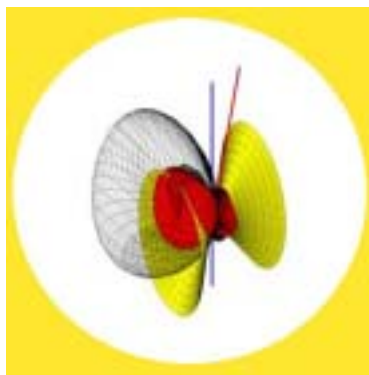


A publication for alumni, friends, faculty, and staff of the MSM-UMR Physics Department

UMR Physics Department Hosts Joint International Symposia on Electron Collisions



The UMR Physics department was the host for two international meetings on electron scattering this past summer. The first meeting, an "International Symposium on (e,2e), Double Photo-ionization, and Related Topics," and a second entitled, "The Eleventh International Symposium on Polarization and Correlation in Electronic and

Atomic Collisions" were held simultaneously on the Rolla campus from July 25 to July 28, 2001. Two UMR Physics faculty members, **Don Madison** and **Michael Schulz** served as local organizers and symposium chairmen. The two symposia brought together 115 scientists from 15 different countries working in a variety of different areas of atomic and molecular physics, including charged-particle impact ionization of atoms and molecules; the photo-ionization of atoms and molecules; and polarization and correlation effects in electronic and atomic collisions. The symposia included a stimulating selection of invited lectures which reviewed the state of the field, progress reports, and poster presentations on the most recent experimental and theoretical results in the field of atomic scattering physics. Other UMR participants at the meeting included faculty member **Bob DuBois**, Postdoctoral Associates **Stephen Jones** (BS '86, MS '95, Ph.D. '97) and **Khaldoun Khayyat**, Graduate Students **Liqun An**, **Andy Prideaux**, **Zhangjin Chen**, **Muzaffer Tabanli**, and **Junfang Gao**, and undergraduate students **Dominic Biava** (BS '01), **Matthew Foster**, and **Deepak Vaid**. Drs. DuBois and Schulz also presented invited talks. In addition to the scientific program, the participants were treated to scrumptious Missouri barbecue at the lovely garden residence of Don and **Lina Madison**, sight-seeing trips to several nearby attractions, and an exciting float trip along the Meramec river. The proceedings of the meeting have recently appeared in a conference volume published by the American Institute of Physics.

In this issue:

Memo from the Chair	2	Gaylord Professional Degree	8
Hughes Zenor Remembered	2	Alumnus Van Nostrand	9
Physics Department Scholarships	3	Alumnus Ereifej	9
UMR Researchers Study Jet Engines	4	Dean's List	9
Report from the SPS	4	UMR Ph.D. in Medical Career	10
Charge Transport in Polymers	5	Alumni Notes	10
2001 Physics Degree Recipients	5	Frontiers in Physics	11
Faculty Member Carsten Ullrich	6	Faculty Thomas & Agnes Vojta	11
International Science Fair	6	Eighth Annual Scheerer Prize	12
Zirbel Makes Nobel Choice	7	Prize Winner Ranasinghe	12
Packwood Professional Degree	7	Faculty, Staff, and Student Notes	13
UMR Astronomy Intern	8	Homecoming 2002	13



Phonathon 2002

More than 170 alumni pledged \$13,875 in donations to the MSM-UMR Physics Department during last year's Fund-raising Phonathon with an average gift of \$77. The department greatly appreciates your generosity, which helps to support scholarships and student activities like the Society of Physics Students. "Your support makes such a difference to our department," says **Dr. Paul Parris**, Chair of Physics. "Scholarships are extremely important, and so are the student activities that your gifts support." Your support this year will be more important than ever in helping us attract great students to our department. This year, we will be calling our alumni **March 18-April 4**. When the phone rings, please take a moment to share some of your Rolla experiences with a current UMR student, and say, "Yes," when asked for a pledge. Taxpayer support accounts for only 40 percent of the university's revenue, so your contribution makes up an important part of the department's total income. Private funding also helps distinguish UMR from other universities, increasing the value of your education. Any amount you give will be appreciated. It will help make UMR a leader in alumni giving among public universities, and will help the Physics department fulfill its educational mission.

Memo from the Chair

It seems appropriate, given the incredible events of the past year, to begin this column with the sincere hope that all members of the MSM-UMR physics family have been safely out of harm's way during the often frightening events that have occurred since the morning of September 11, 2001. Our sympathy goes out to all of the victims of that terrible tragedy, as does our support for all those who are striving to make the world safe from future acts of the same kind. I am proud to report that as part of that effort, researchers at UMR are working hard to contribute to programs that will enhance the country's security. Under the direction of Vice Provost for Research **Wayne Heubner** (BS, '82, PhD '87), UMR faculty have proposed numerous studies that would enhance critical technologies used by the United States to detect and thwart terrorist attacks on domestic targets. Physics faculty members **Greg Story** and **John Schmitt**, for example, have proposed a new class of ultra-sensitive trace element detectors that would use multi-photon absorption and ionization of particles entrained in supersaturated vapors. Their method, which has already been demonstrated with atomic particles at previously undetectable levels of dilution, would allow for real-time detection of compounds or molecules associated with explosives, nuclear devices, perhaps even biological hazards.

This program represents one of the many fascinating things going on in the department, some of which you can read about in this issue of **Matter 'n Motion**. As department chair, I am very proud to head one of the most active research departments on the UMR campus. Every day I see, in numerous ways, how our research programs significantly enhance our department's educational effort, of which we are also very proud. As many of our alumni know, the department has always strived to include undergraduate students in its research activities. Most of the research contracts and grants that the department receives from government organizations, such as the National Science Foundation and the Department

of Energy, include funding that allows undergraduate students to participate in the activities of UMR faculty researchers. This opportunity for students, many right out of high school, to participate in research at the forefront of a given scientific discipline, is simply unobtainable in many schools and colleges. At UMR over 60% of physics undergraduate participate in research projects with UMR faculty members at some point during their four years here. All our majors participate in independent research in our capstone Advanced Laboratory course, taken by physics students in their senior year. Often these projects result in publications, or in prizes won in undergraduate research competitions, such as the one sponsored by the Missouri Academy of Sciences, where UMR students have a sparkling record of achievement.

This level of undergraduate research participation is responsible, I think, for the incredible success that our undergraduates have had obtaining great positions after graduation, either in industry or in graduate school. In the last two years, for example, UMR graduates who have not gone on to graduate school have entered the work force with reported starting salaries averaging over \$55,000 per year, higher than the national average of \$42,000, higher even than the national average for virtually all engineering disciplines. Our majors who do go on to graduate school find that if they work hard they can get into the very best graduate schools in the world. This past year, UMR graduate **Brett Maune** (BS '01) went to Caltech, **Sean McKinney** (BS '01) went to the University of Illinois-Urbana Champaign, and **Josh Zirbel** (BS '01) went to work with Nobel Laureate Carl Wieman at the University of Colorado. The schools where our graduates were accepted, but didn't go, looks like a list from US News and World Report: Stanford, Harvard, MIT, Yale, UVA, Rice, Cornell, and others. Of course, as many of our alumni also know, cutting edge research can be very expensive. In a time of economic downturn, with the state holding back big chunks of our budget, we are forced to rely more and more on contributions from friends and alumni to help make up the difference - so that *we* can continue to make a difference in the lives of the students that come through our doors. To all who have contributed in the past, I offer sincere appreciation for the support you have provided over the years. It helps enormously to have partners in our endeavor who share our vision of what a quality education in Physics can do for those who achieve it.

- Paul E. Parris



Paul E. Parris

Hughes Zenor Remembered

We were saddened to hear of the passing of Professor Emeritus **Hughes Zenor**, who died earlier this year, in January 2002. Zenor, who had been a member of the UMR faculty since 1960, had recently moved to Alabama to be closer to his son, **Phil Zenor**. He is survived by Phil, and sons **John J. Zenor** and **Hughes Earl Zenor**. Before the move, Hughs had a reputation as the department's most devoted attendee of the weekly "Frontiers in Physics" colloquium series. A memorial resolution, which is being prepared for presentation at the next UMR General Faculty Meeting, will appear in the next edition of **Matter 'n Motion**.



Physics Department Awards 2001-2002 Scholarships and Fellowships

The following scholarships have been endowed through the generous gifts of the friends of the UMR Physics Department. Scholarships are announced annually at the Harold Q Fuller Undergraduate Research Seminar, held this past year on April 19, 2001. Congratulations to all our Departmental Scholars!

Recipients of the *Harold Q Fuller Scholarship-Loan* were **John Weirich** of Washington, Missouri, **Charlie Glaus** of St. Louis, Missouri, and **Christopher Lloyd** of St. Louis, Missouri. The \$1,300 scholarship-loan was endowed by the late Dr. 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.

Recipients of the *Burke H. Miller Memorial Scholarship* were **Ryan Mallory** of Ballwin, Missouri and **Joao Sosa** of Shawnee Mission, Kansas. This \$1,000 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.

Travis Yates of Searcy, Arkansas, and **John Zirbel** of Watertown, South Dakota received the *L. E. Woodman Memorial Scholarship*. This 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 *Charles M. Rice Scholarships* are presented to outstanding juniors or seniors in physics at UMR. They were established by Mr. **Charles M. Rice** (MS '50) to recognize and encourage outstanding effort and achievement in undergraduate physics. Chuck got his MS in physics at MSM in 1950 and was awarded a Professional Degree from UMR in 1996. During his career, he did award-winning work for the US government and later started several successful business enterprises. The 2001-2002 scholarship was awarded to **John Quebbeman** of Springfield, Missouri. The *Charles M. Rice Fellowship* is presented to outstanding students in the graduate physics program at UMR. This year, the \$2000 fellowship was awarded to Mr. **Stephen Black**.

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 were awarded to the following students, who range in academic standing from freshman to junior: **Timothy Ivancic** of St. Louis, Missouri, **Cameron Johnson**, of Manchester, Missouri, **Joseph Eimer** of Hillsboro, Missouri, **Jason Burnes** of Fenton, Missouri, **Rebecca Merrill** of Hallsville, Missouri, **Deepak Vaid** of New Delhi, India, and **Kevin Zimmerschied** of Sedalia, 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 UMR. An endowment to the university will bear the name that you designate *in perpetuity*.

Consider, e.g., 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 UMR physics department has several donors that have been adding to their endowment for several years, including endowments established last year by **Ed** and **Mary Sue Sickafus**, and by the estate of **Richard Hannum**.

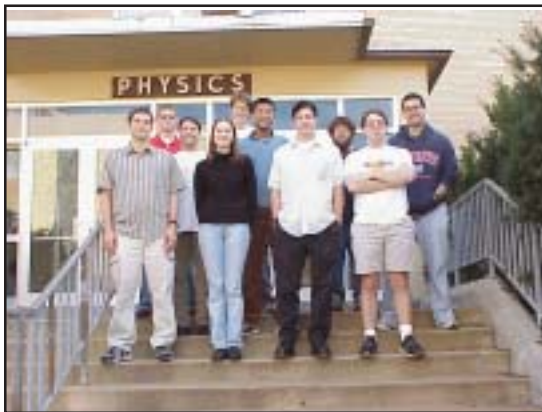
Endowments may be established with cash or readily marketable securities. Regardless of the amount of the endowment you wish to establish or the methods used to establish it, your investment will have a significant and long-term impact on the Physics Department and on the University of Missouri-Rolla. Please call Dr. **Sandra Ogrosky** or Mr. **Kevin Lindsey** at 1-800-392-4112 if you have any questions or wish to discuss options available to you for giving to the department.

Report from the SPS

From Lea Ann Cozort, President of SPS

I have really enjoyed the task of being SPS president this year, and am happy to report that the UMR chapter of the Society of Physics Students continues its legacy of fun and successful physics activities! To start the fall semester off on the right foot, the SPS and Physics faculty gathered for a picnic at Schumann Park on a cold, rainy day in October. **Kurt Koch, Christopher Lloyd, Travis Yates, B. J. Fendler, Joe Eimer, and Lea Cozort** served as cooks and hosts. After a meal of chips, hot dogs, and hamburgers, we had the traditional volleyball grudge match between the SPS members (on one side) and Physics Professor **Greg Story** (on the other). This year, because of bad weather, the game had to be moved to the UMR multi-purpose building, where we still got stomped by Dr. Story. (Despite the painful practice over STUCO free day weekend!)

Also, as many readers of **Matter 'n Motion** know, the SPS organizes an annual road trip to Argonne National Laboratory in early November to attend the undergraduate research symposium that takes place there. This past November, Travis Yates, B. J. Fendler, Kurt Koch, Joe Eimer, and I attended. Along with listening to great presentations given by undergraduate students involving their research activities, we took advantage of the opportunity to travel



into Chicago for a little more fun. FYI - hotels in downtown Chicago are warm, and glass elevators intrigue physics majors! Finally, as the end of the semester came flying at us, a number of SPS members met on a Saturday afternoon at the local bowling alley for some last minute stress relief. Coordination and high scores obviously weren't the goal, but the turnout was unbelievable. As for other club activities, several speakers were invited to our semi-weekly meetings. Some came to us from the physics department, others from various departments on the UMR campus.

This semester we hope to have more speakers and possibly take a field trip to another university to visit with the SPS chapter there. Also, we will be participating in the annual phonathon, volunteering in the "Bridging the Gap" event for local girl scout troops, judging for the Missouri Science Olympiad, recruiting potential freshmen, and making the Society of Physics Students a better-known organization on campus. For other interesting facts or to contact us personally, go to <http://www.umn.edu/~sps>.

Editors note: SPS Officers for the 2001-02 school year are: President: Lea Ann Cozort (Fall '01 and Winter '02); Vice President: Charlie Glaus (Fall '01 and Winter '02); Secretary: Kurt Koch (Fall '01 and Winter '02); Treasurer: Travis Yates (Fall '01) and Christopher Lloyd (Winter '02); Recycling: B. J. Fendler (Winter '02).

UMR Researchers Study Jet Engine Emission in England

A group of researchers and students from the University of Missouri-Rolla traveled to England this past summer to test emissions from the exhaust of a jet engine as part of a joint project with NASA and the British government. **Dr. Donald Hagen**, professor of physics at UMR, is among the team that traveled to a British government testing facility in Farnborough, England. Hagen is the director of UMR's Cloud and Aerosol Sciences Lab (CASL), a key research laboratory of the UMR Physics department. During the first phase of testing last summer, the researchers studied the combustor of a Spey jet engine, testing particulates in its emissions. "This summer the entire jet engine was tested," says Hagen. The test was run under the same conditions as before to show how the rest of the engine affects emissions. Among the researchers from UMR

were two graduate students and a group of five undergraduate students. "These undergraduates worked on individual projects in the lab here at UMR, and then were able to travel to England to see those projects integrated into a large multi-faceted research effort," says Hagen, "UMR's part of this project is to characterize particulate emissions in the exhaust," By studying the emissions as they travel through the entire jet engine, Hagen says, they are able to define what emissions are like under different operating conditions of the engine.

"Most particulates are smaller than the wavelength of light," Hagen says, "but they do affect the environment." CASL researchers determine the size and concentration of different types of particulates in the emissions.

(continued on page 6)

Parris Studying Charge Transport in Polymers

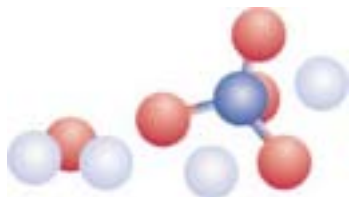
UMR Physics' Chair **Paul Parris's** research into how electrical charge moves through organic materials could lead to improved flat-screen computer displays, credit card-sized smart cards, and the development of other applications in the rapidly-growing field of plastic electronics. Parris recently received a \$150,000 grant from the National Science Foundation for a theoretical study on "Quasiparticle Transport in Organic Materials: Vibrational and Static Disorder, Nanoscale Confinement, and Quantum Effects." One of the biggest current uses of materials of this type are molecularly-doped polymers used in copying machines and laser printers. Closely related materials will appear in new light-emitting devices, like computer screens.

Parris is studying how charge transport in these devices is related to basic properties of the polymer material they're made from. "Typical polymers are disordered", Parris says. By understanding this disorder, researchers can predict electrical properties and aid in the design of new devices. "Our goal is the fundamental physics of the process," Parris says. As a charge moves through a polymer, it is attracted to molecules in the polymer and causes them to distort, much like a bowling ball rolling across a mattress distorts the springs of a mattress as it crosses. Along with physics graduate student **Alex Silvius** (BS '00) Parris is studying this "polaron", which he says is "the combination of the charge carrier and the distortion around it."

Inorganic materials like silicon are widely used in electronics and computer equipment. Parris's research focuses on the growing field of organic electronics. "People are finding that ultra-pure organics can conduct charge as well as many inorganic semiconductors," he says.

Parris's research group is currently gearing up for the early stages of the research, analyzing recent experiments. "There are fundamental things we don't know about charge transport in organics," Parris says. "By studying the most recent experiments we isolate different physical effects that occur when charge moves through these systems."

Parris's research is part of a collaborative three-year, project with researchers from the University of New Mexico, funded by the National Science Foundation at a combined level of \$500,000.



Congratulations to UMR's 2001 Physics Degree Recipients!

May 2001

Bachelor of Science

Banning Bozarth
 Brian Ray Fuller
 Orion P. Grimmer
 Brett Michael Maune
 Sean Aaron McKinney
 Curtis Steven Stratman
 Matthew Forrest Strobel
 Joshua James Zirbel

Professional Degree

Thomas Gaylord

December 2001

Bachelor of Science

Dominic Anton Adam Biava
 John Randolph Weirich
 Ryan Major Rule

Master of Science

Brian Christopher Polis

Doctor of Philosophy

Gabor Balazsi
 George Jay Doster

Professional Degree

Donald Lee Packwood

Leaving a Legacy Through Your Will

A planned gift makes a perpetual statement about your dedication to MSM-UMR. 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 **Judy Cavender** at 573-341-6090 or e-mail her at judyc@umr.edu.

UMR's Newest Physics Faculty Member Carsten Ullrich

The UMR Physics Department was pleased this past August to welcome **Dr. Carsten Ullrich** into its faculty ranks. Carsten is a native of Würzburg, a beautiful old German city, located on the river Main in the northeastern corner of Bavaria. According to Carsten, however, the inhabitants of the region vehemently reject being labeled "Bavarians." Instead, they identify themselves as "Franconians," a distinction that is perhaps best seen in their preference for the local, extremely dry, white wines over the beers of Bavaria. The University of Würzburg, where Carsten majored in physics, was founded over 500 years ago, and is perhaps best known as the place where x-rays were discovered in 1895 by **W.C. Roentgen**, winner of the first Nobel Prize in physics. In 1989, Carsten spent a year in the US as an exchange student at the State University of New York at Albany. As a consequence, he completely missed all the exciting historical events in Germany during the fall of the iron curtain. But he also got his first impressions of academic life in the US, of the country, and its people, and overall had such a wonderful time that he looked forward to the chance to return.

Upon returning to Würzburg, Carsten started his thesis research in theoretical physics, working with Prof. **E.K.U.**



Carsten Ullrich

Gross on various issues in density-functional theory. His master's thesis in 1992 dealt with inhomogeneous superconducting systems, and for his Ph.D. in 1995 he worked on numerical simulations of dynamical processes of atoms in super-intense laser fields. In fall 1995, Carsten started his life as a postdoc. His first station was Toulouse, a beautiful city in southwest France, where he spent the year 1996 studying electron dynamics in strongly excited metal clusters—and the local cuisine. In 1997, he then went back to the US to work with Prof. **Giovanni Vignale** at the Physics department of UM Columbia, doing research on electron dynamics in semiconductor nanostructures. After spending two and a half years in Columbia, he began to feel very much at home in Missouri. Nevertheless, when the opportunity arose to go to California, he didn't think twice, but left for Santa Barbara in the fall of 1999. He spent two years at UCSB, at the Institute of Theoretical Physics and the Quantum Institute, working with 1998 Chemistry Nobel Laureate **Walter Kohn**, the founder of density-functional theory. Finally, we are happy to report, he returned to Missouri in the Summer of 2001, when he joined the UMR Physics faculty.

UMR Researchers Test Jet Engines - continued from page 4.

Researchers from MIT, the British government, and Aerodyne Research Corporation also participated in the test. The British government and Aerodyne researchers studied different types of gas used in the engine. "MIT researchers are specialists in modeling combustion," Hagen says. Their research shows how emissions pass through the engine.

In addition to Hagen, UMR CASL researchers **Philip Whitefield**, associate professor of chemistry; **Max Alcorn**, research maintenance technician; and **Max Trueblood**, senior research aid, traveled to England to participate in the testing of the jet engine. UMR students participating in the test included **Andy Rutter**, a graduate student in chemistry from Wiltshire, England; **Ben Eimer** (BS '00), a graduate student in physics from Hillsboro, Mo.; **Michael Cress**, a junior in computer engineering from Rolla, Mo.; **Grant Folkmann**, a senior in chemistry from Washington, Mo.; **Derek Dressler**, a senior in chemistry from Lenzburg, Ill.; **Jeromy Jones**, a senior in chemistry from Kansas City, Mo.; and **Gregory Sitton**, from Rolla, Mo., a computer engineering student at the University of Missouri-Columbia who worked in UMR's CASL for the summer.

UMR Well-Represented at 2001 International Science and Engineering Fair

Steven Goldammer (BS '73, MS '76), who is Online Products Engineering Leader for Novellus Systems in San Jose, CA, sent us this report on the 2001 International Science and Engineering Fair:

"The 2001 International Science and Engineering Fair was held in San Jose, California, during the second week of May. UMR scholarships were awarded for Physics, Chemistry, Computer Science, Ceramics, Metallurgy, and Petroleum Engineering. I was pleased and honored to represent the UMR Physics department as a special awards judge. Also representing UMR were local alumni **Joey Tuttle** (Phys '64), **Dr. Donald Packwood** (Phys '63), and **Michael Johnson** (MetE '62). The UMR team was led by Lori Gilmore from the School of Mines and Metallurgy and **Dr. Daopu Numbere**, Professor of Petroleum Engineering. All of the judges were impressed by the depth and quality of the exhibits and by the students' composure throughout a long day of interviews. Special activities included a panel discussion with eight Nobel laureates and a judges' reception at the San Jose Museum of Art. The experience was rewarding for all involved."

Alum Josh Zirbel Makes Nobel Choice for Graduate School

Editors note: Josh Zirbel (BS '01) had the singular good taste to go to the University of Colorado-Boulder to work with Physics Professor Carl Wieman just a few months before the latter received the 2001 Nobel Prize in Physics for his work on Bose-Einstein Condensation (with Eric Cornell of UC and Wolfgang Ketterle of MIT). Josh writes:

Immediately following graduation, I came directly to Colorado to begin work with Carl Wieman at JILA. Right away he put me to work testing for a new Rubidium-85 Bose-Einstein Condensate (BEC) machine so that we can further investigate the self-attraction and repulsion of the condensate near Rubidium-85's Feshbach resonance.

My first task was to test a new transfer scheme whose purpose would have been to take cold atoms from one Magneto-optical trap (MOT) in a "dirty" chamber and transfer them to a "clean" chamber in which we would cool the atoms further to the BEC transition. The idea was to use a continuous stream of atoms from the MOT. Although it was simpler than other transfer methods to set up, it turned out to not give us any fruitful results so we abandoned it.

We then decided to try a more conventional method of pushing the cloud of atoms up to a speed of about 3 meters-per-second from the MOT using a hundred-microsecond resonant laser pulse. We then guided the cloud along a bent transfer tube using a quadrupole magnetic field. This method immediately gave us results. At this point, however, we are having some problems with loss and getting the timing hammered out for the magnetic field at the bend. Hopefully, we will get this working successfully over the next month. Then the "clean" chamber can be made and we can begin some real science with a BEC by midsummer. So far, it has been really fun setting up a lab, since we have the opportunity to do things correct from the beginning.

Now that I am gone and have had time to think about it, I would like to thank all of the Physics professors. I really didn't know how fortunate I was to have instructors who were so willing to take, literally, their afternoons to introduce me to interesting physics and to discuss the random things I would come to them with. Those discussions have been the most enjoyable memories from my time at UMR. Best regards - Josh.



Donald Packwood Receives Professional Degree at Winter Commencement

The Physics Department was pleased to honor alumnus **Donald Lee Packwood** (BS '63, MS '65) with a **Professional Degree** in Physics during the December 2001 Commencement. Don recently retired after 20 years with Hewlett Packard's Semiconductor Business Group, now part of Agilent Technologies, where he served in a variety of technical dual-ladder and management positions in corporate and division research and development, and in manufacturing.

He also developed processes to manufacture computer and cell phone chips and invented several semiconductor process architectures and semiconductor device structures, for which he received two patents. Don has published numerous articles in the scientific literature and presented papers at a variety of conferences associated with the semiconductor industry. He has served on the board of directors of the American Vacuum Society, a part of the American Institute of Physics, and has been a member of the American Physical Society, the IEEE, the Electrochemical Society, and the Materials Research Society. Don holds the relatively rare distinction of having earned a Physics B.S. in 1963 from the **Missouri School of Mines**, and a Physics M.S. in 1965 from the same institution, which in the intervening two years had changed its name to the **University**



Don Packwood

of Missouri-Rolla. In 1971, he earned a Ph.D. in physics from the University of Missouri-Columbia. Don, who was joined at Winter Commencement by his wife **Lona**, and his sister **Carol Dunning** and her husband **Alan**, is an avid photographer, runner, and adventurer who among other activities, offers his services as a guide for extended trips into the depths of the Grand Canyon. During his visit to the Rolla campus, Don toured the department, and met and discussed his career experiences with UMR graduate and undergraduate students at an informal departmental luncheon.

To Contact UMR 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@umr.edu. You might also be interested in checking out our web page, <http://www.umr.edu/~physics>.

UMR Alum in Nantucket Intern Program

*Editors Note: Physics major **John Weirich** (BS '01) graduated with honors in December of 2001. The summer before graduation he worked as an astronomy research intern on Nantucket Island. Here is John's report of that experience:*

Spending a summer in Nantucket was a very enjoyable experience. Nantucket is an excellent summer vacation spot - beaches surround most of the island, and there is



John Weirich

always fresh salmon in the market. There are also many events to attend throughout the summer. The biggest of these is the Figawi Celebration, a boat race from Hyannis to Nantucket that ends in what is informally called "Spring break for forty year olds." The nightlife was also exciting. One gentleman I spoke with flew in from New York in his private jet every

Friday night because he preferred the Nantucket bars.

In addition to Nantucket itself, the other interns and I had a choice of touring the large telescopes in the West or going to South Africa to see the solar eclipse. The trip to the West was free and the trip to South Africa was expensive, so I toured telescopes in the West. While not as exciting as a solar eclipse, I was able to learn a lot from the private tours of the telescopes, as well as stand inside the different parts of the larger ones. The most well-known telescope we toured was the VLA in Socorro, New Mexico. Jodi Foster found an alien broadcast using this telescope in the movie "Contact."

However most of my time was not spent in recreation. I was working at the Maria Mitchell Observatory under Dr. **Vladimir Strel'nitski** (director) and Dr. **Nikolai Samus**. The observatory was founded in 1908 and dedicated to Maria Mitchell, the first professional female astronomer, who was born and raised in Nantucket. During the summer I worked on two projects, recovering "lost" Harvard variable stars with Dr. Samus and searching for short-term variability in the Galactic MASER MWC349 with Dr. Strel'nitski. During the days we would give tours of the Maria Mitchell Observatory and, in the evenings, tours of the sky using the observatory's telescopes.

The first project I worked on consisted of rediscovering variable stars that were found on Harvard photographic plates, but were published with only rough coordinates and no finding charts. After locating the stars on Nantucket photographic plates (some from the early 20's) we recalculated the coordinates and published our results along with finding charts. The telescopes at the Maria Mitchell Observatory are kept for historical reasons, so for my second project I used the 12 meter radio telescope at Kitt Peak, Arizona. After examining my data of MWC349, along with previous data taken by Vladimir, we detected variations on the order of days in various components of the masing regions (including intensity, line width, and radial velocity).

This January at the American Astronomical Society (AAS) meeting in Washington D.C. I will be presenting an oral presentation of my research on MWC349 as well as a poster on the "Lost" Harvard Variables. Over all I had a very enjoyable experience, Vladimir was very dedicated to his students and was always available to answer questions.

- *John Weirich.*

Department Honors Physics Alumnus Tom Gaylord

The Physics Department was pleased to present alumnus **Thomas Gaylord** (BS '65, MS '67) with a **Professional Degree** in Physics during the May 2001 Commencement. Tom serves as the Julius Brown Chair and Regents' Professor of Electrical and Computer Engineering at the Georgia Institute of Technology. He has authored 350 technical publications and holds 25 patents in the areas of semiconductor devices, diffractive optics, and optoelectronics, and is known for his development of a rigorous coupled-wave analysis method currently used worldwide for the design of diffractive optical elements.

Tom earned a B.S. degree in physics in 1965, an M.S. and professional degrees in electrical engineering from UMR in 1967 and 1985, respectively. He received a Ph.D. in electrical engineering from Rice University in 1970. In October 2000, Tom also visited the department as homecoming speaker, giving a talk entitled "Diffractive Optics". During his visit to the department for Spring Commencement, Tom spoke extensively with many of the department's undergraduate students and met with UMR Chancellor **Gary Thomas** to discuss the value of a strong Physics program, both for students of Physics and as an essential component of any engineering curriculum. At an unusually warm Spring Commencement, Tom was joined by his wife **Nan**, and his daughter **Grace**.



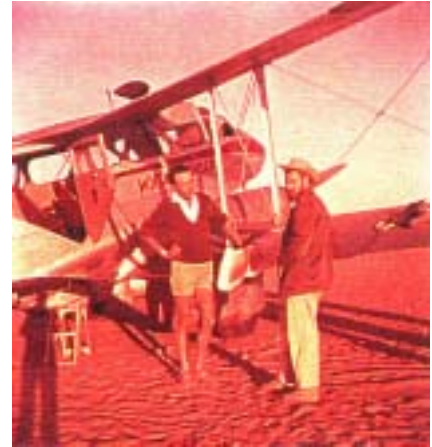
Tom Gaylord

Robert Van Nostrand (BS '42, MS '49), a 1942 graduate of what was then the Missouri School of Mines, sent the department a wonderful illustrated "microbiography" of his career as a geophysicist, for which he traveled all over the world in the fifties looking for oil. As Van Nostrand describes in his narrative, his work took him to many different places, including Fort McMurray, in Alberta Province, Canada, which in 1953 "looked like one of those sparsely settled frontier towns in cowboy movies," and LaFrette, France, a picturesque town where he lived about twenty miles outside of Paris. From France, Van Nostrand made geological expeditions deep into Saharan Africa, traveling with the French



Army to Djanet, "the last oasis in the southeast corner of Algeria," and onward through the hot uncharted desert into the Niger Republic, where he had many exciting experiences with the local people. He writes, enticingly, "To recite everything would take a book - and more time than we have." The picture at right shows Van Nostrand next to the plane they had acquired for emergencies and reconnaissance, at left a scene from their desert camp.

Van Nostrand currently lives with his wife in Boston, Virginia, which, he writes, "is not much of a settlement, consisting largely of country store and post office." The quiet pace and rolling hills of rural Virginia must be a nice, but quiet, contrast to the excitement of those hot early days in the Sahara. Many thanks, Robert, for sharing your experiences.



From Alumnus Heider Ereifej (Ph.D. '00)

My name is Heider N. Ereifej, and I received my Ph.D. from the UMR Physics Department in winter 2000 in Atomic and Laser Physics. In the course of my graduate study, I carried out many research and teaching activities that were helpful in building my scientific and engineering background. By graduation I had a stack of scientific publications and conference presentations from the research and investigative studies I carried out as a graduate student, which have been very important in helping me to secure my present position. After completing my degree, I had the privilege of getting three promising job offers. I decided to accept a postdoctoral position with the Electrical Engineering Department at the University of Maryland's Laboratory for Physical Science. My job involved carrying out high-level research in the field of optical fiber communication. Even though the position was not directly related to physics, it was fairly simple and straightforward to adapt to this new activity. The training I received as a graduate student had a significant impact on my ability to carry out the type of work I needed to do. After a year and a half in this position I was then offered a Senior Optical Engineering position in a fiber optic company called Optium Corporation. I have been working for Optium for about five months now, during which I have been doing research and am focused on transforming new ideas into reliable industrial engineering products. The training I received in the Physics Department at the University of Missouri-Rolla is, and always will be, the core of any career I choose. Dr. Heider N. Ereifej, Senior Optical Engineer, Optium Corp., Orlando, FL 32826.

Congratulations to UMR's 2001 Physics Dean's List Recipients

Winter Semester 2001

Bernard Fendler, Cameron Johnson, Banning Bozarth, John Zirbel, Timothy Ivancic, Curtis Stratman, Orion Grimmer, Christopher Lloyd, Jason Burnes, Sarah Eyermann, Charlie Glaus, Brett Maune, Joseph Eimer, John Quebbeman, Ryan Mallery, Travis Yates, Sean McKinney, Joao Sosa, Dominic Biava, John Weirich, Joshua Zirbel, Deepak Vaid, Ryan Rule.

Fall Semester 2001

Charles Williams, Joao Sosa, Rebecca Merrill, Ryan Mallery, Christopher Lloyd, Timothy Ivancic, Charlie Glaus, Bernard Fendler, Elizabeth Farrand, Joseph Eimer, Dominic Biava, Jason Burns, Samuel Woods, Travis Yates, John Zirbel.

UMR Ph.D. Finds Career in Medical Physics

Editors note: Dan Otero graduated in Winter 2000 with a Ph.D. in computational atomic and molecular physics under the supervision of Curators' Professor of Physics, Don H. Madison and Professor Jerry L. Peacher. Dan writes

I landed my first job as Postdoc at University Hospital and Medical Center, SUNY-Stony Brook in the Department of Radiation Oncology, barely before graduation. At Stony Brook, I participated in the development of an interfacing computer package for performing quality control on medical linear accelerators used for delivering external beams (electrons and x-rays) in cancer treatment. I was impressed with the great marriage of my skills with medical applications, i.e., my knowledge of particle scattering and computer applications. I decided that my career would henceforth be in Medical Physics. Then, in November 2000, there was an advertisement for a Medical Physics Residency Fellowship at Johns Hopkins Hospital in Maryland. I emailed my resume, and within one day there was a phone call interview followed by an invitation. I attended the fully arranged interview, and within a day the director called me that his staff said "if you don't get Dan here then you should resign". The package was very attractive. When I had finished my training in less than the stipulated two years, my director would not let me go. But, life has to continue ("You can't get dry where you have taken a bath - a Kenyan saying implying that a change is imminent when necessary). I applied for four permanent jobs as a medical physicist in five hospitals; all extended an offer. It was hard making the selection but I decided to join St. Francis Hospital and Medical Center in Topeka, KS, effective August, 2001. I have to say that I have been blessed so much that the major obstacles that most of the international students meet in the Visa sponsorship have never arisen. For every success, there must have been somebody behind it. For my case, my family, wife and kids are always the winners in my successes. However, the training that I obtained under Dr. Madison, is one that I would live to cherish. - Dan Otero.

Alumni Notes:

Laura (Morey) Bosnak (BS '63) is an Associate Research Chemist with Bayer Corp. in Stilwell, Kansas. Laura writes "after 15 years with Bayer Corporation's Environmental Research Metabolism group, I am now working with the Field Residue Program as Database Administrator."

Leroy Alt (BS '61, MS '66) retired from East Central College in 1993 and now teaches in the Electrical and Computer Engineering Department at UMR.

Franklin Kone (MS '70) recalls many fond memories of the NSF Summer Institutes, 1967-1970, and how the "good doctor" Harold Q Fuller held the "upside down" maps he would draw to get them to the Kickoff Picnic (and then work, work, work!) at Meramec Springs Park.

James Perez (BS '94, PhD '00) has joined the faculty of Luther College, Decorah, IA, as an Assistant Professor of Physics.

Jeff Schroeder (BS '95) reports "life continues to be great in Colorado. My wife and I are expecting our third (!) child in July. My career has taken an interesting turn, and I am now managing three different companies, doing web consulting work."

G. Jay Doster (BS '93, PhD '01) who received his Ph.D. at the December commencement, is currently working for Cutting Edge Optronics, a division of TRW which offers solid state diode-pumped laser technology, combining the reliability and efficiency of laser diodes with the optical performance of both rods and zig zag slabs.

Gregory Caudle (BS '57) is enjoying retirement and consulting. He plans to build a new house at Terre du Lac in the Bonne Terre, MO area.

Harry Dreeste (BS '51) has enjoyed his 12 years of retirement. He keeps busy around the home, working on model train layouts and his old Studebaker cars. He belongs to two old car clubs and volunteers at the VA Hospital. He reports that his medical treatments are going well.

Joel Brand (BS '86, MS, PhD '94) and his wife Ann still love Colorado Springs, and have started their own instrumentation company with **Aron Gaus** (BS '88, PhD '94). You can see them on the web at www.brandgaus.com.

Chris Thornton (BS '90) has been named CIO of NuVok Communications, a competitive telephone provider headquartered in St. Louis.

Sandra Magnus (BS '86), an astronaut with NASA has been scheduled for her first trip into space on a July 2002 mission to the International Space Station, where she will help deliver a segment of the space station's truss along with equipment to help space walkers move around the station's exterior. We'll be rooting for her the whole way! Go Sandra!



Sandra Magnus

Chris Mertens (BS '84, MS '88) has been hired as a research scientist in atmospheric physics at the NASA-Langley Research Center at Newport News, VA.

Chris Bouchard (BS '96) earned his MS degrees from UIUC in Physics and Math in 1999. That same year he married Amy Kellogg, joined the Navy, and became a father. He recently graduated from the U.S. Navy Basic Nuclear Power School at Naval Nuclear Power Training Command, Goose Creek, SC.

Frontiers in Physics Colloquium Series

The 2001 *Frontiers in Physics Colloquium Series*, which normally features a wide spectrum of interesting topics, was highlighted this year by an outstanding series of talks from candidates for the new faculty positions in condensed matter theory. The series started with a visit from Dr. **Alexei Koulakov** from The Salk Institute for Biological Studies. Dr. Koulakov's talk, "*Pattern Formation in Visual Cortical Areas*" demonstrated the growing appreciation of the use of physics in understanding phenomena in disciplines such as biology and physiology. Other highlights from the faculty candidates were the talks by Dr. **Carsten Ullrich** entitled



"*Terahertz Electronic Excitations in Semiconductor Nanostructures*" and by Dr. **Thomas Vojta** entitled "*Quantum Phase Transitions in Electronic Systems*." Drs. Ullrich and Vojta have both joined the department as faculty members this past year.

Later in the spring semester, Prof. **Eric Mazur** of Harvard University, shown on the left, addressed the

educational issue of shifting the focus of the classroom experience from the delivery of information to its synthesis, in a talk entitled "*Understanding Or Memorization: Are We Teaching The Right*

Thing?" Prof. Mazur also presented an informal talk about his research on laser-induced explosions in transparent materials.

Dr. **Zdenek Dohnálek** of Pacific Northwest National Laboratory led off the fall semester colloquia, with a talk on novel ways of preparing catalytically important materials. The



fall semester series included talks on atomic physics by Prof. **Klaus Bartschat** of Drake University, cosmology by Prof. **Ta-Pei Cheng** of the University of Missouri-St. Louis, and biophysics by Prof. **Gabor Forgacs** of the University of Missouri-Columbia.

Prof. **Ryne Raffaele** (Ph.D. '90) of the Rochester Institute of Technology, shown on the left, was our homecoming speaker

this year. Prof. Raffaele talked about his recent work on lightweight power systems for space missions in his talk entitled "*Integrated Microelectronic Power Supplies*." The series closed with Prof. **Alison Baski** who presented interesting STM images of one-dimensional growth on silicon surfaces.

New Physics Faculty Thomas & Agnes Vojta

The UMR Physics department grew a little bit bigger in January, with the addition of **Drs. Agnes and Thomas Vojta**, shown in the photo below with their two children, **Sophia and Philipp**. The Vojta's both grew up "behind the iron curtain", in the East German city of Dresden. This capital of the state of Saxony located at the river Elbe is famous for its Baroque architecture, art galleries, and today also for its high-tech industries. It is also known as the gateway to the mountains of "Saxon Switzerland" where modern freeclimbing evolved about 150 years ago. Growing up in such an area, Agnes and Thomas naturally became passionate hikers, climbers, and mountaineers.

The University of Dresden where Agnes and Thomas majored in Physics is not very old by European standards, it grew out of a technical school founded in 1828. In 1989, Agnes and Thomas became active participants in the exciting changes that led to the fall of the Berlin Wall and eventually also changed the course of their lives. After receiving his MS degree in 1991 Thomas first went to Mainz, and later to Chemnitz University to work with Prof. **M. Schreiber** on the transport properties of weakly doped semiconductors, obtaining his Ph.D. in Theoretical Physics in 1994.



He then came to the United States to do a two-year postdoc at the University of Oregon in Eugene with Prof. **D. Belitz** on quantum magnetism. In the meantime, Agnes was working on problems in pattern formation with Prof. **W. Pompe** in Dresden at a newly formed group of the Max-Planck Society, which at that time was beginning to set up research institutes in the

former East Germany. Agnes received her Ph.D. in Theoretical Physics in 1994, and left two weeks after her thesis defense for lovely Santa Barbara, California, where she spent two years working with Prof. **D. R. Clarke** on electronic ceramics. The two-year, long-distance relationship gave Thomas and Agnes a great chance to get to know several parts of the United States. They got to love living here and have been looking forward to returning ever since. Upon returning to Chemnitz

University in Germany, Thomas worked on quantum phase transitions in order to obtain his Habilitation, a kind of a second Ph.D. necessary to obtain a faculty position in Germany.

(continued on page 12)

Eighth Annual Schearer Prize Competition

The Eighth Annual Schearer Prize Competition for Graduate Research took place on the UMR campus in November, 2001. The Schearer Prize was established to commemorate the memory of the late **Dr. Laird D. Schearer**, Curators' Professor of Physics, who joined the department in 1971, and served as department chair from 1971 to 1977. Professor Schearer's encouragement and support of scientific research enabled the UMR physics graduate program to grow and flourish. The Laird D. Schearer Fund, endowed through gifts from alumni, friends, and the Schearer family, was established in 1994, to provide annual prizes for the best research conducted by UMR physics graduate students.

This year, five students, representing a variety of different research disciplines, entered the competition, which was judged by UMR faculty members **Dan Waddill**, **Carsten Ulrich**, **Barbara Hale**, and **Bob DuBois**. From the five entries received, the committee selected three finalists to present short talks on their research at a regular department colloquium. Based on the quality of the talks and on each participant's overall research record, the committee, after much deliberation, awarded first place to **Kisa Ranasinghe**, (see related story, right) whose entry was entitled "Containerless processing of lithium-disilicate glass using an electrostatic levitator," while Carmen Doudna, who presented "Structural investigation of Ag-Pd clusters synthesized with the radiolysis method," and **Muzaffer Tabanli**, who discussed "Electron-cadmium ionization for energies near overlapping autoionizing resonances," tied for second place. Ms. Ranasinghe is doing her thesis work under the direction of **Gerry Wilemski** (Physics) and **Del Day** (Materials Research Center and Ceramics). Ms. Doudna is working with **Max Bertino** while Mr. Tabanli is working with **Jerry Peacher** and **Don Madison**. The Physics Department is extremely proud of the research accomplishments of all the students who entered the competition.

Thomas & Agnes Vojta - continued from page 11.

Meanwhile, Agnes worked at the University of Dresden on ferroelectric ceramics, interrupted by several months of family leave after the birth of Sophia and Philipp in 1997 and 1999, respectively.

After his Habilitation, Thomas won a Heisenberg Fellowship which he used to spend most of 2001 at the University of Oxford in the United Kingdom.

Finally, they returned to the US, joining the UMR physics faculty this winter. The Physics department is pleased to welcome them to the Rolla area, where they have already been busy exploring the hiking trails, rivers, and state parks of Missouri.

From Schearer Prize Winner Kisa Ranasinghe



Kisa Ranasinghe

It was a great honor to receive first prize in the Eighth Annual Laird D. Schearer Graduate Research Competition. I would like to thank the committee and the staff in the Physics department for giving me the opportunity to participate and for selecting me as a winner. I would like to offer special thanks to my supervisors **Dr. Delbert E. Day** and **Dr. Chandra S. Ray** for encouraging me to participate in the competition. The talk I presented was based on work we did on the containerless processing of lithium-disilicate glass using an electrostatic levitator. For the first time we have been able to successfully levitate, melt, and process oxide glasses using the Electrostatic Levitator (ESL) furnace at NASA Marshall Space and Flight Center in Huntsville, Alabama. I would like to thank **Dr. Jan Rogers** and her team for giving us space and time in their busy schedule to conduct our experiment. This work is part of our ongoing research project in which we are going to melt glass in the International Space Station. This very exciting research makes me happy that I came this far from home to this little town of Rolla. I came to UMR in the fall of 1998 to study for my Ph.D. after I finished my bachelor's degree in Sri Lanka, where I was born and raised. On arriving in Rolla, I at first felt I had come to the middle of nowhere. Then I met the professors and staff in the physics department and found out that this is indeed a friendly place where humanity matters, instead of where you are from. **Dr. Kanishka Marasinghe** (PhD '93), then research associate professor and fellow Sri Lankan, introduced me to Dr. Day and Dr. Ray. He and his family took me under their wing from the moment I arrived. After nearly five years of this journey at UMR, my accomplishments are many, not just as a student but also as a person. Being president of the International Student Club in UMR, I found capacities and courage I didn't realize I had.

Faculty, Staff, & Student Notes:

- Emeritus Chancellor and Physics Professor **John T. Park** has been appointed by Missouri Governor Bob Holden to head the eight member **Missouri Life Sciences Research Committee**, which will provide guidance to the state in issuing grants from the \$21.5 million tobacco settlement money set aside for life science research.
- In September, **Gerry Wilemski** was notified that the U.S. Dept. of Energy's Division of Material Sciences and Engineering would fund his research project entitled "Theoretical Studies of Nucleation Kinetics and Nanodroplet Microstructure." Total funding for the three year project is \$395,000.
- The department was pleased to welcome **Dedie Wilson** into the department as Senior Clerk in the Cloud and Aerosol Sciences Laboratory (CASL).
- Professor **Allan Pringle** served as site coordinator for one of Missouri's regional Science Olympiad competitions. This past year was the first that a Science Olympiad was held on the UMR campus. More than 500 students from grades 6 to 12 competed in 38 separate events, which ranged from construction of a Rube Goldberg device using as many as 30 separate simple machines to launch a ping-pong ball, to a test of contestants' knowledge of cell biology, and DNA analysis. The events emphasize creativity, teamwork, and fast "on-your-feet" thinking and acting. Physics faculty members **Ralph Alexander**, **Greg Story**, and **John Schmitt** served as supervisors in four of the events.
- For a second year, **Ron Bieniek** has been the UMR professor most often cited by UMR graduates as having had a positive influence on them. Bieniek, who has been expanding the Learning Center concept pioneered in the Physics department to the rest of the campus, also received the Faculty Member of the Year Award from the Residence Hall Association & National Residence Hall Honorary, and has been selected by Chancellor **Gary Thomas** to be UMR's coordinator for the UM-system New Faculty Teaching Scholars Program.
- In early October Professor **Ron Olson** spent two weeks at the University of Groningen, The Netherlands, developing theoretical methods to support an experimental group that has built a magneto-optical (MOT) trap to study atomic collisions. Six laser beams and two anti-Helmholtz coils are used to cool and trap sodium atoms at 1 mK. After collision by 3 MeV/u O⁶⁺ ions, a kinematically complete measurement of the momentum transferred during the collision is determined. Travel support was provided by an NSF-International programs grant. In late October Olson and postdoctoral associate **Juan Fiol** traveled to Rio de Janeiro, Brazil, to work with physicists at the Catholic University for two weeks in a collaboration with Brazilian experimental programs jointly funded from NSF-International programs and the CNPq (the Brazilian NSF equivalent). Efforts are focused on four-body systems and electron correlation parameters in fast ion-atom collisions. New theoretical methods developed by Olson and Fiol allow prediction of electron correlation signatures.

Come Back for Homecoming

The UMR Physics Department warmly invites you to return to Rolla for **UMR Homecoming 2002** on the weekend of **October 11-13, 2002**. On Friday afternoon, October 11, 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 UMR physics students. Come see what we have done since you received your degree.

In keeping with a long-standing tradition, a UMR alumnus or alumna will deliver the Homecoming 2002 Physics Colloquium at 4 PM. on Friday, October 11. Later that evening, professors **Ed** and **Barbara Hale** will host a homecoming reception in their lovely home. Contact us at physics@umr.edu for specific information about physics department activities, or alumni@umr.edu for general homecoming information. Come home to your college roots, and help us celebrate UMR's past, even as we work to shape its future!

- Drs. **Dan Waddill** and **Michael Schulz** were the recipients of 2001 UMR Faculty Excellence Awards, which are given annually to faculty who best exemplify the ideals of excellence in research, teaching, and service to the UMR campus.
- The Physics Department was saddened to learn of the September, 2001 death of **Judy West**, who worked in the Physics Department front office from 1981 to 1984. Our sympathy goes out to her family.

To Contact UMR 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@umr.edu. You might also be interested in checking out our web page, <http://www.umr.edu/~physics>.

So What's News with You?

We hope you enjoyed this years edition of **Matter 'n Motion**. We enjoy keeping you informed about what is going on at UMR, 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: **UMR Physics Department, University of Missouri-Rolla, 65409-0640**. Or, if you would prefer, you can e-mail us your comments at **physics@umr.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: _____

Department of Physics
University of Missouri-Rolla
Rolla, MO 65409-0640

NONPROFIT ORG.
US POSTAGE
PAID
PERMIT NO. 170
ROLLA, MO