Thomas White**, and **Benjamin Williams** of Florissant, Missouri.

Endowments: Gifts that Keep on Giving

Through the generosity of friends and alumni, the Department of Physics has been very successful in raising annual support for scholarships, student travel funds, and program enrichment. As you make your annual commitment to the department, however, you might want to consider starting an endowment in your name or in the name of a loved one, so that your gift will still be making a difference when your great-grandchildren enroll at Missouri S&T. An endowment to the university will bear the name that you designate in perpetuity.

Consider the impact of leaving an endowed scholarship or lecture series in your name. With an initial gift of \$10,000 (which may be started with \$2,000 and a pledge of \$2,000 annually over the next five years) you can start a fund from which generations of students will benefit. The fund will generate approximately \$500 per year initially, and will

continue to grow as the principal increases each year. The Missouri S&T Physics Department has several donors that have been adding to their endowment for several years, including endowments recently established by **Ed** and **Mary Sue Sickafus**, and by the estate of **Richard Hannum**.

Endowments may be established with cash or readily marketable securities. Regardless of the amount of the endowment you wish to establish or the methods used to establish it, your investment will have a significant and long-term impact on the Physics Department and on the Missouri University of Science and Technology. If you have questions about creating an endowment or making a gift to the Physics Department please contact the Office of Development at 1-800-392-4112 or email giving@mst.edu.

Report from the SPS

The Society of Physics Students (SPS) is viable and flourishing. Our home in the physics building, Room 222, is a-stir with studying, broom fights (see photo) and heated political discussions in light of the upcoming elections. While we feel the absence of our past members we are happy for them and wish them well in the future; however, the SPS room is home to many new faces this semester as the seniors have passed leadership to the sophomore and junior members in the department. The new officers are: **Jason Mast** (president), **Lauren Rich** (vice president), **Tom Schmit** (treasurer) and **Zach Weber** (secretary).

Last year the department, now under the reins of Dr. Waddill, sent a record number of 14 students to the Argonne National Lab Undergraduate Research Symposium. Your contributions to the annual department phonathon make this wonderful trip possible. **Ryan Hupe**, **Mark Herrera**, **Michael Hoffman**, **Emilio Nanni** and **Paul Robinette** presented research in astrophysics, complex network theory, plasma physics, the ATLAS detector at CERN and computer science. But that's not all. The department gave the undergraduates two weeks of colloquium this fall to showcase their summer research. The event was very successful with six undergraduates participating: Mark Herrera, Emilio Nanni, Michael Hoffman, Ryan Hupe, **Shellie Huether**, and **Josh Cardenzana**.

In addition, SPS has been holding regular meetings and special events throughout the year. We have created our own lecture series, *The Wandering Series*, allowing students to show their interests in physics while gaining the presentation skills needed for industry and academia. We have also hosted guest speakers such as Dr. Rodgers in the geology department who gave a very intriguing talk, *The Race toward the Atomic Bomb*, based on live interviews with the scientists who helped build the bomb.

The chapter is staying active on campus and trying to promote undergraduate involvement in science by sponsoring the Missouri S&T Journal Club. We also hosted our fall picnic and held many movie nights in the physics building.

With the approaching commencement in May we say goodbye to our graduating members: Mark Herrera, Michael Hoffman, Shellie Huether, Ryan Hupe, **Tom Mahler**, Paul Robinette and Emilio Nanni (who graduated in December). We wish them all the best of luck in their careers and graduate studies. To all alumni we extend a warm welcome and would enjoy it if you dropped by to say hello if you are in the Rolla area.

--Mike Hoffman, President of SPS



Emilio Nanni speaking at Argonne



cleanup time in the SPS room



Lauren Rich, Lane Martin, and Mark Herrera

A Visit From Capt. Jack Crossproduct

Special guest Captain **Jack Crossproduct** visited our Physics 24 (Engineering Physics II) classes on October 31 last fall. Captain Jack specializes in teaching the right-hand rule to handedness-challenged students.

"Arrrrr've never seen a student use tharrrr left hand marrrr than once when arrrrpplying the arrrrright-hand arrrrrule," says Capt. Jack, emphatically swinging his cutlass to get his point across.



Capt. Jack Crossproduct



Congratulations to S&T's 2007 Physics Degree Recipients!

May 2007

Bachelor of Science

Lindsay Leigh Bailey
Adam Joseph Blinzler
Micah Elliot Burgdorf
Joshua Warren Carey
Zachary Louis Christensen
Jonathan Lamar Reinagel
Zachary Allen Stegen
Brett Owen Curtis Sweeney
Steven Charles Underwood
Andrew William Walters
Sara Jo Whitbeck

Doctor of Philosophy

Jorge Nicholas Brea

December 2007

Bachelor of Science

Quinn Looker
Emilio Alessandro Nanni

Master of Science

Jared Martin Gavin

Doctor of Philosophy

Eric Samuel Mandell
Raghuvveer Reddy Gadipalli

Leaving a Legacy Through Your Will

A planned gift makes a perpetual statement about your dedication to MSM-UMR-Missouri S&T. While many may not be able to establish an endowment today, they find that they are able to leave a significant legacy to the university through a planned gift, such as a bequest, life income gift, or life insurance. By making a planned gift, you show your loyalty to an institution that has played a significant role in shaping your future. For more information about giving a planned gift, contact the Office of Development at 1-800-520-0938 or e-mail giving@mst.edu.

From Alumnus Ryan Rule

After graduation from UMR I went to work for the Electromagnetic Effects Technology group at Boeing Phantom Works and was able to enroll in the Physics Master of Science program at the University of Washington. In 2003, I purchased a floating home on Portage Bay near the UW campus and began pursuing a Computer Science and Engineering M.S. degree.

Upon completion of my Physics MS in 2005, and after four years of lightning research and analysis/tool development, I moved on to work for the Connexion by Boeing organization where I was fortunate enough to be able to work and fly on some unique aircraft such as the Boeing corporate jet, the USAF E-4B, and many others. I was even able to spend time working on Airbus, Boeing and Bombardier planes around the globe in locations such as Frankfurt, Manila, Montréal, Taipei and several others.

After a year of travelling, I got involved with the Wedgetail project (a set of six surveillance aircraft for the Royal Australian Air Force) where I operated the datalink system onboard a number of flight tests including "Trident Fury '07," a Canadian military exercise involving aircraft from several nations. 16 months of working with military people convinced me to move from the defense side of Boeing to the commercial side. As a result, I have just started a new job on Electronic Flight Bag, whose goal is to provide a wide range of useful information to the pilot while keeping the airlines' headquarters informed of near real-time maintenance information.

I am now engaged to **Carrie Mantsch** (BS '00 Math, MS '03 Math) who I first met at UMR in 1999. Our wedding will be on August 2nd, 2008 and we will be taking our honeymoon in north eastern Australia. I plan on finishing my CSE MS during Fall of 2008.



Ryan Rule and Carrie Mantsch

Physics Department Acknowledges Corporate Support

The Physics Department gratefully acknowledges the support of the following corporations:

3M Foundation
Boeing/McDonnell Douglas Foundation
Chevron Corporation
ConocoPhillips
General Electric
General Mills Foundation
Hill's Books
Novellus Systems, Inc.
Shell Oil Company Foundation
Sun Microsystems

Greg Story Receives Teaching Award

This past year, physics faculty member **Greg Story** received the Missouri S&T *Outstanding Teaching Award*, which honors the top 10 percent of teachers campus-wide.

Greg has won eight teaching awards over the last six years including five straight Outstanding Teaching Awards, as well as awards for outstanding teaching in large courses and laboratory courses.

S&T of the USA

As you surely know by now, MSM/UMR is now Missouri University of Science and Technology. Summarizing the name change blog (<http://namechange.mst.edu/>), the reasons for the change were:

To distinguish us from the other University of Missouri campuses. Among the four University of Missouri campuses, Missouri University of Science and Technology is unique because of its focus as a technological research university. “UMR,” however, did not reflect the distinctive nature of the campus. Often, UMR was viewed as a “satellite” or “branch” campus due to its name or as a “feeder” campus for the University of Missouri-Columbia (commonly referred to as the University of Missouri). This branch-campus designation hindered many of our efforts to achieve national recognition and a strong reputation as a technological research university. Alumni, faculty and staff reported the campus confusion, as they were often referred to as being associated with the “University of Missouri” in edited biographies, introductions and news media reports.

To reflect the university’s national mission. The goal of Missouri S&T’s Strategic Action Plan is to make us one of the nation’s top five technological research universities by 2010. Many of our “comparators” possess names that better reflect their mission. Universities such as California Institute of Technology, Massachusetts Institute of Technology, Rensselaer Polytechnic Institute and Georgia Institute of Technology all have names that reflect their mission.

To broaden our market share for the best students nationally. Interest in engineering continues to decline on a national level. Currently, less than 5 percent of college-bound high school seniors express an interest in engineering. Compounding this problem, the number of high school graduates in Missouri will decline by around 10 percent between 2010 and 2013. More than 75 percent of our students traditionally come from Missouri, with the remainder coming mostly from contiguous states. The shifting demographics and declining student interest in engineering and science threaten our future viability. A name that is more descriptive of our focus in science and technology will help us attract the students interested in such an education.

To enhance the university’s reputation. While “UMR” was known in the Midwest and in specialized circles for its academic excellence, it was less well known on a national and international scale. Beyond the Midwest, prospective students often viewed UMR as a branch campus. One indicator of this lack of visibility can be seen in the number of ACT scores UMR received from high school seniors outside of Missouri. Of the 1.1 million seniors in the nation who took the ACT in 2006, only 551 non-Missouri seniors – or .05 percent – sent their scores to UMR. A more distinctive, mission-based name will more easily achieve national visibility for both our recruiting efforts and our research programs.

The UMR name is well known in our geographic region and among the research agencies and corporate recruiters aware of our areas of expertise. However, beyond those areas, the name and reputation are either confused with MU or unknown by uninformed students, corporate partners and opinion leaders. For 42 years, the university had limited success in marketing itself as a national technological research university because of the regional, branch-campus designation of the name. While the marketing and recruitment efforts were successful to a limited extent, the lack of a distinctive name made recruitment on a national scale much more difficult.

To many, including the media and academic leaders who rank our reputation in national polls, the place identifier “Rolla” on University of Missouri-Rolla signified that our university is a branch campus or a regional institution. This was particularly true among residents of states where hyphenated names are used to indicate such institutions. Even the regional and national media frequently credited the work of our faculty and students to MU or the University of Missouri.

A name that more accurately reflects our strengths will make us more effective in our national enrollment, research, and fundraising efforts.

Right now, you are probably asking yourself, “what should I call my university?” The full, official name is “Missouri University of Science and Technology.” For audiences familiar with the campus, “Missouri S&T” is always acceptable. When space is tight, “Missouri S&T” is preferred, but “S&T” is acceptable because we’re unique—there is no other S&T in the USA!



But beware! If you call your alma mater “MUST,” “MS&T,” or “MST,” Captain Jack Cross-Product (see page 5) just might pay you a visit.



To Contact S&T Physics

If you would like to contact us for any reason, you can reach us by phone at (573) 341-4781 and by e-mail at physics@mst.edu. You might also be interested in checking out our web page, <http://physics.mst.edu>.

Vojta Gives Lectures in Korea

Professor Thomas Vojta was invited to give a series of talks during the Winter Workshop on Strongly Correlated Electrons organized by the Asia Pacific Center for Theoretical Physics (APCTP) in February 2007.

APCTP is an international research center in theoretical physics supported by ten member countries from the Asia-Pacific region. It is hosted by Pohang University of Science and Technology in Korea which was recently ranked as the leading science and technology university in Asia.

During the workshop which focused on “Emergent Phenomena near Quantum Critical Points,” Vojta gave several lectures on the current understanding of quantum phase transitions, the effects

of impurities, and the interplay between disorder and dissipation. The talks stimulated lively discussions with participants from all over the world leading to new ideas and collaborations.

Vojta’s lectures were well received by the audience, and he has been invited to return to the APCTP for the upcoming Summer School on Strongly Correlated Electron Systems in July 2008.

In addition to the workshop the schedule left some time for sightseeing in South Korea’s capital, Seoul, and a ride on the impressive KTX high-speed train that can reach more than 200 miles per hour.



Gyeongbok Palace in Seoul, which dates back to 1395

Congratulations to 2007 Physics Academic Scholars

Students who maintain at least a 3.50 GPA for twelve hours or more of coursework are honored for their outstanding accomplishment by being named Academic Scholars.

Spring Semester 2007

The list of Academic Scholars replaces what was previously known as the Dean's List. Due to administrative restructuring, there was no Academic Scholars/Dean's List for Spring 2007.

Fall Semester 2007

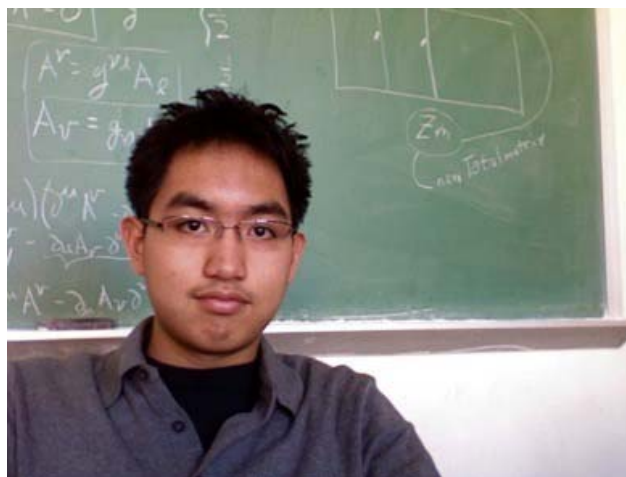
Benjamin Bethge, Tara Biggers, Nicholas Brackley, Kiley Bush, Brian Derickson, Adam Farquhar, Elizabeth Fiechtner, Paul Gholson, Jonathon Gigax, Mark Herrera, Michael Hoffman, Shellie Huether, Ryan Hupe, Christopher Immele, Douglas Kimmich, David Kimzey, Benjamin Knapp, Quinn Looker, Jason Mast, Ciaran Ryan-Anderson, Thomas Schmit, Kenneth Smith, Dustin Spieker, Bradley Towery, Christopher Van de Riet, Zachary Weber, and Benjamin Williams.

Physics Undergrads Win Awards

Three Physics Department undergrads received awards for their presentations at the 3rd annual Missouri S&T Undergraduate Research Conference, held on April 11, 2007. The awardees were **Michael Hoffman**, who received first place in the Natural Sciences Oral Session for his presentation “*Detecting gamma-rays with quantum dots*,” done in collaboration with **Emilio Nanni** under the supervision of Drs. **Max Bertino** and **Ralph Alexander**; **Lauren Rich**, who took second place in the Natural Sciences Poster Session for her poster “*Quantum dot photolithography*,” supervised by Dr. Max Bertino; and **Mark Herrera**, who was awarded third place in the Natural Sciences Poster session for “*The slow light effect in dual-periodic photonic crystals*,” under the supervision of Dr. **Alexey Yamilov**.

Michael Hoffman was first place winner in the Physics, Mathematics, Engineering, and Computer Science Division at the April 20, 2007 Collegiate Division competition of the Missouri Academy of Science, where he again presented “*Detecting gamma-rays with quantum dots*.” **Shellie Huether** placed second in the poster competition, which was open to all categories and had 40 entries. Her poster was “*Slow dynamics at the smeared phase transition of randomly layered magnets*,” done with **Ryan Kinney** and supervised by Dr. **Thomas Vojta**.

Mark Herrera was one of 20 recipients worldwide of a *Milton Chang Travel Grant*, which he used to present his research at the 2007 annual meeting of the Optical Society of America (Frontiers in Optics). His presentation was “*Waveguiding in photonic crystal slab with variable thickness*,” supervised by Dr. Alexey Yamilov.



Mark Herrera

Sandra Magnus to Serve Aboard Space Station

Veteran space flyer and Missouri S&T Physics alumna **Sandra Magnus** (BS '86, MS EE '90) is scheduled to fly on the Space Shuttle to the International Space Station in April of this year. Magnus will remain aboard the space station as a flight engineer and NASA science officer for space station Expedition 17. Magnus will return to Earth on the Space Shuttle STS-126 mission targeted for summer 2008.

In October 2002, Dr. Magnus flew aboard shuttle mission STS-112. In completing her first space flight she logged a total of 10 days, 19 hours, and 58 minutes in space. STS-112 was an International Space Station assembly mission. Dr. Magnus operated the space station's robotic arm during the three spacewalks required to outfit and activate the new component.

Magnus has also served on expeditions beneath the surface of the earth. She led a four-astronaut crew on a seven-day undersea mission in September 2006, onboard the National Oceanic and Atmospheric Administration's Aquarius underwater laboratory. During this mission, astronauts imitated moonwalks, testing concepts for mobility using various spacesuit configurations and weights to simulate lunar gravity. Aquarius is a 45-foot-

long, 13-foot-diameter complex three miles off Key Largo in the Florida Keys National Marine Sanctuary. The laboratory rests 62 feet beneath the surface.



Sandra Magnus shows how you wash your hair in space (NASA photo)

The Physics Department gratefully acknowledges the support of the following alumni and friends.

Donations over \$100:

Leroy H. Alt
 Daniel J. Arbini
 Fred Keith Baganoff
 Mark Jeffery Barnhart
 Howard L. Brooks
 Charles E. Byvik
 Lewis K. Cappellari
 James H. Carlson
 Ross O. Carnes
 Matthew Henry Commens
 David C. Davisson
 Kenneth L. Dufner
 Ronald C. Epps
 Clayton E. Evans
 Courtney Ryan Feeler
 Steven R. Frey
 Alexandre Frohlich
 Thomas K. Gaylord
 John R. Glaese
 Steven R. Goldammer
 Barbara N. Hale
 Edward B. Hale
 Stanley S. Hansen
 Harry E. Hardebeck
 Terrance Rich Harrison
 Daryl C. Hatfield
 Jon Mark Holdman
 Wayne E. Holland
 Thomas K. Holley
 Paul Joseph Kemper
 Jerry Kiefer
 Erika Gabriella Kisvarsanyi
 Rollin H. Koontz
 Gary S. Kovener
 James I. Latham
 Charles C. Limbaugh
 Don Madison
 Sandra H. Magnus
 Rex A. Mann
 Donald I. Meyer
 Brian G. Millburn
 Thomas F. Miller
 Michael J. Mochel

David Patrick Moore
 Mark W. Morris
 Charles W. Myles
 Arthur L. Nickless
 Michael Lee Noble
 Ronald E. Olson
 Donald L. Packwood
 Paul E. Parris
 Daniel N. Payton
 Lajos B. Peresztegy
 Kathryn Masterman Pimmel
 Norman H. Pond
 John S. Price
 Donnie W. Priest
 Frederick H.K. Rambow
 Roger L. Reagan
 Donald A. Reago
 Franklin D. Schowengerdt
 Jeffrey Paul Schroeder
 Scott Richard Sehlin
 Richard H. Shields
 Dale R. Shull
 Arthur M. Soellner
 Kiran Girish Sonnad
 Mrs. Leslie (Harriet) Spanel
 Edward E. Stepp
 Curtis Steven Stratman
 Millard K. Underwood
 Michael A. Vietti
 Steffen Thomas Vojta
 Jay Andrew Wallmark
 Gerald Wilemski

Donations under \$100:

Bruce C. Anderson
 Sheldon I. Arenberg
 Sandra L. Bax
 John S. Bosnak
 Christopher J. Brannon
 Mack A. Breazeale
 David K. Bross
 James P. Canner
 John C. Carstens
 Charles H. Church
 Patrick L. Cole
 Vibhakar R. Dave
 Kevin B. Edwards
 Roger Keith Foehrweiser
 Stephen P. Garber
 Donald R. Gasner
 Lea Ann Gettinger
 Michael D. Glascock
 Andreas K. Gorocho
 Carol V. Hanrahan
 Carol E. Henderson-Kuhn
 Mary Ruth Hershey
 Keith R. Honey
 William M. Hughes
 Suman K. Hukku
 Jerry G. Johnson
 John Daniel Jones
 David A. Kanevsky
 Shella Dawn Keilholz
 Jessica Joy Kerr
 John V. Knopp
 Franklin W. Kone
 James E. Lawler
 Terrence A. Leigh
 William A. Lindgren
 Arthur R. Loepf
 Suzanna Maupin Long
 Hulen H. Luetjen
 Daniel B. Marsh
 John L. McDaniels
 John W. McGuire
 Verallynn A. Mecham
 Luzheng Meng
 William Vernon Meyer
 Sanjay Ramnaresh Mishra

Amy Leigh Jones Morriss
 Charles A. Myers
 Jon R. Nance
 Lawrence A. Newquist
 Charles S. Nichols
 Eric J. Norman
 Robert R. Nothdurft
 Larry D. Oppliger
 Raymond E. Paul
 Larry J. Peery
 Daniel H. Perkins
 Matthew Nathan Pritzker
 Kathy A. Rages
 Nancy L. Ranek
 Donald G. Rathbun
 Emmett R. Redd
 Paul Frank Reichert
 John R. Reiter
 Frank E. Salter
 Gary S. Sammelmann
 David Robert Schultz
 Richard S. Schwentker
 James Shiells
 Carl B. Sigler
 Haresh G. Siriwardane
 Bart Wayne Smith
 Gary E. Staats
 Kenneth B. Steinbruegge
 Blair C. Stringfellow
 John Lester Tappmeyer
 Richard D. Thom
 John L. Thompson
 Robert E. Thurman
 Joey K. Tuttle
 Kari Anne Van Brunt
 Ralph Franklin Ward
 Jerry Doug West
 Charles R. Wickizer
 James T. Willcutt
 David A. Wilmont
 David J. Wolters
 Gary K. Woodward
 Gary G. Wooley
 Stephen Paul Yallaly

Phonathon 2008

More than 155 alumni and other donors pledged \$17,210 in donations to the MSM-UMR-Missouri S&T Physics Department last year. Last year's fundraising Phonathon raised \$11,805, with an average gift of \$71. The department greatly appreciates your generosity, which helps to support scholarships and student activities like the Society of Physics Students.

"With new scholarships made possible by past phonathon donations the department has been able to more than double undergraduate enrollment from 35 in the Spring 2005 semester to 73 currently," says Dr. **Dan Waddill**, Chair of Physics. "This year we continue to work towards our goal of 100 undergraduate and graduate majors. Every dollar you can give for scholarships and graduate fellowships will greatly assist the department in its aggressive recruitment plan, and will be greatly appreciated."

This year, we will be calling our alumni April 10 and April 13-16. When the phone rings, please take a moment to share some of your Rolla experiences with a current Missouri S&T student, and say, "Yes," when asked for a pledge.

Taxpayer support accounts for only one-third of the university's revenue, so your contribution makes up an important part of the department's total income. Private funding also helps distinguish Missouri S&T from other universities, increasing the value of your education. Any amount you give will be appreciated. It will help make Missouri S&T a leader in alumni giving among public universities, and will help the Physics Department fulfill its educational mission.

Missouri University of Science and Technology Students & Alumni: In Press

The following journal articles which appeared over the last year feature work by Missouri S&T undergraduate students,¹ graduate students,² or alumni³ under the supervision of Missouri S&T faculty.

"Effects of dissipation on a quantum critical point with disorder," J.A. Hoyos, C. Kotabage,² and T. Vojta: Phys. Rev. Lett. **99**, 230601 (2007).

"Electronic band structure and carrier effective mass in calcium aluminates," J.E. Medvedeva, E.N. Teasley,¹ and M.D. Hoffman,¹ Physical Review B **76**, 155107 (2007)

"Experimental and theoretical momentum transfer dependence of the He ($e; 2e$) cross section for incident electron energies 150 eV and 488 eV," B. A. deHarak, Zhangjin Chen,³ D. H. Madison, and N. L. S. Martin, J. Phys B **40**, 755-768 (2007).

"Effects of the final state electron-ion interactions on the fully differential cross sections for heavy-particle impact ionization of helium," A. L. Harris,² D. H. Madison, J. L. Peacher, M. Foster,³ K. Bartschat, and H. P. Saha, Phys. Rev. A **75**, 032718, 1-4 (2007).

"Ionization and ionization/excitation of helium to the $n = 1:4$ states of He^+ by electron impact," S. Bellm, J. Lower, K. Bartschat, X. Guan, D. Weflen, M. Foster,³ A. L. Harris,² and D. H. Madison, Phys. Rev. A **75**, 042704, 1-12 (2007).

"Investigation of the closure and simplified Green's function approximations in second-order distorted-wave calculations for ($e, 2e$) processes," Zhangjin Chen,³ D. H. Madison, and K. Bartschat, J. Phys. B **40**, 2333-2344 (2007).

"Angular distributions from photoionization of H_2^+ ," M. Foster,³ J. Colgan, O. Al-Hagan,² J. L. Peacher, D. H. Madison, and M. S. Pindzola, Phys. Rev. A **75**, 062707, 1-5 (2007); also selected for the July 2007 issue of Virtual Journal of Ultrafast Science.

"Coplanar symmetric and asymmetric electron impact ionization studies from the $1b_1$ state of H_2O at low to intermediate impact energies," C. Kaiser, D. Spieker,¹ J. Gao,³ M. Hussey, A. Murray and D. H. Madison, J. Phys. B: At. Mol. Opt. Phys. **40**, 2563-2576 (2007).

"Electron impact ionization of molecules at low to intermediate energies – a search for young's double slit type interference," A. J. Murray, M. J. Hussey, C. Kaiser, J. Gao,³ J. L. Peacher, and D. H. Madison, Journal of Electron Spectroscopy and Related Phenomena **161**, 11-16 (2007).

"($e,2e$) ionisation of helium and hydrogen molecule: evidence for two-center interference effects," E. M. Staicu Casagrande, A. Naja, F. Mezdari, A. Lahmam-Bennani, P. Bolognesi, B. Joulakian, O. Chuluunbaatar, O. Al-Hagan,² D. H. Madison, D. V. Fursa and I. Bray, J. Phys. B **41** 025204, 1-7 (2008).

Class of '57 Honored

Class of '57 alums **Ken Crandall** (BS '57) and **Bob Fuller** (BS '57) visited the Physics Department and toured the campus in May of 2007 as part of their 50th reunion.

During their visit Ken and Bob, who is the son of the late **Harold Q Fuller**, Physics Department chair from 1948-1970, entertained faculty with stories of the old days and presented a special colloquium on physics at MSM in the 1950's.



Ken Crandall, Bob Fuller, and Paul Parris

Steven Frey Awarded Professional Degree

Steven R. Frey Jr. (MS '86) was awarded a Professional Degree in Physics at the December 2007 commencement ceremonies. Steve received his BS in engineering physics from Bradley University in 1984 and his MS in physics from Missouri S&T in 1986.

Steve joined Lockheed Martin in 1986, and is currently the Director of Applied Research and Laser Directed Energy in Orlando, Florida. He leads a group of 50 engineers and scientists focused on applications of laser directed energy technology including ultra-short pulsed lasers, solid state high energy lasers, fiber lasers, diode lasers, and supporting technologies.

Steve will be visiting the department again this spring to take part in the department's colloquium series and to discuss career opportunities with our students. Steve credits an experience with the department's colloquium series while he was at Missouri S&T with helping him make career choices.

Steve was accompanied on his visit to Rolla by his wife Michelle and his two children who, having grown up in Florida, were apparently delighted to experience a Missouri snow during their visit. The Frey's were also joined by extended family from Illinois during their visit.



above: Steven Frey and Chancellor Carney

right: David Fahey,
Homecoming 2007 Speaker
Then and Now

Alumni Notes

Matt Woodward (BS '91) writes "after getting my PhD in physics from Clark University and some time at NIST doing neutron science I left physics to fix the Department of Defense. Well, we can all see how that is going."

John Glaese (BS '64, MS '66, PhD '69) says "I changed jobs in late 2006 so I could continue to work for a small company among long-time co-workers."

Sam (PhD '93) and **Debbie Bross** are the proud parents of a baby boy, **Atticus**, born Friday, April 6, 2007. He weighed 8 pounds and was 19 inches long .

Franklin Hill (MS '55) reports "Hill's books has been in business nearly 45 years. We have most always operated from our home address. We have approximately 20,000 books in stock."

Mack Breazeale (MS '54) was elected Life Fellow of the Institute of Electrical and Electronic Engineers on January 1, 2007.

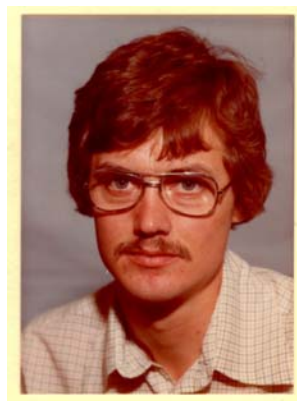
Suzanna Maupin Long (BS '84) completed her PhD in Engineering Management from Missouri S&T in May, 2007.

Jerry Johnson (BS '64, PhD '74 Mathematics) writes "in May 2007 I retired from Boeing/McDonnell Douglas after 35 years in Information Technology. Looking forward to travel and pursuing my own interests."

James Latham (MS '54, PhD '67) says "still working at Trident Semiconductor. Retirement is definitely getting closer, but still enjoy being 'connected'."

Alex (MS '04) and **Valerie Frolich** are the proud parents of a baby girl, **Julia**. The baby weighed 8 pounds, 1 oz. Alex likes his new job which in South Carolina. He said that he has dollars for his lab at the high school!

If you wish to get in touch with any of these alumni, or any others, please contact the Physics Department at (573) 341-4781 or at physics@mst.edu. We can generally give you current phone numbers, along with postal and e-mail addresses. We would be



Frontiers in Physics Colloquium Series

The 2007 *Frontiers in Physics Colloquium Series* began in January with Dr. **Irene D'Amico** of the University of York, United Kingdom, whose talk was entitled "*Potential architectures for quantum dot based quantum computers.*" She was followed by Prof. **Masaru K. Kuno** of the University of Notre Dame, who spoke on "*Solution-based semiconductor nanowires: new opportunities in one dimension.*" Next up was Prof. **Stephen Julian** of the University of Toronto who presented his efforts on "*The search for new quantum phases of matter.*" The last two speakers in February were Prof. **Eugene Kogan** of the Bar-Ilan University, Israel who described the "*Decay of a discrete state resonantly coupled to a continuum of finite width,*" and Prof. **Austen Angell** of Arizona State University, who explored "*The glassy water controversy and supercooled water as the Rosetta stone for understanding glassformers.*"

March began with the Third Joint Missouri S&T/UMSL Physics Department Meeting held at the UMSL campus this time. The featured speaker was Prof. **Robert D. Mathieu** of the University of Wisconsin, who gave a colorful presentation on "*Star clusters, binary stars, and stellar collisions: tracing the interface between stellar dynamics and stellar evolution.*" Back in Rolla, Prof. **Gregory L. Comer** of Saint Louis University continued in the stellar vein with his talk on "*Gravitational wave astronomy: a new look at neutron stars.*"

April started in fine fashion with the Harlow Shapley Visiting Lectureship in Astronomy. This year's Shapley Lecturer was Prof. **Robert A. Knop** of Vanderbilt University, who gave a regular colloquium entitled, "*High-velocity and relativistic gas near the supermassive black holes at the cores of galaxies,*" and followed that up with a very well-attended public lecture in the evening on "*The power of the dark side: the exotic material that makes up most of our universe.*" Our next visitor was physics alumnus Dr. **Ryan Feeler** of the Northrop Grumman Corporation. Besides speaking on "*Physicists in industry: the role of physicists in the laser business,*" Dr. Feeler provided our students with additional perspective on an industrial career during an informal luncheon meeting. The following week, the Department held the *Thirty Sixth Annual Harold Q Fuller Prize Colloquium*, which was run this year as a poster competition. Details of the Fuller competition appear in a separate article on page 15. The spring series concluded with a talk by Prof. **Thomas E. Mallouk** of The Pennsylvania State University on "*Catalytic nanomotors and pumps.*"

The fall colloquium series started in September with two weeks of short presentations by Physics faculty members on their research interests. The next two colloquia featured undergraduate speakers from our department detailing their summer research exploits for us. First up were **Mark Herrera**, **Emilio Nanni**, and **Michael Hoffman**. A week later **Ryan Hupe**, **Shellie Huether**, and **Joshua Cardenzana** took the floor.

Our first speaker in October was National Academy of Engineering member, Prof. **Pablo Debenedetti** of Princeton University, whose subject was "*Water in confined spaces.*" Next Prof. **Julia Medvedeva** and Prof. **Thomas Vojta** of our department gave a joint presentation about "*The 2007 Nobel Prize in physics,*" in which they explained the physical basis and the practical importance of giant magneto-resistance. Our Homecoming Weekend Speaker this year was Physics graduate alumnus, Dr. **David W. Fahey** (PhD '79) of NOAA in Boulder, CO. He provided us with an insightful and timely overview of "*Ozone depletion and climate change: advancing the science.*" Our final October speaker was Dr. **Jose A. Hoyos** who concluded his post-doc stay with **Thomas Vojta** by giving a talk entitled, "*Dissipative effects in quantum phase transitions of disordered magnets.*"

November featured three speakers. First, Curators' Professor **Don Madison** of our department reprised his performance as Foundation Speaker at the 60th Gaseous Electronics Conference, a month earlier, with a talk entitled, "*Why would anyone be interested in charged particles ionizing atoms or molecules?*" Next, Prof. **Ilya Vekhter** of Louisiana State University spoke about "*Probing superconductivity with magnetic fields: anisotropy revealed.*" Finally, Prof. **Anthony Caruso** of the University of Missouri - Kansas City gave an informative lecture on "*Molecular magnetism: an electronic structure approach.*" Following the Thanksgiving break, November finished with the *Fourteenth Annual Laird D. Schearer Prize Colloquium*. This year's graduate student contestants were **Allison Harris** and **Ola Al-Hagan**, who gave impressive talks and tied for first place.



David Fahey and Professor Emeritus Don Sparlin

14th Annual Schearer Prize Competition

The Fourteenth Annual *Laird D. Schearer Competition for Graduate Research*, established by the family of Dr. **Laird D. Schearer** to recognize research performed by a graduate student, was held on November 29, 2007. Three students submitted applications for the competition, consisting of a short description of their research, copies and lists of any publications and presentations they have made, plus a résumé. Based on these applications, the judges, professors **Barbara Hale**, **Greg Story**, **Alexey Yamilov**, and committee chair **Thomas Vojta**, selected the finalists who gave oral presentations of their work in one of the departmental colloquia.

The 2007 finalists were **Ola Al-Hagan** and **Allison Harris**, both advised by professors **Don Madison** and **Jerry Peacher**. During the colloquium on November 29, Ms. Al-Hagan spoke about

“Investigation of nuclear structure effects on electron impact ionization cross sections of He and H₂ measured in the perpendicular plane” while Ms. Harris discussed “Projectile interactions in excitation-ionization of helium.” Both students gave excellent talks and impressed the committee with the quality of their research. During its deliberations about whom to award first and second prize, the committee was evenly split between the two candidates. Therefore, it was decided to award first prizes to both Ola Al-Hagan and Allison Harris.

Because of the generous donations of the Schearer family, cash awards were given to the finalists. Following the presentations, the finalists and numerous faculty members had a relaxing dinner at a local restaurant.

From Schearer Prize Winner Allison Harris

It is quite an honor for me to have the chance to write this article again. Winning the *Schearer Prize Competition* for the second time is just as exciting as it was the first time. This year I was fortunate to share first place with another member of our research group, and a friend of mine, **Ola Al-Hagan**. Missouri S&T continues to be a wonderful place to be a graduate student. My advisors, Drs. **Don Madison** and **Jerry Peacher**, deserve a big thank you for all of their help and patience. I would also like to thank my friends and family for their patience and support.

I am beginning my fourth year at Missouri S&T, and my research area is theoretical atomic physics. My presentation for the *Schearer Prize* discussed the four body collision problem of excitation-ionization of helium. In particular, I examined the role the projectile plays in the collision. For this particular four body problem, a better theoretical treatment of the projectile did produce better agreement with experiment, but there is still room for improvement. Currently, I am working on applying the theory to other four body collision systems.



The Schearer Prize Competition is a great opportunity for graduate students to present their work, and to learn about the work of fellow graduate students. Thank you to the Schearer family for making this opportunity possible, and I hope to be able to participate again in the future.

From Schearer Prize Winner Ola Al-Hagan

It is a great honor to be the winner of the *14th Annual Schearer Prize for Graduate Research*. I'd like to give special thanks to my advisors Dr. **Don Madison** and Dr. **Jerry Peacher** for encouraging me to participate in the competition and for their guidance on my research. I'd like to thank the prize committee and the department of physics for selecting me as one of the finalists. I also would like to thank my friends and family, especially my father, for giving me the encouragement and the support to come to the US to pursue my PhD degree.

My graduate journey in physics at Missouri S&T started in August 2005, after I completed my bachelor's degree in Saudi Arabia. My living experience in Rolla has been great. I had to adjust to some of the culture differences here but over all it has not been bad. I quickly found that the Physics Department at Missouri S&T to be a nice working and studying environment. This environment is full of support, inspiration and surrounded by a knowledgeable faculty with great motivation.

My research is in theoretical atomic and molecule physics. My presentation in this competition was about investigation of the effect of nuclear structure on the differential cross sections for ionization of atomic He and molecular H₂. I calculated the cross section for electron impact ionization of atomic He and molecule H₂ using a Three-Body Distorted Wave theory that was developed by our group. This was then compared with experimental results. We found out that the cross sections for He and H₂ (same number of protons differently configured) show remarkable similarities and what differences there were could be explained in terms of elastic scattering for the respective nuclei.

Finally, by winning the Schearer Prize, I am more motivated to do more and to challenge myself to work harder in other project in the future.

36th Annual Fuller Research Seminar

The Physics Department encourages undergraduates to participate in research through courses, projects with Missouri S&T faculty, and summer research internships at other institutions. The **Harold Q Fuller** Undergraduate research seminar is presented by finalists selected by their peers, and the Harold Q Fuller Award is given to the student(s) whose project is judged to be most outstanding on the basis of their accomplishment, their presentation, and their response to the questioning of the judges.

The 36th Annual Harold Q Fuller Undergraduate Research Seminar was held on April 26, 2007. The 2007 Seminar Chairman was Dr. **Ralph Alexander** and the judges were Drs. **Allan Pringle** and **Dan Waddill**.

For the 2007 competition, students presented posters about their research. The competitors were **Mark Herrera**, "*The slow light effect in modulated photonic crystals*," **Shellie Huether** and **Ryan Kinney**, "*Slow dynamics at the smeared phase transition of randomly layered magnets*," **Emilio Nanni** and **Michael Hoffman**, "*Detecting gamma rays with quantum dots*," and **Lauren Rich**, "*Quantum dot photolithography*."

Shellie was awarded first place, Emilio and Michael took second place, and Mark and Lauren shared third place. The winning students names were engraved on the Harold Q Fuller Award Plaque. The first place project received \$300, second place received \$200, and third place received \$100.

Thanks go to Drs. **Max Bertino**, **Thomas Vojta**, and **Alexey Yamilov** for helping these students with excellent undergraduate research projects.

Faculty Notes

Alexey Yamilov had his National Science Foundation research proposal "*Mesoscopic transport and localization in active random media*," funded for 3 years, starting in September 2007. This is a three year collaborative project with the experimental group of Dr. **Hui Cao** from Yale University.

Thomas Vojta received his third *Faculty Excellence Award* in December, 2007. This award recognizes and rewards those faculty members whose teaching, research, and service contributions are exemplary and who strike an effective and appropriate balance among these various activities. Because of the prestigious nature of these awards, only a limited number are given.

Both Dr. **Greg Story**, a current member of the Physics faculty and Dr. **Bob Gerson**, a former member of the Physics faculty, won a play writing competition and had their plays produced in Camdenton, Missouri last spring. Greg's play was entitled "*Bridge*" and Bob's was "*A Doll Named Louisa*."



Shellie Huether

Come Back for Homecoming

The Missouri S&T Physics Department warmly invites you to return to Rolla for **S&T Homecoming 2008** on **October 17-18, 2008**. On Friday afternoon, October 17, the department will hold an open house and special programs for its alumni and friends. Tours of laboratories and educational facilities will be offered and there will be opportunities for interaction with current Missouri S&T physics students. Come see what we have done since you received your degree.

In keeping with a long-standing tradition, an S&T alum will deliver the Homecoming 2008 Physics Colloquium at 4 PM. on Friday, October 17. Later that evening, professors **Ed** and **Barbara Hale** will host a homecoming reception in their lovely home. Contact us at physics@mst.edu for specific information about physics department activities, or alumni@mst.edu for general homecoming information. Come home to your college roots, and help us celebrate our past as UMR, even as we work to shape our future as Missouri S&T!

So What's News with You?

We hope you enjoyed this year's edition of **Matter 'n Motion**. We enjoy keeping you informed about what is going on at Missouri S&T, but we'd also like to know what's new with you, both personally and professionally. Any information you send will be circulated in the department and, if appropriate, inserted in the next physics newsletter unless you request otherwise.

Please print or type your information, and include your mailing address so that we can update our records. Mail to: **Physics Department, Missouri University of Science and Technology, 1315 N. Pine St., Rolla MO 65409-0640**. Or, if you would prefer, you can e-mail us your comments at **physics@mst.edu**. Thanks for keeping in touch. It's always good to hear from old friends.

Name: _____ Phone: _____ E-mail: _____

Mailing Address: _____

Job Title (if appropriate): _____

Business Phone: _____

Business Address: _____

News or Comments: _____

Physics Department
Missouri University of Science and Technology
102 Physics, 1315 N Pine Street
Rolla, MO 65409-0640