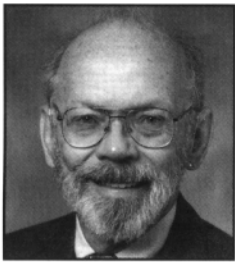


Matter Motion

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

Ed and Mary Sue Sickafus Establish Endowed Fund to Benefit Undergraduate and Graduate Physics Students



Dr. Edward N. Sickafus

Dr. Edward N. Sickafus and his wife Mary Sue Sickafus have pledged \$50,000, including Ford matching funds, for the purpose of endowing undergraduate scholarships and graduate fellowships for physics students. Ed and Mary Sue said of their

decision to endow the fund, "This scholarship was intended for students who have a fascination for physics. We hope it will assist their pursuit of understanding through physics department programs and interaction with the dedicated staff in physics."

In announcing the gift to the department, Dr. Paul Parris, Chair of the Physics Department explained, "Ed and Mary Sue's gift will provide solid assistance to the Physics Department in continuing to attract the kind of exceptional undergraduate and graduate students for which the department is noted. It will also have an impact in providing support for the large number of physics students now participating in the Master's Student Fellowship Program. We thank them for their generosity in providing support to our students in perpetuity through this endowment."

Ed received B.S. and M.S. degrees in Physics from MSM in 1955 and 1956, respectively, and his Ph.D. in solid state physics at the University of Virginia in 1960. He taught undergraduate and graduate courses at the University of Denver for seven years before joining the research staff at Ford Motor Company in 1967. He served Ford Motor Company in various research and management roles,

including Manager of the Physics Department, Ford Research Laboratory, from 1994 until his retirement from Ford in 1997. He is a past president of the American Vacuum Society and has published more than 60 scientific papers in surface physics, crystal morphology, secondary electron scattering, and various aspects of LEED and auger electron spectroscopy. He holds a dozen patents.

Ed has been an active alumnus. He served as a spring colloquium speaker for the department in 1999. His talk was very engaging as he discussed his technique of creative problem solving for teams, called Unified Structure Inventive Thinking (USIT). After he retired from Ford, Ed formed his own company, Ntelleck, to develop and market a textbook and to teach USIT to Ford suppliers and other project teams throughout the world. Since his retirement, he has continued to develop and promote USIT through his company for corporations throughout the world. For an overview of some of Ed's insights, read his article on "Structured Inventive Thinking" on pages 18-20 in the March, 1966, issue of the journal *The Industrial Physicist*.

In recognition of his many contributions to society, Dr. Sickafus was awarded the **Professional Degree of Physics** at UMR's Spring Commencement. We were pleased to get the opportunity to become acquainted with family members during the festivities that surrounded the event. His wife Mary Sue, son Karl Sickafus from West Chester, Pennsylvania, son and daughter-in-law Kurt and Talissa Sickafus from Chimayo, New Mexico, and sister Vi Roussin, from Florissant, Missouri, joined him in Rolla for Commencement.



Phonathon 2001

More than 160 alumni responded to the call last year and pledged **\$15,523** to the Physics Department during Phonathon 2000. \$15,018 in gifts was received with an average gift of \$92. This average was second only to the record of \$130, set in 1997-98. Thank you for your generosity.

Your support provides funds for scholarships and support of student activities including SPS, the Society of Physics Students.

"Your support makes such a difference," 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 the high-quality students we have come to appreciate over the years."

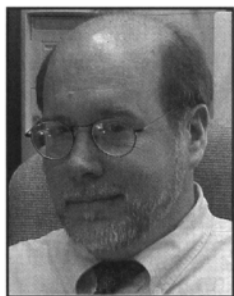
This year, we will call our alumni between **Feb. 21-27**. When your phone rings for **Physics Phonathon 2001**, please take a moment to share some of your Rolla experiences with the current student making the call, and say, "Yes!" when you are asked for a pledge.

Taxpayer support accounts for only 40 percent of the university's revenue, making your contribution a vital ingredient in the revenue pie. Private funding also helps distinguish UMR from other universities, increasing the value of your education. Any amount you give will be appreciated, and most importantly, your participation will help make UMR a leader in alumni giving among public universities.

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Memo *From the* Chair



Paul Parris

It's been quite a year, and it's a pleasure for me to pen my first remarks as department chair to alumni far and near, to former and current faculty and staff, and to the many, many friends of the UMR physics department for this true millennium edition of *Matter 'n Motion*. As many of you know, the early retirement program that was offered last year resulted in many changes to the campus. Four members of the Physics Department took retirement. **Bill Parks**, who has for many years been generally recognized as one of the most knowledgeable theorists in the department, retired this year after 34 years of service. As one who worked with Bill for many years in the introductory Physics 24 courses and who appreciated the breadth and depth of his knowledge, his common sense, and his good sense of humor, I know I express the sentiments of the department in wishing Bill and his wife **Carol** all the best in his retirement. **Don Sparlin**, who arrived on campus with his wife **Linda** in 1968, also took early retirement this year, but has graciously agreed to help out the department by teaching half-time in the introductory physics courses. Don continues to provide the department with the benefit of his many years of service and his unique viewpoints on the department, the campus, and the state. As he has often characterized his own viewpoints: he may not always be right, but he is always certain. Congratulations, Don and Linda!

Perhaps the biggest change within the department came as a result of **Ed Hale's** retirement from his position as chair of physics. Ed, who came to Rolla with his wife **Barbara** in 1969, took over as chair from **Ralph Alexander** in 1992. From the perspective of six months in the chair's position, I continue to be impressed with how effective Ed was as department chair and advocate, and how skillfully he steered the department through some of its most productive years. His vision of maintaining and improving the quality of the physics faculty and students, and in promoting the department on campus and throughout the country will be felt for years to come. Ed has been traveling around the country considerably since his retirement, but still maintains an office in the building. We wish him and his wife (UMR Professor) Barbara well in his retirement.

From the campus point of view, an even bigger change was the announcement by **John Park**, UMR Chancellor and Professor of Physics, of his retirement from the University, effective September 2000. John, who was replaced as Chancellor by Dr. Gary Thomas, came to campus with his wife **Dorcas** in 1964 to set up the department's first externally-funded research program in atomic and molecular physics. (I have given extended remarks about his research career in a separate article in this newsletter.) John's ion accelerator continues, under the supervision of Associate Professor **Michael Schulz**, to provide the atomic and molecular physics community with increasingly detailed information about the structure of the stuff of which we are made. John also found the time to act as

department chair, and ultimately, took on the larger responsibilities of guiding the campus, first as Vice Chancellor, and then, finally in 1992 as UMR's Chancellor. John, who with characteristic determination successfully overcame the cancer with which he was diagnosed a year-and-a-half ago, and Dorcas have built a large new house in Rolla. We wish them the very best and look forward to seeing them often in the coming years.

As chair, I would like to extend, on behalf of the whole department and UMR physics community, heartfelt thanks to all of the department's retirees for their many years of service to the Rolla campus.

Since becoming department chair, I have come to learn that one of the great pleasures of the job is the chance to interact with the many great physics alumni who come back to visit the campus, often after having gone out and done great things in the "real world". So it was a real joy to meet and talk with **Ed Sickafus** (BS '55, MS '56), who received a professional degree from the Physics Department in May and who, with his wife **Mary Sue**, established an endowed scholarship-fellowship detailed elsewhere in this issue of *Matter n' Motion*. More recently, the department was pleased to award **Greg Upchurch** (BS '72, MS EE '85) a professional degree in physics at the December commencement. In recruiting new students we often try to point out the versatility of a degree in physics. We often mention Greg in this context, since he is currently a partner with the law firm of Thompson Coburn in St. Louis. He and his wife **Susan** deserve a special commendation for driving out for commencement on what must have been one of the worst winter days in recent memory.

In October, the department hosted homecoming speaker, Professor **Thomas Gaylord** (BS '65, MS EE '67), currently the Julius Brown Chair Regents' Professor at Georgia Institute of Technology. Tom gave a great homecoming talk and conveyed a good sense of some of the exciting research that can be done starting with a UMR physics degree. Finally, it was a real pleasure to meet UMR alumnus **Fred Newton** (BS EE '69), currently the head of Triton Elics, International, who had worked in John Park's research lab as an undergraduate. The company that Fred has since gone on to found develops extremely sophisticated underwater imaging apparatus that is used around the world, especially in underwater searches. His visit to campus and his work are described in an article in this newsletter.

With alumni of the caliber that I have met in the last year I have every confidence that the UMR reputation in technology and science will continue well into the future. To any UMR physics alumnus or alumna I would like to extend an open invitation to visit the department whenever you are in the area, so we can learn more about the exciting things that you have been doing since your graduation from UMR, and so we can show you the exciting things that we have been doing since you left.

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 are also cordially invited to check out our evolving Web page at <http://www.umr.edu/~physics>

Endowments: Gifts that Keep on Giving

In October 1997, MSM-UMR announced the first ever comprehensive private fund-raising campaign. The campaign has now raised almost \$45 million towards its \$60 million goal. The theme of the campaign is a call to remember the past while preserving the future.

The Department of Physics has been very successful in raising annual support through the Phonathon for scholarships, student travel funds, and other purposes for a number of years. Now, because of the campaign, we have been able to expand our efforts to secure endowments for scholarships, student travel, faculty and departmental support, and program enrichment. As you make your annual commitment to the department, please also give some consideration to starting an endowment in your name or the name of a loved one, and your gift will still be making a difference when your great-grandchildren enroll at UMR. Your gift to the university will bear your name or the name of a loved one *in perpetuity*.

The Physics Department has the benefit of the University of Missouri's Balanced Income Pool which has grown from \$150 million in 1994 to more than \$575 million today. *The objective of the pool is to provide income for expenditures while preserving the purchasing power of the endowment principal.* The fund employs a

total return approach with a strong emphasis on equities, and distributes five percent annually of a trailing 12-quarter average of the endowment's market value. It is invested for long-term growth with diversified investments to reduce risk. The pool has maintained a 13.5 % return over a ten-year period.

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 initially, and will continue to grow as the principal grows. UMR has several donors that have been adding to their endowment fund for many years — see the articles regarding the endowments established by **Ed and Mary Sue Sickafus** and by the estate of **Richard Hannum** elsewhere in this newsletter.

Endowments may be established with cash or readily marketable securities. For more information on the tax advantages of gifts of appreciated long-term stock, see the article entitled *The Economics of Giving* in this newsletter. 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.

Physics Department Awards 2000-2001 Scholarships

The following scholarships have been endowed through the generous gifts of the friends and family of the UMR Physics Department. Scholarships were announced at the Harold Q Fuller Undergraduate Research Seminar, held on April 11, 2000. 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 **Orion Grimmer** of Bridgeton, MO, **Brett Maune** of Washington, MO, **Sean McKinney** of Springfield, MO, and **Matthew Teig** of Overland Park, KS. The \$1,000 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. Half of the scholarship is an interest-free loan that students begin to repay when they start their first jobs.

Recipient of the *Burke H. Miller Memorial Scholarship* was **Kevin Zimmerschied**. 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.

Carmen Doudna of Barnesville, OH, and **Michelle Eldridge** of Lake St. Louis, MO, received the *Leon E. Woodman Memorial Scholarship*. This scholarship was established by the Woodman family in honor of Dr. Leon 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 to recognize and encourage outstanding effort and achievement in undergraduate physics at UMR. 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 1999-2000 scholarships were awarded to **Dominic Biava** of Springfield, MO, **Banning Bozarth** of Shawnee, KS, **Brian Fuller** of Kansas City, MO, **Charlie Glaus** of St. Louis, MO, **Curtis Stratman** of Jefferson City, MO, **Matthew Strobel** of Madison, AL, **John Weirich** of Washington, MO, and **Joshua Zirbel** of Krebs, OK.

In addition to the above endowed scholarships, which are usually awarded to juniors and seniors, the department awarded Special Departmental Scholarships to the following students, who range in academic standing from freshman to junior: **Justin Braden** of Green, OH, **Anthony Cocchiara** of Rolla, MO, **Joseph Eimer** of Hillsboro, MO, **Kurt Koch** of Arnold, MO, **Christopher Lloyd** of St. Louis, MO, **Ryan Mallery** of Ballwin, MO, **Joao Sosa** of Shawnee Mission, KS, and **Travis Yates** of Searcy, AR.

Rice Continues His Support for Students



Charles M. Rice

Charles M. Rice (MS '50) continues to help support several UMR physics students each year through his annual donations to the department. Last year, his gift of \$4,000 allowed us to offer two \$1,000 undergraduate scholarships and one \$2,000 graduate fellowship. This not only gives financial assistance to the students, but also helps the department mightily in its recruitment effort. We are grateful to Chuck for his continuing support of our educational mission and the benefits it brings to our students.

Congratulations to Our 2000 Physics Degree Recipients!

MAY 2000

Bachelor of Science

Benjamin Christopher Eimer
John Eric Golden
Alexander Aden Silvius
Keith David Winkler

Master of Science

Courtney Ryan Feeler
Kisa Saranganie Ranasinghe

Doctor of Philosophy

Kevin Ray Cornelius
Heider Naim Ereifej
Dan Onyango Otero
James Andrew Perez
Otmar Schmid

Professional

Edward Nathan Sickafus, Jr.

DECEMBER 2000

Bachelor of Science

Jennifer Anne Adams
Anthony Thomas Cocchiara, II
Carmen Maria Doudna
Matthew James Teig
Dustin Tige Williams

Doctor of Philosophy

Kevin Thomas Dolan
Wentao Qin
Chiu-Ying Tai

Professional

Gregory Edwin Upchurch

Physics Department Demonstrates Quality Teaching

In January 2000, MSM/UMR's Director of Academic Assessment prepared an analysis of the results of the Academic Profile Test (APT). The APT measures, among many other things, general education performance and student satisfaction. It is given to students who have accumulated 45 credit hours or more at UMR. Student satisfaction with their quality of learning was listed for the seven departments in the College of Arts and Sciences which have high service loads: Chemistry, Economics, English, History/Political Science, Mathematics, Physics, and Psychology.

For four of the five semesters from Winter/Spring 1997 to Winter/Spring 1999, the Physics Department ranked first in student satisfaction with regard to quality of learning, and ranked second to History/Political Science only for Winter/Spring 1998. We believe our educational track record, both for Physics majors and for students taking service courses, has been commendable.

Come Home for Homecoming 2001!

Your Physics Department warmly invites you to return for UMR Homecoming 2001 on the weekend of September 28-29, 2001. On Friday afternoon, Sept 28, 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 interactions with current students. You are cordially invited to come see what we have done since you received your degree.

Following tradition, a physics alumnus or alumna will deliver the Homecoming 2001 Physics Colloquium at 4 p.m. on Friday, Sept 28. As has been long and happy custom, Professors **Ed** and **Barbara Hale** will host a convivial reception Friday evening in their lovely home. Contact us at physics@umr.edu for specific information about physics activities, or alumni@umr.edu for general homecoming information. Come home to your college roots, and celebrate our past and future!



Banning Bozarth

From the President of SPS

Greetings from **Banning Bozarth**, president of the UMR chapter of the Society of Physics Students! I am happy to report another successful semester for SPS here at UMR.

Last semester, society activities included a trip to Argonne National Laboratory in Chicago. **Banning Bozarth**, **John Weirich**, **Ryan Rule**, **Lea Cozort**, **Travis Yates**, and **Tim Ivancic** attended an undergraduate research seminar during which students from various universities across the Midwest gave presentations on their work. While in Chicago, we took a side trip to the Museum of Science and Industry. That's about all the noteworthy activity, I think, unless you want to hear about us horsing around in the Argonne Guest House and eating pizza!

Early in the fall, we hosted a departmental barbeque and a volleyball grudge match. Although the match this year was much closer than usual, we were unable to defeat Dr. **Greg Story** until we lent him some students to "help" his side. We also took a trip to the Universal Challenge Center ropes course located in the wilds south of Rolla. **Banning Bozarth**, **John Weirich**, and **Josh Zirbel** had to use teamwork to solve some problems, such as scaling a 12-foot smooth vertical wall and transporting a full bucket of water across an open pit without spilling any, using only a rope. We did some rope walking (about 30 feet up or so) and tried the "jump for life," jumping off a ledge about 30 feet high and trying to catch a bar to avoid plummeting down to the ground. And yes, this was all done with the appropriate safety equipment.

We also hosted a number of guest speakers from the Physics Department, as well as a special Chaos Theory presentation by Dr. Kevin Pilgrim of the Mathematics department.

An old favorite was brought back for our SPS t-shirt. Take a look at it in color on the web and order it at: <http://www.umn.edu/~sps/tshirt/shirt.html>.

Finally, we ended the semester with the election of new officers. **Dominic Biava** replaced **Banning Bozarth** as president, while **Michelle Eldridge** took **Dominic's** former position of vice-president. **Banning Bozarth** took over for **Josh Zirbel** as secretary, and **John Weirich** replaced **Ryan Rule** as treasurer. We are looking forward to another fun (and physics)-filled semester in 2001!



UMR Freshman Develops Software for NASA and British Defense Agency

After his first year at UMR, physics major **Mike Cress** had a very productive summer 2000 that included international travel. He took advantage of UMR's Opportunities for Undergraduate Research Experience program to work with Prof. **Don Hagen** in the Cloud and Aerosol Sciences Laboratory (CASL). Mike developed computer software designed to support communications for several new instruments under development. Some of the instrumentation was developed for NASA and was tested at the NASA Glenn Research Center in Cleveland, OH, during the summer following Mike's freshman year. Last June Mike traveled to Cleveland to participate in this equipment test at NASA.

In August of the same summer he traveled to the British Defense Agency jet engine test facility in Farnborough, England, to participate in an exhaust sampling experiment on an engine combustor. His software was employed on the UMR aerosol instrumentation package used in that test. The photo shows Mike at work at his work station during the test at Farnborough.

Mike was able to develop his software in an academic setting, and then see it used in government laboratory and industrial laboratory settings. Because these tests involved scientists and engineers from various disciplines (physics, chemistry, mechanical engineering, combustion engineering, etc.) Mike had the opportunity to interact with all of them.

Scientists from Aerodyne Inc., a research company from Boston, also participated in the combustor test at Farnborough. Mike was able to take time to help the Aerodyne group adapt some plotting software to aid in the display and analysis of their data.

Mike's OURE project focused on the implementation of LabView software for instrument communications. The resulting software was capable of performing size sweeps, taking aerosol measurements, error checking, providing the user with charts displaying the current aerosol data, recording this data to a user-specified file, and performing data reduction on the data files.

Not bad for his first year on board!



Mike Cress

Physics Grad Wins Six-Year Fellowship



Joel R. Buckley

Shortly after his December graduation, **Joel R. Buckley** (BS '99) was awarded a six-year graduate fellowship worth up to \$200,000 through the National Physical Science Consortium (NPSC).

The NPSC offers these fellowships annually to qualified applicants. A recipient of the fellowship must pursue a Ph.D. in the physical sciences or a related engineering field. The award, which is renewable for up to six years, includes an annual stipend of \$12,500 during the first four years of advanced study, and then \$15,000 for each of the remaining two years of study. The annual stipend is to be used for living expenses. In addition, the fellowship guarantees tuition and fee waivers at all signatory universities. The total value of the fellowship, up to \$200,000, is dependent on where the fellow pursues his or her graduate-level education.

Funding for the NPSC program comes from approximately forty sponsoring employers, including several national laboratories and industrial research centers. NPSC fellows spend at least two paid summers working for one of

these employers. Joel's NPSC sponsor is HRL Laboratories in Malibu, CA. Formerly the research and development center for the Hughes Corporation, HRL is now jointly owned by Boeing, General Motors, and Raytheon. Joel spent his first summer working in HRL's Photonics and Communications division.

Joel is now a graduate student in Cornell University's applied physics department where he intends to pursue his interests in optoelectronics and optical materials research. "My undergraduate coursework and recent work at HRL have really helped to crystallize my interests, and I am excited about the prospect of joining a research group at Cornell," says Joel who, subsequent to obtaining his degree, plans to work in an industrial environment.

Here are Joel's responses to some questions we put to him:

Q: "Why applied physics?" **A:** "Interdisciplinary programs such as applied physics seem to be in greater demand than ever before, as cutting-edge research tends to span many of the traditional fields of study. Moreover, I particularly enjoy research that is geared toward an end product or process."

Q: "How crucial was your undergraduate education to achieving your current goals?" **A:** "I highly value my

physics education at UMR. I believe UMR's Physics Department is doing an excellent job training scientists for the twenty-first century. The department's greatest strengths are the faculty's willingness to involve undergraduates in their research and the one-on-one attention that the professors give to their students both in and out of the classroom."

Q: "How has your graduate experience been so far?" **A:** "Because I'm only in my first year of graduate school, I have not begun the 'real work' yet. The classes have been extremely challenging, but so far, I have found the experience to be very rewarding. I especially appreciate the sense of family among the graduate students and professors here at Cornell. It is exciting to be in an environment where everyone is so passionate about their work."

Q: "Why did you choose to go to graduate school at Cornell?" **A:** "Cornell has some of the strongest and most active research programs in the physical sciences. A graduate student here has the benefit of numerous research facilities. Also, the academic environment at Cornell is one that encourages freedom to tailor your education to fit your needs. Many of the barriers separating conventional departments do not exist here."

Professional Degree Recipient Upchurch Credits UMR for Leadership Success

The Physics Department was pleased to honor alumnus **Gregory E. Upchurch** (BS '72, MS EE '85) with a **Professional Degree** at the December 2000 Commencement. Greg teaches classes each semester at Washington University Law School and is a favorite speaker for UMR students when he visits the campus. He spoke to the Chancellor's Leadership Class in the fall, and was the speaker for the Honors Student Banquet in 1998. In both talks he highlighted his opportunities to learn leadership skills during his undergraduate years at UMR, and he gave credit to UMR for his success, explaining that a degree from UMR will prepare you well for graduate or professional school or for a career.

He insisted that obtaining a Yale Law Degree was not a problem for him because of the solid education he received in Physics at UMR. He encouraged students to take advantage of UMR's leadership opportunities through student activities, and to find a major that is interesting and challenging to them personally, and that this will lay a solid foundation for their life's work. When Dean Marvin Barker served as Dean of the College of Arts and Sciences, Greg served on the Arts and Sciences

Advisory Board for two years.

Greg is a partner with the law firm of Thompson Coburn in St. Louis, and chairs their intellectual property practice. He has extensive experience in advising individuals and businesses of all sizes concerning protection of their intellectual property. Greg litigates patent and trademark cases throughout the country and has authored several publications. He is a member of the Missouri Bar and the New York Bar, and received the Missouri Bar's President's Award in 1994. He earned a B.S. degree in physics in 1972 from UMR, a J.D. from Yale University in 1975, and an M.S. in electrical engineering from UMR in 1985. Greg has previously served on UMR's College of Arts and Sciences Advisory Board.



Gregory E. Upchurch

After the December Commencement, where Greg was accompanied by his wife **Sue**, he declared, "Receiving the Professional Degree of Physics is truly one of the greatest honors I've ever received." Faculty attending the College reception to celebrate the professional degree recipients were reminded what an honor it is to work in a department with such great alumni.

From Alumnus Jeff Schroeder (BS '95)

I received the February edition of *Matter n' Motion* and, as always, enjoyed reading about the latest exploits of physics students, professors, and alumni. I was surprised (but pleased) to see a little blurb at the bottom of one page containing my last letter to you. I don't know if everyone enjoys reading about my adventures, but I thought I should at least give you an annual update.

My life has undergone quite a few changes in the past months. After four years at Raytheon Space Systems, I decided to try my hand at software consulting and took a job at a startup company called Creative Concepts. With only twenty-five employees when I started, there was great potential for growth, and I felt the benefits of a small company would be a welcome change from the frustrating bureaucracy which often manifests itself at large corporations.

After nearly nine months at my "new" job, I'm glad I made the decision to change companies. There were certainly challenges—because of the hour-long commute my wife and I decided to move to Boulder and cut the commute to fifteen minutes. Also, I had developed quite a bit of expertise and skill at satellite orbital analysis and now was in a different industry and had to learn new computer skills. Nonetheless, after a few months of feeling ignorant, I've been put in charge of a project and wrote a proposal which won a half-million-dollar contract. I know that the skills I gained at UMR, particularly while doing undergraduate research for **Don Madison**, have continued to help me succeed in the corporate world.

If I could give advice to today's students, it would be twofold: first, be sure you know how to use a computer, and I mean

more than to write e-mail or a paper. Today's business world centers on computers and the ability to process data. Whatever the industry or application, it's important to know how to find information, understand it, and transform it into something useful.

That leads into the second important skill: public speaking. No matter what your position, there will be a time when you have to show someone what you've done. You must turn the deep technical knowledge you have into a presentation for people who may not have a clue about the details, but who are interested in the final answer. In addition, you must be comfortable interacting with "important" people, whether they be corporate vice-presidents or four-star generals or the all-important customer.

With these two skills in your grasp, you will be ready to go out into the Real World and succeed. Four or five years at UMR provide ample opportunity to develop these skills. Advanced Physics Lab is a wonderful (though often challenging) example. Undergraduate research, whether through OURE or with one of the wonderful professors in the department, is another. And with so many organizations on campus, taking a leadership role is as easy as finding things you're interested in and pursuing them.

Well, I should close this letter before it becomes a masters' thesis! I hope everything continues to go well in the department, and as always I look forward to hearing from you or anyone else at UMR.

Take care,
Jeff Schroeder

From Alumnus Joseph Hughes (BS '54, MS '59)

I was raised on a farm about three miles from Saint James and seven miles from Rolla. I graduated from John F. Hodge High School in Saint James in May of 1950, and started at Missouri School of Mines in September of that same year. I received by BS in Physics on May 31, 1954, and was married the following day to Narine Pettus, a high school teacher in Rolla.

For my first job we traveled to California, where I was engaged in rocket research for the Navy at the Naval Ordnance Test Station at China Lake, CA. There I performed analytical work on the internal ballistics of solid propellant rockets.

With my ROTC commission, I was soon called to active duty in the Army Corps of Engineers and prepared to go to Korea. I was accepted for Army Aviation Training, however, and before I had finished the training the Korean War was over. Fort Leonard Wood was my next assignment and I essentially spent my active duty career there.

While still on active duty, I went to see Dr. **Harold Fuller** and arranged to take a few courses. When I finished active duty in October of 1957, I already had a running start at my masters degree in physics. My thesis advisor was Dr. **James Kassner**. While back in school, my wife again taught high school in Rolla, and I worked part time as an instrument flight instructor at the Rolla airport.

I finished the masters degree in May of 1959, and we again went to California. This time it was to do inertial navigation research with the Autonetics Division of North American Aviation. We developed a quartz accelerometer that became the mainstay device for their inertial systems for the next 25 years.

In December of 1961 I went from Autonetics to Litton Industries, Guidance and Control Systems Division, where I worked in electro-optics research. We developed daylight startrackers that could pick out a star at mid-day at sea level on a clear day. These startrackers went into stellar-inertial-doppler navigation systems, using kalman filters (one of the earliest forms of artificial intelligence.)

At Litton, in the late 60's I managed a 180-man project to develop a daylight startracker for the bomber version of the F-111 for General Dynamics. This program led to an invitation to manage all of the electronic engineering people at the General Dynamics, Convair Division in San Diego. Consequently, in April of 1972, I became Director of System Technology, with over 600 people who were involved in the flight controls, payload integration, checkout systems, and launch control for the Atlas and Centaur space launch vehicles. Our team was a major part of Convair's successful pursuit of the Tomahawk cruise missile program.

In August of 1975 I left Convair to join a small company in the undersea business called HydroProducts. When I joined them they had just delivered the first two remotely operated vehicles to be delivered to the offshore oil industry. These were very popular. While I was president the company grew from 110 employees to over 550. Late in 1980 I was promoted to Vice President of Tetra Tech, HydroProducts parent company. From there I managed another subsidiary, Tetra Tech Systems Company. They were mostly in undersea systems design and analysis and were located in the Washington, DC area.

In March of 1982 we sold Tetra Tech to Honeywell and I became a Vice President of Honeywell. In March of 1988 I took an early retirement at the age of 55 and went into management consulting. I have since helped several of my former employees at HydroProducts to build their own companies.

I am now on the board of directors of four corporations and one technical society. My wife, Narine, and I reside east of San Diego in La Mesa, California, surrounded by our four children, their spouses and fourteen grandchildren, where we live a very active retired life.

Joseph Hughes

Campus Visit By Frederick L. Newton (BS EE '69)



Frederick L. Newton, Jr.

The Physics Department had the pleasure of hosting **Frederick L. Newton, Jr.** in November 2000 during his visit to campus. Mr. Newton, a 1969 electrical engineering graduate of UMR, began graduate studies in Physics under the direction of Prof. **John T. Park** immediately following completion of his bachelor's degree.

Newton is founder and chair of Triton Elics International of Watsonville, California. The company, founded in 1983, is the world leader in underwater remote sensing and imaging systems. Systems designed by Triton Elics have been used in highly publicized searches including that of the Space Shuttle Challenger, TWA Flight 800, Swiss Air Flight 111, and the plane flown by John F. Kennedy, Jr.

Fred Newton's visit with Physics gave our students an opportunity to make research presentations and to demonstrate their outstanding abilities. Mr. Newton gave an informative lecture in the electrical engineering building titled "Engineering That Targets the Mainstream." He was also invited by Chancellor Thomas to speak to the Chancellor's Leadership Class.



Don't Forget Phonathon 2001

More than 160 alumni responded to the call last year and pledged **\$15,523** to the Physics Department during Phonathon 2000. \$15,018 in gifts was received with an average gift value of \$92. This average was second only to the record of \$130 set in 1997-98.

This year, we will call our alumni between **Feb. 21-27**. Please say, "Yes!" when you are asked for a pledge.

Thank you for your generosity!

From Alumnus Joel Brand ('86 BS ChE, '94 MS ApMth, '94 PhD Phys)

Hello Everyone,

As many of you may be aware, about a year ago **Aron Gaus** ('88 BS CerE, '94 PhD Phys) and I started our own instrumentation company. I wanted to let you know we have now launched our e-commerce website at www.brandgaus.com. Our first product line is benchtop and rackmount temperature controllers, for both laboratory and industrial applications. We have more products in development, including gas analysis instruments. We have designed our company around direct web-based sales and immediate delivery of standard products. We are very excited about both our products and our enterprise, it has been a lot of work, but also quite fun. If you ever run across someone looking for this type of thing, we'd greatly appreciate it if you'd let them know about us.

On the personal side, Aron and **Jennifer** are

still living in Austin. Their daughter will be one year old in March, she is very cute and charming. Jennifer is now Controller for a branch of Time Warner Cable. **Ann** and I still live in Colorado Springs, and love it out here. Ann is doing software development and project management for Raytheon for several satellite/defense projects. She'd tell me what she really does, but she'd have to shoot me.

Best wishes to everyone there, both personally and professionally.

Regards,

Joel Brand

Brand-Gaus, LLC

(888) 698-7305 (toll free, Austin office)

(719) 533-1129 (direct line, CO)

Alumni Notes

We hear that ...

Bradley Brown (BS '80) says hi to everyone. He is still living in beautiful Hermann, MO, and running his utility bill analysis business. He now has great long distance rates, too.

James Canner (MS '65, PhD '69) remembers the youthful enthusiasm that **John Park** brought to the Physics Department in 1965, and wishes John the best in his retirement.

Robert Cessac (BS '88) tells us that he is currently working as a software engineer in medical physics and pursuing a graduate degree in computer science. He is married and has a daughter.

Harry Dreste (BS '51) says he has been enjoying retirement for ten years now. He keeps busy around his home, works on his old Studebakers, belongs to two car clubs, works on his model train layouts, and is a volunteer as well as a patient at the VA Hospital.

Suzanna Edwards (BS '90) writes that she and husband Kevin are enjoying their four daughters. She keeps busy with carpool to preschool, choir, and swimming lessons, and thinks that being a mom is a great job.

We regret to note that **James Hayes**' (MS '64) death was reported to UMR on July 30, 1999.

Jon Holdman (BS '81) writes that he has jumped ship from the oil business to computers, and is now working for StorageTek in Colorado.

Joseph Hughes (BS '54 MS '59) has been a consultant since he retired as VP of Marine Technology from Honeywell in 1988. He serves on the boards of four corporations and one technical society. Joseph recalls that the thing he enjoyed least about MSM/UMR was walking to school through the ice and snow and, not surprisingly, suggests that UMR should provide more low-cost dorms near campus.

James Jensen (BS '41) and his wife Velma keep busy tending their flock of about 100 exotic deer, antelope, and birds on their little Texas ranch.

Bennett Link (BS '84) is an associate professor of physics at Montana State University, where he is engaged in research on neutron stars.

Lou McKenzie (MS '86) married in August 1999, and has a new last name — Mack (big change!). She tells us that she moved to Florida with her wonderful husband and now teaches physics at the high school and the local community college.

Donald Packwood (BS '63, MS '65) retired after 20 years at Hewlett-Packard, where he developed processes to manufacture computer and cell phone chips. He also worked in microelectronics and optoelectronics at National Semiconductor Corp. and McDonnell Douglas.

Kate Masterman Pimmel (BS '96) is now working as a radar analyst on the National Missile Defense Project. She generates ballistic models of threats and re-entry vehicles for Xantech Corporation. She married Keith Pimmel (BSEE '97) on October 9, 1999.

Matthew Pritzker (BS '95) received his MS from Indiana University in 1999 and is now working at IUPUI in High-Performance Computing Support. The three systems he works with the most are the 64-processor Beowulf cluster, the 64-processor 64-GB-of-RAM Sun E10K and the 128-processor 140Gflop IBM SP.

Nancy Ranek (BS '73) is a Regulatory Specialist for the Environmental Assessment Division of Argonne National Laboratory, based in Washington, DC.

Franklin Schowengerdt (BS '66, MS '67, PhD '69) is director of the NASA-funded Center for Commercial Applications of Combustion in Space. His experiments are scheduled to fly on the space shuttle and international space station.

Don Schricker (BS '74) retired after 37 years in the aerospace industry, and sends his best wishes and regards to the Physics department.

Jeff Schroeder (BS '95) decided to try his hand at software consulting and took a job at a small startup company called Creative Concepts. You can read a more detailed report from Jeff elsewhere in this newsletter.

Dave Schultz (PhD '89) is now Director of the Controlled Fusion Atomic Data Center at Oak Ridge National Laboratory. Dave sends his best to everyone.

Gary Sellers (BS '59) retired in October, 1999, and is enjoying his retirement in Las Vegas, Nevada.

Wayne Sievers (BS '61) is a Program Engineer and Scientist with the Nondestructive Evaluation Department of Mason and Hanger Corporation in Amarillo, Texas.

Anibal José da Silva (BS '50) comments "during the great depression, family members worked just to eke out a living wage; now families work to keep up, at great sacrifice to family values, unlike depression families."

Robert Spratt (BS '58) finally decided to join the 21st century crowd and bought a computer. He can be reached by e-mail at hoberg@mntvernon.net.

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@umr.edu. We can generally give you current phone numbers, along with postal and e-mail addresses. We would be grateful if you would take the time to fill out and return the alumni information on both sides of the last page of this newsletter.

Four Physics

This past year has been an eventful year in the ranks of the UMR physics faculty. Four professors (**John Park, Don Sparlin, Bill Parks, and Ed Hale**) decided to step aside from the operation of the department by officially retiring, although they remain active within it in a variety of different ways. These faculty all contributed mightily to the development of the present form of the UMR Physics Department.



The UMR physics family held a convivial retirement reception for these special members. New Physics Chair **Paul Parris** spoke about their contributions to the department and to physics over the years. Each one was given an engraved memento of his years of service to the department.

Because the weather was so fine last May, the department also organized a very pleasant end of semester picnic to honor all our retirees. Held in the grassy area behind the physics building, stories and tales were swapped by young and "mature" alike. The very good barbeque repast prepared by Chef **Ted Deskin** was



thoroughly enjoyed by all.

John Park's contributions to physics are described elsewhere in this newsletter. Here are some reflections on the careers of retirees Don Sparlin, Bill Parks, and Ed Hale:

Don M. Sparlin

In the Fall of 1968 at the age of 31 **Don Sparlin** arrived at UMR with wife **Linda** and children in tow. He was

an Assistant Professor, one of the one hundred new faculty hired in one year as MSM became UMR. Those were the days when physics exams were scheduled at 7:30 A.M. on Saturdays, and the new assistant professor's early research program involved all night data-taking using a superconducting magnet.

Now Professor Emeritus at age 63, he still does all night research, now directed toward the applications of computers to teaching. "Some things don't change, eh?" chuckles Sparlin.

Along the way he mentored more than a hundred undergraduate students who authored over forty-five

graduate physics papers continue to be produced in the department today as a result of his changing the traditional labs into team projects which require written and oral reports. He added role-playing career interviews to the mix, which post-graduates told him turned out to be one of the most useful parts of their education

Several of Don's graduate students received M.S. and Ph.D. degrees in solid state physics or material science, based on funded research in collaboration with faculty in the Ceramics Engineering department. The completion of their degrees followed by their successful careers in an amazing variety of fields is a continuing source of pride to Dr. Sparlin.

His devotion to all aspects of his faculty position is reflected in his seven Faculty Excellence Awards and one Outstanding Teacher Award for outstanding performance in teaching, research, and service. An active member of several physics organizations, he served as president of the Missouri Chapter of American Association of Physics Teachers. He continues to support UMR as a member of the Order of the Golden Shillelagh and the Athletics Booster Club

Don is still found on campus every day, teaching in the Physics Department part time. When he is not in the office, you may find Dr. Sparlin rehearsing or performing on his trombone with the World's Finest German Band, of which he was a founding member. He also has a long history of participation in local theatre performances, campus table tennis championships, fly-fishing, gardening, golf, and now eternal swimming pool maintenance for his grandchildren.



Don Sparlin

winning papers in regional undergraduate competitions. These winning under-

Faculty Retire

William F. Parks



Bill Parks received his bachelor degree from Lehigh University, and his Ph.D. from the University of Iowa, where he worked on field theory with Max Dresden. After two years at Kansas State University he arrived at UMR as an Assistant Professor in the Fall of 1966 with wife, **Carol**. He was one of the first UMR professors hired in the transition from MSM.

Bill's general interest in all aspects of theoretical and experimental physics broadened the Physics Department's expertise and proved invaluable to fellow faculty members and students alike. His wide-ranging publications (in field theory, solid state physics, and atomic and molecular physics) often resulted from collaborations with fellow physicists on both theoretical and experimental research projects. He recalls with pleasure the time he supervised one of UMR's graduate students, **David Fahey**, in an experimental thesis in atomic and molecular physics while **Laird Schearer** was on an extended sabbatical leave.

Bill took a keen interest in all discussions about physics, and his door was open to all the graduate students as they struggled with the complexities of his graduate courses on solid state physics, E&M, classical mechanics, and statistical physics. His standards of performance were demanding, and his students often more fully appreciated his teaching years later when they were out in the "real world." His intent in retirement

is to pursue his latest interests and to enjoy his family and grandchildren.

Bill Parks is likely to be found on remote mountain tops, back in the wilderness, or scaling the nearest rock wall. Bicycling, running, and working out are all employed to stay in top shape for his demanding hobby. His children, and now grandchildren, have benefited from his love of the outdoors and have enjoyed camping and climbing with him.

Edward B. Hale



Ed and Barbara Hale came to UMR in Fall, 1969, after meeting and getting their Physics Ph.D. degrees at Purdue. Ed had spent a year-and-a-half as a post-doc in Rochester before accepting a faculty position at UMR as a solid-state experimentalist, while Barbara found a position in the Cloud Physics Laboratory on her way to a regular faculty appointment.

Initially, Ed built a laboratory and obtained federal funding from the Air Force and the National Science Foundation to conduct electron spin resonance experiments. Later, with excellent consulting advice from **John Park**, he built an ion accelerator that he used to study implantation in semiconductors and other materials under several grants.

In 1982, Ed became a Senior Investigator in the Materials Research Center at UMR and director of its Sample Characterization Laboratory. In 1988, he was appointed Associate Director of the Center.

In 1992, Ed became Chairman of the Physics Department

— a position he held until last May. These were eight prosperous years for the Physics Department. He obtained funding from the National Science Foundation for a major renovation of the research space in the Physics Building. He successfully recruited many outstanding undergraduate students to physics at including the only three "perfect-ACT/SAT" students to attend UMR. He hired six new physics faculty. The department benefited greatly from numerous generous donations from our alumni.

Now in retirement, Ed says "I am greatly enjoying myself. Still have not caught up with numerous projects put off for many years. I have gone back to playing serious bridge and travel about once a month to a state or national bridge tournament. Have been doing a lot of other traveling as well. Recently, I went to the Rose Bowl and parade. After the game, I set out in the early evening for a few days in Las Vegas. As I cruised at 70 mph along I-15, there was a 250-mile string of four headlights abreast going the other way - LA folks were returning (at a slow pace) from New Year's in Las Vegas. (This year, unlike last, Vegas put on special shows at reasonable rates and "everybody" went.) TV news indicated it took 12 hours to make the normal 3-1/2 hour trip. I was happy to get back to Rolla, where still the only traffic jams occur at three lights at 5:00 pm for 5 minutes. Best wishes to all the many friends I met and enjoyed along my UMR way."

Reflections on Chancellor Johh T. Park upon his Retirement



John T. Park

Chancellor and physics professor **John T. Park** retired last year after many years of service to the campus. The *MSM-UMR Alumnus* magazine carried a front-page feature retrospective about John's connection to the MSM-UMR community (summer, 2000, pages 6-13). However, that article gave only light coverage of his scientific work. The following are excerpts from a talk about the scientific career of John T. Park given by Physics Chair **Paul Parris** at the UMR

at it. You find out how easy it is to move; you try and spin it around; you try and knock chunks off it, and see how tightly put together it is. After a little practice you find that this technique tends to work best when the things you throw are not enormously bigger or enormously smaller than the item to be probed.

"So one thing that atomic physicists do is take other atoms and ions and electrons and anything else they can put into an accelerator and they throw them at other atoms and molecules that they are interested in investigating, atoms and molecules that are often just floating around minding their own business in a gas or sitting quietly in a foil target while the physicist is busy trying to probe their interior structure.

"And that, in a nutshell, is what John did. Brilliantly.

"In fact, those first research proposals that I mentioned provided the resources for John to build a truly unique and beautiful piece of research equipment called an energy loss spectrometer that is still humming away and being used by **Bob DuBois**, **Michael Schulz**, their students and postdocs, in the basement of the Physics Department. And using this basic piece of equipment, John, along with an incredible array of students, faculty collaborators, and postdocs — many of whom have gone on to enjoy international reputations of their own — have made some of the most precise energy loss measurements that have ever been made for a number of collision processes, including what are considered by many to be among the most important and fundamental systems for comparing theory and experiment, that of protons on hydrogen and helium.

"The work performed in John's lab has been presented to the scientific community in well over 100 papers, about half of which were in archival journals such as the *Physical Review*, and at least five of which were published in prestigious *Physical Review Letters*. In reviewing John's record I was particularly impressed with the fact that his production rate for refereed papers actually went up and hit what appears to be a peak during the years that he served as chair of the Physics Department, from 1977 to 1983.

"One of the enduring themes of John's work over the years is contained in the idea that by carefully looking at as many aspects of a particular collision as possible, by trying to measure all the different processes that can happen in the collision, and the probabilities with which they occur, the stronger the test that one can provide of the underlying physical theory. And that, largely, is what the game of science is all about. It is somewhat of a cliché, perhaps, but nonetheless true for being so, that one of the most important aspects about a physical theory in science is that it is potentially falsifiable.

"Because of his fundamental contributions, John has received a number of honors and awards. As a physicist, I find the most compelling honor of John's career to be his election as a Fellow of the American Physical Society, a very rare honor conferred annually on less than one-half of one percent of physicists in the country.

"It is a pleasure for me to have been able to highlight what may be for some a side of John's career that is not, perhaps, discussed on campus quite so often, but of which we in the Physics Department, on a daily basis, are aware and very proud. I will close with the observation that, with the department anticipating the possibility of a hire or two in the near future to replace those that have retired, I have no doubt that we will find ourselves wondering where can we find more physicists of the caliber of John Park."

Honors Banquet 2000. Parris remarked:

"I remember distinctly when I arrived here at UMR fifteen years ago, that it was absolutely clear from everyone that I talked to that a large part of the international research reputation of the Physics Department was associated with the physics being done and the work coming out of John Park's lab.

"I was told when I arrived about how in the early sixties the late **Harold Fuller**, the Abraham-like patriarch of the Physics Department, had essentially kick-started the department as a research and Ph.D. granting entity by bringing in three wunderkinds: brilliant, energetic, young physicists, each working in different disciplines: **Bob Bell** in solid state physics, **Jim Kassner** in cloud and aerosol physics, and John Park in atomic and molecular physics. There is also no question that a certain amount of the goodwill that the department enjoys, even now with funding agencies stems from the reputations that were formed in those early days in which John was a major mover and shaker in the department.

"John arrived at UMR in 1964 fresh off of a postdoctoral stint as a prestigious National Science Foundation postdoctoral fellow at University College, London, about a year or so after finishing his Ph.D. at the University of Nebraska. His first research paper was published in the *Physical Review* the year he completed his Ph.D., well before he arrived at UMR. Within a year of arriving at the University, however, John received from the Research Corporation his first research grant, followed a year later by the first of what turned out to be eleven three-year grants from the National Science Foundation covering a continuous period from 1965 right up until 1993 - a remarkable twenty-seven years of continuous NSF funding. On top of this he also received concurrent support on a grant from the Department of Energy from 1984 to 1988.

"So I thought it might be appropriate for this audience if I tried to capture for you in relatively simple language the essence of what John was trying to do during those 27 years of continuous funding by the National Science Foundation and the Department of Energy.

"The basic problem handed to the experimental atomic physicist in the last half of the last century is how do you find out information about the interior structure of something which, because it is so small, you can't really grab it, or hold it, or shake it the way you do when you are trying to determine the interior structure of a Christmas gift before you are allowed to actually open it.

"Well, one thing you can do, if you can't get close enough to an object you are interested in investigating, is to throw things

Malcolm Cole Remembered

Malcolm B. Cole was born in Merrill, Wisconsin on July 4, 1916. He died at the age of 83 on December 20, 1999, in Rolla, Missouri. He is survived by his wife **Millie** of Rolla.

The Cole family moved to Madison, Wisconsin in 1922, where Malcolm received his primary and secondary education. He obtained a B.S. in Physics from the University of Wisconsin in 1938 and an M.S. in Physics from the same school in 1948. The intervening years were spent as a Lieutenant, Junior Grade, in the Navy where he received training at MIT, Harvard, and Fort Schuyler, and became an instructor in radar. Between 1948 and 1952 he taught physics at Mankato State College in Mankato, Minnesota and at Knox College in Galesburg, Illinois. In 1953 he joined the Physics Department of MSM where he taught until his retirement in 1983. He and Millie were wed September 3, 1954, in Rolla.

In 1967 Malcolm completed his ground school training in aeronautics via University of Missouri extension, and finished his flight instruction under Aaron Miles. In 1974 he was elected to honorary membership in the freshman honor society, Phi Eta Sigma, by the student membership of that society. He was named *Advisor of the Year* by the National Society of Physics Students in 1967. From 1959 to 1969 "Mac" organized and directed the

Duplicate Bridge Club in Rolla, regularly overseeing fifteen to twenty tables every Friday night. From 1976 to his retirement Malcolm supervised the Spring Science Fair in Rolla, a voluntary service in which he took great pride.

After retirement Malcolm and Millie remained in Rolla where Malcolm pursued his lifelong love of golf at Oak Meadow Country Club, while Millie continued in her capacity as head nurse at the Phelps County Regional Medical Center laboratory until her retirement in 1984.

Malcolm taught Newtonian Classical Physics with verve and utter clarity. The discussion among the students of Phi Eta Sigma resulting in his election to honorary membership was a great tribute to Malcolm's dedication and skill as a teacher. We remember our colleague Malcolm with appreciation and respect, and lament his passing.

John C. Carstens
Jack L. Rivers
Otto H. Hill



Malcolm Cole

Dr. Richard W. Hannum Leaves Bequest for Physics

Dr. **Richard W. Hannum** (PhD '66) died on March 8, 2000, at the age of 87 in Media, Pennsylvania. Dr. Hannum earned a B.S. from Rensselaer Polytechnic Institute in 1935 and his Ph.D. in Physics from UMR in 1966. He had a long and successful career, which included teaching at Yale University and Southern Connecticut State University, working for Westinghouse and the New Haven Police Department. He worked into the mid 1990's as a systems analyst for Systems and Software Services of Media.

Through a bequest, Dr. Hannum provided a generous gift for the department. The initial distribution from his estate has provided sufficient funds for establishing the **Richard W. Hannum Endowed Development Fund**.

Dr. Hannum placed no restrictions on how the department is to use the funds provided through his bequest. Physics Chair **Paul Parris** indicates that the Physics Department will be able to use these funds to assist with evolving needs of the department as they arise. Because a major goal of UMR at this time is to increase enrollment, the first few years of funding will probably be used to assist with recruiting and retaining the kind of excellent students for which the department has become known.

Dr. Parris notes: "We are grateful to Dr. Hannum for his foresight and planning for his alma mater through his estate, and we are pleased to be able to honor his memory through this named endowment."

Leaving A Legacy Through Your Will

A planned gift makes a statement in perpetuity about your dedication to MSM-UMR. While many may not be able to establish an endowment fund today, they often find 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 are demonstrating your loyalty to the institution that played a significant role in shaping your future. For more information about giving a planned gift, contact Anne Weller at 573-341-6090 or e-mail her at aaweller@umr.edu.

Seventh Annual Laird D. Schearer Graduate Research Prize

The Laird D. Schearer Graduate Research Prize was established to commemorate the memory of the late Dr. Schearer, a Curators' Professor of Physics. Dr. Schearer joined the department in 1971, and chaired the department from 1971 to 1977. His encouragement and support of the research programs in the department enabled the graduate physics program to grow and flourish. Gifts from alumni, friends, and the Schearer family endowed and increased the Laird D. Schearer Fund, established to provide annual prizes for the best research conducted by UMR physics graduate students.

Graduate students document their research accomplishments for the Schearer Prize committee and present their work to an audience of faculty and students. This experience proves invaluable after students graduate, when they must present their research to audiences of professionals. A faculty committee selected three graduate finalists to

describe their research at a departmental colloquium held last November. One of this year's finalists was **Kisa Ranasinghe**, in experimental solid state physics, whose entry was entitled "A generalized method for determining the crystal nucleation and crystal growth rates in glasses using differential thermal analysis," (supervised by Prof. **Gerry Wilemski**). The second finalist was **Otmar Schmid**, in experimental cloud and aerosol physics, whose entry was titled "Determination of the amount of aqueous sulfuric acid on aviation aerosol" (supervised by Prof. **Don Hagen**). The third finalist was **Osman Ozturk**, in experimental solid state physics, whose entry was entitled "Epitaxial growth of chromium and chromium oxide films on Ag(001)" (supervised by Prof. **Dan Waddill**).

Following the colloquium presentations, the committee awarded first place honors to Mr. Schmid, who has written a personal profile that appears below.

From the Schearer Prize Winner, Otmar Schmid



Otmar Schmid

Receiving first prize in the 7th annual Laird D. Schearer Graduate Research Competition is a great honor for which I am grateful. The research I presented on the chemical characterization of combustion aerosol is important for the assessment of the environmental impact of aviation aerosol. This work also represented part of the requirements for my PhD degree, which I received from

UMR in May 2000. Being an international student from Germany, the completion of a PhD thesis not only marks the endpoint of a scientific, but also of a cultural and personal journey. On this five year long journey, I felt supported by numerous people, most notably my advisor, Prof. **Donald Hagen**, the staff of the Cloud and Aerosol Sciences Laboratory, and the staff and faculty of the physics department. Thank you all for your unfailing support.

I was born in 1964 in Augsburg, in the heart of Bavaria, Germany, where I also received my primary and secondary school education. I served for 15 months in the German army (as required by law), received a Bakkalaureat in Philosophy from the Jesuit University in Munich, and hold a Diploma in physics from the Ludwig-Maximilians-University in Munich. While working on my Diploma thesis at DLR (the German equivalent of NASA) during the summer of 1993, I met Drs. Donald Hagen and **Philip Whitefield** from UMR, who at the time were collaborating with DLR on an

environmental study sponsored by the European Community. The interesting nature and the international reputation of their work encouraged me to apply for a PhD program at UMR.

Arriving in Rolla in January 1995, I was impressed by the friendliness and kindness of the people. The students were nice, the professors and secretaries were helpful and even the WalMart cashiers would ask how I was doing. Believe me, this could never happen in a German grocery store, where the customer seems to be the natural enemy of any cashier. Through musical groups like Madrigal Singers, UMR choir and Oak Savannah as well as church activities, I quickly made friends and started to feel at 'home' in Rolla.

After completing class work, I worked with Dr. Hagen on the physico-chemical characterization of combustion aerosol. My main task became the characterization and optimization of devices, which were used on numerous national and international projects funded by NASA, the US Air Force, Boeing, and the European Community. These ground-based and airborne field projects were ultimately aimed towards the assessment of the impact of aviation on the environment. In this context, two of the main concerns were and still are ozone depletion and climatic changes. The data we provide on the aerosol emissions of jet, rocket, or space shuttle engines represent one piece of the complex puzzle of resolving these issues. Much progress has been made over the past decade, but numerous pieces are still missing. Currently, I am working at UMR as postdoc in the Cloud and Aerosol Sciences Laboratory.

International Conference on Nucleation and Atmospheric Aerosols held at UMR

Last August 6-11, scientists from around the world arrived in Rolla. The event was the *15th International Conference on Nucleation and Atmospheric Aerosols (ICNAA)*, organized by Prof. **Barbara Hale** and others associated with UMR's Cloud and Aerosol Sciences Laboratory. The first conference of this series took place in *Dublin* in 1955 and the second in *Basel and Locarno* in 1956. Thereafter conferences occurred as follows: the 3rd in *Cambridge* (1958), the 4th in *Frankfurt am Main and Heidelberg* (1961), the 5th in *Clermont-Ferrand and Toulouse* (1963), the 6th in *Albany and University Park* (1966), the 7th in *Prague and Vienna* (1969), the 8th in *Leningrad* (1973), the 9th in *Galway* (1977), the 10th in *Hamburg* (1981), the 11th in *Budapest* (1984), the 12th in *Vienna* (1988), the 13th in *Salt Lake City* (1992) the 14th in *Helsinki* (1996), and the 15th in *Rolla* (2000). This series of conferences has been held jointly with the Nucleation Symposium since 1988.

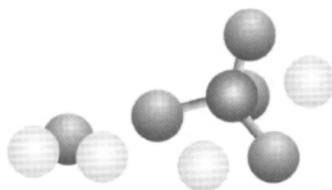
At this 15th ICNAA a special session, the *Howard Reiss Symposium*, was held in honor of Professor Howard Reiss, Chemistry Department, University of California, Los Angeles, for his many contributions to the field of nucleation. This Symposium was organized by Richard Heist (University of Rochester and Manhattan College) and included Invited Lectures by Michael E. Fisher (University of Maryland), Joel Lebowitz (Rutgers University) and Charles Knobler (University of California, Los Angeles). At the end of this

symposium, Howard Reiss offered reflections on his 50-plus year career in the field of nucleation research.

Authors from 27 countries presented over 200 papers which are contained in "*Nucleation and Atmospheric Aerosols 2000*", edited by Barbara Hale and Markku Kulmala, American Institute of Physics Press, Melville NY (2000). (The proceedings is also available in electronic form. For information see www.UMR.edu/~icnaa) The International Advisory Committee provided guidance for the conference's scientific content and selected ten Plenary Speakers to present state-of-the-art overviews of their field: K. Kelton, T. Koop, A. Laaksonen, R. McGraw P. McMurry, K. Okuyama, S. P. Pandis, H. Reiss, M. Tolbert and P. E. Wagner.

The ICNAA was sponsored by the IAMAS, ICCP, CNA, WMO, the National Science Foundation of the USA and the University of Missouri-Rolla. The conference

chair was Barbara N. Hale of UMR's physics department. When not working, the participants were entertained by a float trip and barbeque on the Meramec River, a jazz piano and classical music concert in Leach Theatre, an ice cream social at the Hales' in Oak Knoll, and a banquet in the student union. The poster session on Wednesday night after the float trip was a great success as beer and snacks welcomed those who conquered their exhaustion and made an appearance.



Logo of 15th ICNAA

Faculty & Staff Notes

Ron Bieniek has just completed his period of appointment on the American Physical Society's national Committee on Education. He reports that much of the deliberation and work dealt with the role that the physics community can and should play in improving and enhancing pre-college (K-12) science education.

Massimo (Max) Bertino and his wife **Ulrike** are pleased to announce the birth of their daughter, **Anna Francesca**, born January 4, 2000.

Pam Crabtree was promoted to Senior Secretary of the department.

Bob DuBois has taken a year's leave of absence so that he could take advantage of an opportunity to work at the Albert

Ludwigs University in Freiburg, Germany. After encountering some difficulties with the tight housing situation in that lovely European city, he and his wife Kay (and their two boys) have successfully settled in. Kay is teaching several English classes, the boys are attending a German Gymnasium, and Bob is finding the research exciting. In their spare time they all are enjoying bike rides through the surrounding winefields and local countryside. Bob says that exploring nearby places like the Alsace wine region of France is easy since Freiburg is just 30 minutes by car from both France and Switzerland.

Michael Schulz traveled to Kiev last summer to initiate a new student exchange program. **Nataliya Maydanyuk**, the first graduate student admitted to UMR under this program, arrived on campus in January, 2001.

Max Bertino's First Year as UMR Professor



Max Bertino

Massimo (Max) Bertino joined the UMR physics faculty in January, 2000. He was born and raised in Milan, Italy. He obtained his B.S. degree in 1991 from the University of Milan, and his PhD from the University of Göttingen in Germany. This was followed by a 2-year experience at Massachusetts Institute of Technology, and a 6-month stay at Pacific Northwest National Laboratory in Richland, WA. (For a wife's perspective on the international physics lifestyle, see related article in this newsletter by **Uli Bertino**.)

Currently, Prof. Bertino is setting up an experiment to grow metal clusters in the gas phase and deposit them on surfaces. The method, conceived independently, should allow the deposition of small metal clusters on surfaces without destroying them. More importantly, heteronuclear clusters will be generated out of metals that are immiscible on a macroscopic scale. Calculations have shown that these heteronuclear clusters might constitute the building blocks for alloys that do not have a macroscopic counterpart, and thus might lead to new materials.

Bertino's experiments will be carried out in a combinatorial fashion, i.e., the physical and chemical properties of the alloys will be examined for several different compositions. The resulting database will be employed to compare experiment and theory and to single out the most promising compositions for catalytic and coating applications.



Max, Anna and Uli Bertino

Beginning a Physics Career – a Wife's Viewpoint

by Ulrike (Uli) Bertino

When I met **Max Bertino** he was already well into his Ph.D. program at the Max-Planck-Institut fuer Stroemungsforschung in Goettingen, working with Prof. Toennies on scattering of He atoms from surfaces. He impressed me with his fluent German (which was very good because my Italian was nonexistent at the time), and his cooking skills.

I was studying French, Math and Psychology at the University of Goettingen, intending to become a teacher. By the time I graduated, Max had already been at MIT for six months, working with Prof. Ceyer on etching of Si surfaces. Instead of doing the second stage of a German teacher's training (a two-year internship), I joined him in Boston and we soon got married there.

After 2 years in Boston I left my manager job at Starbuck's, packed our belongings in a moving truck and started driving west. After seeing Niagara Falls, Badlands National Park, Little Big Horn National Historic Site, Mt. Rushmore, Devil's Tower and more prairies and cattle than I care to remember, we arrived in Richland, WA. There Max worked at Pacific Northwest National Laboratory and climbed every mountain he could get to for six months — I could only join him on a few trips because I was pregnant and didn't want to sleep on glaciers or fight with bears!

A month before my due date, we again packed the moving truck and drove back east to Rolla. This time my brother joined us from Germany. We managed to see still more interesting sites in this big country — the Great Salt Lake, Arches National Park (a climber's dream), the Rocky Mountains of Colorado and, of course, the beautiful corn fields of Kansas.

Our first year in Rolla was quite eventful. Within a month of our arrival our daughter Anna Francesca was born, we bought a house and made a lot of new friends. It is still amazing to me how warmly people welcomed us into this community. We have finally found a place where we feel at home and where we would like to settle down and raise our child(ren). I would like to take this opportunity to thank you all for making Rolla into a permanent home for our family.

Frontiers *in* Physics

The Frontiers in Physics Colloquium Series this past year offered a variety of talks covering a wide spectrum of subjects. The past year also saw the initiation of a web page for the UMR Physics Colloquium series. Interested parties can find a schedule of the current and recent semester's series along with the abstracts

of the talks at <http://www.umn.edu/~physics/colloquium.html>.



Tom Gaylord

Special Homecoming Returnee

We were extremely fortunate this past year to have as our Homecoming 2000 Colloquium speaker Prof. **Tom Gaylord** (BS '65, MS EE '67), the Julius Brown Chair and Regents' Professor of Electro-optics in the School of Electrical and Computer Engineering at the Georgia Institute of Technology. Prof. Gaylord's talk, "Diffractive Optics," discussed the analysis and design of diffractive optical elements. During his visit Prof. Gaylord listened to undergraduate research presentations by **Dominic Biava**, **Banning Bozarth**, and **Carmen Doudna**, and held a round table meeting with our undergraduate physics majors, where they shared experiences in physics education at UMR.

Dr. James Cowin of Pacific Northwest National Laboratory described new experiments designed to study ion transport and solvation at oil-water boundaries in a talk entitled "Sculpting the Oil-Water Interface to Probe Ion Solvation". We learned that these processes are important in a variety of systems ranging from cellular and enzyme function to fuel cells. Dr. Kate Kirby, Acting Director of the Institute for Theoretical Atomic and Molecular Physics at the Harvard-Smithsonian Center for Astrophysics, followed with "Molecule Formation in Dilute Gases, from the Early Universe to Bose-Einstein Condensates" which discussed the process of molecule formation in systems such as the early universe, supernovae ejecta, and, perhaps, in Bose-Einstein condensates.

The talk "Magnetic Nanostructures" by Prof. Gary Mankey of the University of Alabama detailed how physics research is contributing to the needs of the magnetic information storage industry. Prof. Mankey's talk attracted

the interest of reporters from the Missouri Miner, the student newspaper, which printed an article about the talk and Prof. Mankey's research.

In his talk "Addressing Single Molecular Events Using the Atomic Force Microscope" Prof. Michel Grandbois of the University of Missouri-Columbia detailed how experimental tools and techniques developed by physicists were finding new and important uses in biology and in applied biomedical research.

30th Harold Q Fuller Undergraduate Research Seminar

One of the high points of the colloquium series is the annual *Harold Q Fuller Undergraduate Research Seminar* in the Spring. This past seminar, the thirtieth, had many fine talks that reflected the diversity of undergraduate initiative and expertise in the department. Undergraduate **Banning Bozarth** talked on his work with Orion Grimmer on "Ionization of the Potassium Atom due to Quantum Tunneling in an Electric Field". They used two pulsed dye lasers to measure decay times of electrons in energy levels of potassium just below the ionization limit. In his talk on "A Study on the Crystal Structure of Tungsten, undergraduate **Joshua Zirbel** discussed his research conducted with Brian Fuller that showed the crystalline structure of tungsten changed rapidly with annealing temperature, as revealed by shifts in x-ray diffraction patterns. Undergraduate **Curtis Stratman** described his research done in collaboration with **Keith Winkler** on "Thermal Hysteresis in DC Resistivity of Carbon-60". Their work on "Bucky" balls reminded us of the marvelous characteristics of these fullerenes. Undergraduate **Brian Fuller** gave a talk on "Quantized Conductance in Gold Nanocontacts" based on research he did with fellow undergraduates **Carmen Doudna** and **Matthew Teig**. Their work probed the formation of nanometer sized structures between two wires in loose contact. Undergraduate **Orion Grimmer** presented research conducted in collaboration with **Jennifer Adams** on the "Determination of Three Constants Using Blackbody Radiation". Grimmer described how they used the spectrum of blackbody radiation to determine Planck's constant, Boltzmann's constant and the speed of light. **Brett Maune** described "A Survey of High-Temperature YBCO Superconductor Properties" done in conjunction with fellow undergraduate Carmen Doudna.



James Cowin

From Freshman Deepak Vaid

Hello, my name is **Deepak Vaid**, and I am from India. I came in as a freshman this fall, and I didn't know much about UMR. In fact, I knew practically nothing, and was hesitant to approach the Physics building before classes began. I had no idea how nice the faculty are. I intended to keep some sort of formal distance. As it turned out Dr. Peacher (my advisor) helped me tremendously. In India I had taken beginning Physics and Calculus in high school. I had also heard that you could skip courses here if you had studied their content earlier. I thought that would be a big boost academically and financially. During registration, Dr. Peacher introduced me to Ms. Mary Kirgan in the Math department. She gave me two Calculus tests and I skipped Calc I and II. Dr. Madison and Dr. Bieniek gave me tests for General Physics I and II. Eventually, I found myself in Calculus III, Modern Physics, and Theoretical Physics and some other courses. I also received a Physics Department scholarship.

I had never expected to be able to accomplish so much here, so soon. My ambition had been to attend CalTech, but I found a full-fledged experimental and theoretical program at UMR. I found employment under Dr. Don Madison as a research assistant, earning enough to pay for a significant part of my food costs and rent each month. I have visited Maryland (with Dr. Madison), been to NIST, seen the SURF synchrotron and the BEC condensate apparatus (at NIST), and been in the company of some of the top physicists in the US and the world. I have enjoyed the company of my fellow students and UMR and found that the only difference between us and Caltech students is that we get to see snow in winter. I also have my own desk and computer at which I am writing this. I don't know if this is warming for those reading it, but it certainly is not a trivial task to pen down these experiences without some emotion surfacing in me.

Some people might think all this is some sort of an accomplishment for a freshman. Well, there haven't been any accomplishments, yet. But I see a bright future - occasionally interrupted by cookies, coffee and colloquia. I commonly hear people say "there are no women in Rolla." Well, I say who needs women when you have Physics (no chauvinism intended)! *[Editors note: Females now comprise 23% of UMR students.]*

Larry Long

Larry Long (MS '81, PhD '85) passed away on March 28, 2000.

He was born to Ora and Ida Long in St. Joseph, MO on August 18, 1955. He graduated from Lafayette High School in St. Joseph, received his BS in Physics from Northwest Missouri State University in 1977 and his MS and PhD degrees from MSM/UMR in 1981 and 1985, respectively. He is survived by his wife Suzie, his daughter Elizabeth Morgan Long, his mother, his sister Kathy Long Weekley, and several nieces and nephews.

Long worked for McDonnell Douglas Corp. in St. Louis from 1985 until 1988, when he began his teaching career at Pittsburg State University. He was an associate professor of physics, and served as Zone 12 counselor for the Society of Physics Students. He was a member of the American Association of Physics Teachers, the American Physical Society, the American Vacuum Society, the Optical Society of America, and Sigma Xi.

Have You Sent Us Your Resumé Yet?

Many alumni have responded to our request for a copy of their resúmes. Summaries of some appear in this newsletter, and we will send a complete set to anyone who requests it. We ask that you fill out the form below and attach a copy of your resumé. Please mail them to: **Chairman, UMR Physics Department, 1870 Miner Circle, Rolla, MO 65409-0640**, or respond by e-mail to **physics@umr.edu**.

MSM/UMR PHYSICS ALUMNUS & ALUMNA INFORMATION FORM

Name: _____ Spouse: _____

Business address: _____ Home address: _____

Phone: _____ Phone: _____

FAX: _____ e-mail: _____

MSM/UMR degree(s) and year: _____

Other degree(s), year and school: _____

If you need more space to answer the questions below, please continue on back of page.

1. Summary of major events and influences in your career path: _____

2. What did you enjoy most about your stay at MSM/UMR? _____

3. What did you enjoy least about your stay at MSM/UMR? _____

4. What should we be doing now that we were not doing when you attended? _____

5. Relate a story, good or bad, about MSM/UMR. _____

6. Are there specific classmates that you would like to hear about or get in touch with? _____

What's New With You?

We'd like to know what's new with you, both personally and professionally. Any information you send will be circulated in the department and inserted into the next physics newsletter, unless you request otherwise.

Please print or type your information. Include your postal label below in your reply, so that we can change our records. Mail to: **Chairman, UMR Physics Department, 1870 Miner Circle, Rolla, MO 65409-0640.** You can e-mail news to us at **physics@umr.edu.** Thanks for keeping in touch!

Name: _____

Mailing Address: (Check if new) _____

Telephone: _____ e-mail: _____

Job Title (if appropriate): _____

Business Address: (Check if new) _____

Telephone: _____

News, Comments, and Input: _____



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