

UM-St.Louis *Physicist*

Department of Physics & Astronomy <http://www.umsl.edu/~physics> November 2005

NOTE FROM CHAIR

I was recently asked to provide an update on our degree programs and was surprised by the results. There are currently 60 students in our degree programs (40 undergraduate and 20 graduate) which indicates continued growth. In addition, I found that since 1968 we have awarded nearly 300 Bachelor's degrees in physics. As you will read in this Newsletter, we are striving to increase these numbers through more retention efforts in the form of scholarships and research assistantships for our majors. We are very happy to announce our first endowed scholarship for physics majors, the Richard D. Schwartz Scholarship. We have also instituted a new orientation course, *Windows on Physics*, for first-time freshman and transfer students. This course introduces our new physics majors to the faculty, the physics curriculum, research and scholarship opportunities . . . and to each other! You will also read about progress in our Master's and Ph.D. programs as our 13th and 14th Ph.D. students successfully defended their dissertations this month.

For the second year in a row, we are pleased to welcome a new assistant professor of physics, Dr. Erika Gibb. Erika is an observational astronomer specializing in studies related to the origins of the solar system. Before coming to UM-St. Louis, she was a visiting professor at the University of Notre Dame. I encourage you to read more about her research interests in the Faculty section. Erika fills the void left by the retirement of Dick Schwartz.

One thing that makes putting the Newsletter together enjoyable is hearing from our alumni. We try and provide updates on as many alumni as possible and wish we heard from more of you. This year, our fourth alumnus, Gary W. Kamerman, received a UM-St. Louis Distinguished Alumni Award. With so many outstanding alumni, it is not difficult to identify "distinguished" alumni to nominate for this award.

Thanks again to our alumni for their continued support!

Bruce A. Wilking, Chairperson



Gary Kamerman and Chancellor Tom George

Gary W. Kamerman Receives UMSL Distinguished Alumni Award

In recognition of his outstanding career in developing laser radar, Gary W. Kamerman (B.A. 1976) received an UMSL Distinguished Alumni Award at the Founder's Day Dinner held at on September 15, 2005. Gary is the founder and Chief Scientist of FastMetrix, Inc. based in Huntsville, AL. The company specializes in optical radar and high-precision, non-contact measurement systems. For his contributions to the development of optical radar, Gary has received the Laser Focus World Commendation for Excellence in Technical Communications (1996), the NASA Achievement Award (1998), the Letter of Commendation from the Joint Special Operations Command (1998), and the Certificate of Recognition and Appreciation from the National Reconnaissance Office (1999, 2002). He is due to publish a book with Academic Press entitled "The Design and Application of Laser Radar". In his acceptance speech, Gary recognized the valuable research experience he received in Bernard Feldman's lab as an undergraduate.

Richard D. Schwartz Scholarship for Physics Students

We are very pleased to announce that we successfully raised the necessary \$15,000 to receive the State of Missouri's match and endow the Richard D. Schwartz Scholarship at a level of \$30,000. This is the *first* endowed scholarship for the Department. The scholarship will be awarded in 2006 to a junior or senior physics major. We thank the faculty and alumni for their generosity!



Roxana Contreras, Nathan Dees and Jorge Brea

Second Annual UMSL/UMR Joint Department Meeting

About 30 faculty and students traveled to Rolla, MO on October 14, 2005 for the second joint meeting between the Department of Physics at UMR and the Department of Physics & Astronomy at UM-St. Louis. Following lunch, there was a poster session by the graduate students. Again this year, the posters were impressive and prizes were awarded to UMR student Raghuvveer Gadipalli (\$500), UMSL student Jorge Brea (\$300), and UMR student Matt Foster (\$200). A colloquium entitled, "Neutrinos: The Mass that Roared", was delivered by Professor Hamish Robertson from the University of Washington. Our colleagues at Rolla were excellent hosts as these annual meeting are accomplishing their goal of building closer ties between Departments and strengthening our Cooperative Ph.D. Program.

Alumni Awards Update

The annual Physics & Astronomy Alumni Awards luncheon was held on April 29, 2005 at the Alumni House. Distinguished alumni Charles F. Jones and Gary W. Kamerman were recognized for their contributions to the Department. Distinguished alumna Otto Sankey and his wife Debra were also present. Eight students received awards. Ryan Cleaver, Ricardo Garcia, Elizabeth Staudt, and Christopher Jost are receiving the Physics & Astronomy



Bruce Wilking, Otto and Debra Sankey

Alumni Scholarships that provides \$1000 for the academic year. Bob Collins, who will graduate this December, received the Jeffrey Earl Award as the outstanding graduating senior in physics which included a set of the Feynman Lectures. Dion Mauer was the recipient of the Senior Physics Award as the rising senior with the highest GPA. Danny Franke and Daisuke Takeshita shared the Outstanding Graduate Teaching Assistant Award. After the luncheon, we were treated to an excellent talk by Gary Kamerman entitled "Optical Radar". It is thanks to your generosity that these awards and scholarships are possible.



Bruce Wilking and Bob Collins

Windows on Physics

Physics majors new to the Department are getting to know the faculty and their fellow students in a new course "Windows on Physics". Students meet once a week to learn about the physics curriculum, advising, financial aid, careers, and faculty research interests. The course, which has an enrollment of 12 freshmen and transfer students, is being organized by Sonya Bahar and Ta-Pei Cheng.

New Speakers Fund

Thanks to a generous contribution by Dr. Elenore A. Schewe, we are seeking to expand the Frank and Elaine Moss Speakers Fund. The fund will be used host visits by distinguished scientists to the Department and the Center for Neurodynamics.



Presenters at the 14th annual meeting of the NASA/Missouri Space Grant consortium in Springfield, MO

Front row l-r, Eric Mandell and Kari Van Brunt
2nd row, l-r, Ryan Cleaver, Nathan Hunton, Dale Downs, Angela Benoist, Rich Schuler, and Dave Holy

Undergraduate Research Symposia

The Department of Physics & Astronomy was well represented at the annual Undergraduate Research Symposium held on the UM-St. Louis campus on April 22 and hosted by the Golden Key International Honour Society. Poster presentations were made by Ricardo Garcia, Dion Mauer, and Gordon Stangler (advisors Frank Moss, Mary Jane Kernan, and Mary Leopold, respectively).

On the same day, 8 students traveled to Springfield, MO for the 14th annual meeting of the *NASA/Missouri Space Grant Consortium*. Oral presentations of their research were made by undergraduates Angela Benoist, Dale Downs, Ryan Cleaver (advisor: Bruce Wilking), by Nathan Hunton (advisor: Phil Fraundorf), by Rich Schuler and Dave Holy ("UMSL Fifth Grade Astronomy Outreach Program"), and by Rich Schuler ("UMSL Science Mentors Outreach Program"). Graduate fellowship recipients Kari Van Brunt (advisor: Ricardo Flores) and Eric Mandell (advisor Phil Fraundorf) also made presentations. These presentations may be found on the Department Web Page under <http://newton.umsl.edu/spacegrant.pdf>.

Dale Downs and Ryan Cleaver were selected to represent the NASA Missouri Space Grant at the annual Great Midwestern Regional Space Grant in Chicago, IL in September. Dale received an Honorable Mention for his poster and was invited to give an oral presentation on his research project.

Observatory News

We are continuing our program of observing possible transits of nearby stars by their planets. The NASA/Missouri Space Grant Consortium is supporting physics undergraduate Earl Gadel in these observations which are important for establishing the inclination of these remote planetary systems.

Two papers were published in 2005 by the Whole Earth Blazar Telescope consortium based on data from the Richard D. Schwartz observatory. Richard Schwartz and student John Basler were co-authors on a paper by Valiita et al. published in January issue of *Astronomy & Astrophysics* reporting on optical monitoring of variability in the blazer BL Lac. Bruce Wilking and undergraduate Josh Tartar were co-authors on a paper published by Boettner et al. in the November issue of the *Astrophysical Journal* on the blazer 3C 66A.

The telescope added another Celestron 8-inch telescope to its observing arsenal through a generous contribution from Dr. Bradley Becker. The telescope is very portable and has already been out at several outreach events.

Director Search Continues for Molecular Electronics

A search continues for a permanent director for the William L. Clay Center for Molecular Electronics. The Center was built in 1988 and houses research scientists from the Departments of Chemistry & Biochemistry and Physics & Astronomy. The first floor features a vibrationally-isolated section that contains Phil Fraundorf's Scanned Tip and Electron Image Lab. Adjunct Professor Dan Leopold also has a lab in the Center that uses molecular beam epitaxy to fabricate novel semiconductors and then study their properties. It is expected that the Director will have a joint appointment with Chemistry & Biochemistry and Physics & Astronomy. Candidate interviews have resumed in September.



Diana and David Coss, Daniel Hopper, Martin Rose, Dan Blake and Isaac Smith (some of our new graduate students)

Graduate Program Update

We welcomed four new students to our graduate program this year. Nathan Dees is entering the Ph.D. program after receiving a M.S. in Physics from the University of Cincinnati. Daniel Blake (Radford University), David Coss (Belmont University), and Isaac Smith (Southwestern University) are beginning the M.S. program. We are pleased to welcome another physics student from the University of Stuttgart, Martin Rose. Martin plans to complete a Master's degree in physics during this academic year.

Three students, Tina Fanetti, Danny Franke, and Oliver Weihberger, completed Master theses this past summer. Ph.D. students Adam Tournier (advisor Peter Handel) and Shaine Joseph (advisor: Vengu Lakshminarayanan) successfully defended their dissertations this month. Adam's dissertation is entitled "Quantum 1/f Noise and the Resulting Phase Noise in High-Stability Resonant Sensors". Shaine's dissertation is entitled "Lens Design and Optimization Using Multi-Objective Evolutionary Algorithms".

Check Out our Web Page!

You can look at the Department Web page to find our schedule of colloquia, journal clubs, and Observatory Open Houses. In addition, you can view the pictures in this Newsletter in color. Check it out at and join us at Department events! <http://www.umsl.edu/~physics>

News from the Electronics Shop

Several of our physics and astronomy courses are using "clickers" to get real time responses from students to questions asked in class. Wayne Garver has developed his own system of clickers and receivers to tabulate student responses for the "How Things Work" class. We hope to expand the system for use in several of the introductory courses. In addition to working with Mary Jane Kernan on the Lab@Home project, Wayne will be publishing a paper in *The Physics Teacher* entitled "The Photoelectric Effect Using LEDs as Light Sources".

Contributors 2004-2005

Dr. M. Marsha Allen
Mr. Scott D. Alspach and Ms. Susan Altman-Alspach
Mr. and Mrs. James M. Baker
Dr. Sergey M. Bezrukov
Dr. Charles E. Burkhardt
Dr. and Mrs. Ta-Pei Cheng
Mr. Cory S. Cook
Mr. Christopher R. Dames
Mr. and Mrs. David R. Dawkins
Mr. and Mrs. Daniel M. Doerer
Mr. and Mrs. David A. Felber
Dr. and Mrs. Bernard J. Feldman

Mr. and Mrs. Craig D. Gulley
Mr. and Mrs. William B. Harms Sr.
Mr. David J. Harris and Ms. Margaret A. Diekemper
Dr. Lu Fei and Dr. Lucy Wenzhong He
Mr. Richard W. Heuermann and Ms. Kathleen P. Price
Mr. and Mrs. Charles F. Jones
Mr. and Mrs. Timothy A. Kirchoff
Mr. and Mrs. Steven L. Lopata
Mr. and Mrs. Fred Madenwald
Mr. Richard J. Melka
Mr. and Mrs. Martin G. Mlynczak
Dr. and Mrs. Frank Moss
Mr. Vincent G. Musielak
Mr. and Mrs. Paul V. Noah
Mr. and Mrs. David M. Pierson
Mr. Kurt M. Pollack
Dr. Wentao Qin
Dr. and Mrs. Lawrence W. Ramsey
Dr. and Mrs. Steven A. Rutledge
Dr. Elenore A. Schewe
Dr. William M. Schmitt
Dr. Richard D. Schwartz and Ms. Eleanor I. McIntyre
Dr. and Mrs. Chang Shen
Dr. James C. Simpson
Mr. Justin R. Trice
Dr. Argyrios A. Tsifutis
Dr. Michael J. Way
Drs. Bruce A. and Janet B. Wilking
Mr. and Mrs. Keith L. Wilkinson
Dr. Zhongyu Zhang
Mr. Guo Jin Zheng and Ms. Shuhan Lin

Note: Please contact us if you made a contribution to the Department from July 1, 2004–June 30, 2005 and your name does not appear. Many thanks to all of you!

Physics Club News

The physics club has already had an exciting year, and it has only just begun. Thanks to a very generous donation from the former club president, Tina Fanetti, we now have a well stocked library, filled with many useful books that have already lent themselves to helping students. We will be continuing plans to carry on with last year's highly successful potluck and movie, as well as strive to conquer the City Museum. We also have plans to attend the December SGA meeting, the December Departmental Christmas Party, and maybe even have a BBQ for members who are graduating.

We have also begun plans to build a one meter Liquid Mirror Telescope for the campus, construct a 20 inch reflector, using the City Museum as a base of operations. We are hoping that we will be able to show off our new telescopes in time for the first ever UM – St. Louis catapult contest, which will be hosted in April down on South Campus. If you have any questions, comments, or you believe that you can assist the club in its endeavors, you can E-mail the president of the club at

Gordon.Stangler@umsl.edu, or bug our advisor at LeopoldM@umsl.edu

The Faculty:

Sonya Bahar

My research concerns neural synchronization in pathological processes and information processing, as well as general problems of collective dynamical behavior in biological systems. A major current area of study involves synchronization of neural firing during epileptic seizures. The role of synchronization in seizure development can be studied with computational models of coupled neurons or oscillators, and also with experimental imaging of epileptic events. I image seizure onset in the rodent neocortex using a combination of various techniques, including the intrinsic optical signal (a drop in light reflectance that correlates with an increase in electrophysiological activity), calcium sensitive dyes, and voltage sensitive dyes. A central problem is to investigate changes in spatiotemporal synchronization, and other measures of spatial organization, during the course of seizure onset, development, and offset, and to try to understand the underlying dynamics driving this process. Other projects involve MEG imaging of the human brain, in collaboration with clinicians at Saint Louis University Hospital, studies of synchronization among cerebellar neurons during eye movements, and synchronization in the crayfish photoreceptor/mechanoreceptor system.

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Ta-Pei Cheng

My book: *Relativity, Gravitation and Cosmology – A Basic Introduction*, came out this past year. Those interested in finding out more (book reviews, etc.) can consult the book's website <http://www.umsl.edu/~tpcheng/grbook.html>.

Bernard J. Feldman

My professional activities in the last three years have been primarily involved in developing new educational materials for the introductory mechanics and heat course. These include: "What to Say About the Tacoma Narrows Bridge to Your Introductory Physics Class," [The Physics Teacher 41, 92-96 (2003)]; "A Physicist's View of the Automobile Engine;" [The Physics Teacher, 42, 543-547 (2004)], "The Nimitz Freeway Collapse," [The Physics Teacher 42, 400-402 (2004)], and "Hydrogen Fuel Cell Automobiles" [The Physics Teacher 43, 492-495 (2005)].

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Ricardo A. Flores

My research interests are astrophysical cosmology and applications of quantum field theory to the physics of elementary particles. Cosmology is now a well established branch of science thanks in great part to the astounding diversification of Astronomy in the last three decades into observations covering a very broad range of the electromagnetic spectrum. It is also a very exciting field of research due to its inherent intellectual appeal, and the rapid progress allowed by a steady flow of observational data. I

am currently working on analyses of large samples of dark matter halos from cosmological simulations to work out their expected properties in the concordance Cold Dark Matter cosmology with dark energy, which is currently favored by a large body of observational evidence. My most recent work has been on the systematics of the shape of DM halos (<http://xxx.lanl.gov/abs/astro-ph/0508497>), and comparisons to observations to test these predictions (<http://xxx.lanl.gov/abs/astro-ph/0508226>). Other relatively recent work has been on clusters of galaxies (see ApJ 532(2000)206 and ApJ 538(2000)92) and gravitational lensing (see ApJ 533(2000)194 and ApJ 535(2000)555). My work has been funded by the National Science Foundation, the University of Missouri System Research Board, and by Research Awards here at UM - St. Louis. Over the years, I have collaborated on a long-term basis with scientists from around the world to carry out my research. Most recently: Joel Primack @ UCSC (Santa Cruz, USA), and Hernan Quintana @ Universidad Catolica (Santiago, Chile).

Philip B. Fraundorf

My research involves materials, atomic resolution microscopes, computer simulations, and conceptual strategies for doing both nanoscale detective work and curriculum modernization. For over a decade we've been providing for the region tools not otherwise available in state to examine the nanostructure of a growing variety of specimen types, including for example aerosol catalysts, integrated circuit silicon, carbon nanotubes, extraterrestrial materials, and ferrofluids for drug delivery. We've also put graduates into applied physics internships and jobs with companies that include MEMC, Seagate, Martin-Marietta, Mitsubishi Silicon-America, and Motorola. Of three recent intellectual challenges, one lies at the intersection between single-walled carbon nanostructures in the history of our own atoms, and possible roles for carbon droplets in cool stellar atmospheres. Another involves the study of defects in and on gigascale integrated circuit silicon, a highly-ordered material tightly connected to future technology. A third involves the study of atomic-resolution images using wavelet-versions of long-established optical darkfield techniques. More on recent developments, information on the recently established Missouri NanoAlliance, and a variety of web-based nanoworld adventures, may be accessed through:

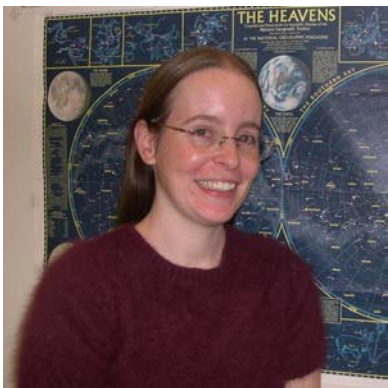
<http://www.umsl.edu/~fraundorf/index.html>.

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Chancellor Tom George

I am involved in theoretical studies of nanostructures (including molecular clusters and nanotubes), lasers, nonlinear optics, polymers and correspondences between quantum and classical mechanics. I maintain active collaborations with scientists at various universities throughout the country as well as countries overseas such as China, Finland, Hungary and Romania. I am the lead principal investigator for a grant (2004-07) from the U.S. Army Research Office for studies of self-assembling organic nanostructures, where my co-PIs are experimentalists at the University of Illinois at Chicago and Argonne National

Laboratory, and a theorist at Indiana State University. I also have a grant (2003-06) from the National Science Foundation for research on ultrafast phase changes in semiconductors in collaboration with scientists from Hungary and the University of Wisconsin–Stevens Point. I recently finished a project funded by a grant from the National Science Foundation, for which I was a co-PI along with scientists at Rose-Hulman Institute of Technology, Indiana State University and the University of Wisconsin–Stevens Point, for the development of a sophomore-level course in nanoscience. In addition to publishing regularly in physics journals such as *Physical Review Letters*, *Physical Review B* and *Applied Physics Letters* (averaging a paper per month), I have co-authored a book with Romanian and Hungarian scientists entitled *Microcomputer Modeling of Growth Processes of Single-Crystal Sheets and Fibers* to be published by Nova Science Publishers, and I am finishing a co-edited book entitled *Molecular Building Blocks for Nanotechnology: From Diamondoids to Nanoscale Materials and Applications* to be published by Springer. In 2005 I delivered lectures on my research at the following institutions: University of Arkansas, University of Missouri–Rolla, University of Szeged (Hungary), Korea Advanced Institute of Science and Technology (Daejeon, Korea), Nanjing University (China), Fudan University (China) and St. Louis University. In fall 2004 I was recognized for my research by my election as a foreign member of the Korean Academy of Science and Technology (over half of the sixty foreign members are Nobel laureates).



Erika Gibb

I am an astrochemist, studying chemistry in star formation regions and comets. One of the most exciting areas of astrobiological research is the search for organic molecules of prebiotic importance in disks and envelopes of gas and dust around low mass young stars that are thought to be similar to the young solar system. I use infrared spectroscopy to detect molecules and infer the quantity, temperature, and location of each molecule. The observations are usually performed at major telescopes like the 10-meter Keck Observatory and the 3-meter Infrared Telescope Facility on Mauna Kea, HI or the 8-meter Gemini South Observatory in Chile. I also collaborate with a research group at NASA Goddard Space Flight center to measure abundances of those same molecules in comets, which are thought to have been a source of much of the early Earth's reserve of organics and water. In this way, I

hope to track the organic chemistry through the star and planet formation process and to be able to infer the role that comets may have played on delivery of organics and water necessary for life on Earth. Another project I am involved with is the search for molecules in the atmospheres of exoplanets.

Peter H. Handel

I have found the origin of the fundamental $1/f$ fluctuations present in most high-tech devices and systems ("Coherent and Conventional Quantum $1/f$ Effect", *Physica Status Solidi b* 194, 393 (1996)), including computer chips, infrared detectors, quartz resonators, atomic and laser clocks, submicron electronic devices, FET and HBT transistors, laser gyros, SQUID magnetometers, etc ("Fundamental Quantum $1/f$ Noise in Small Semiconductor Devices", *IEEE Trans. on Electr. Devices*, 41, 2023 (1994)). I am using this new effect to optimize these devices ("Incoherence and Negative Entropy in the Quantum $1/f$ Effect of BAW and SAW Quartz Resonators", *Proc. Frequency Control Symp.*, Orlando, FL, May 1997, pp. 464-69) for the Department of Defense and for civilian applications, such as ultra-low power computers. This research is supported by the Office of Naval Research and by the Air Force Office of Scientific Research. Having also found the origin of Atmospheric Electricity ("Polarization Catastrophe Theory of Cloud Electricity", *J. of Geophys. Research* 90, 5857 (1985)), I use the new law for weather modification and protection against lightning and ball lightning (Handel et al. "Development of the Maser-Caviton Ball Lightning Theory", *J. of Geophys. Research* 99, 10689 (1994)). In nonlinear Plasma Physics with solitonic MASER interactions, I am developing (Zhil'tsov et. al. "Spatially Localized Microwave Discharge in the Atmosphere", *Zh. Eksp. Teor. Fiz.* 108,1966 (1995) & *JETP* 81, 1072 (1995)) a new type of electric discharge and artificial ball lightning. Finally, I am applying my quantum $1/f$ formulas to optimize our chemical and bacteriological sensors. I was included into DoD's Ultra-Low Phase Noise MURI #17, together with the University of California, Caltech and Yale University in May 2001. The goal of this new 5-year grant is a new generation of electronic devices and radars. See my web site at www.umsl.edu/~handel/. handel@jinx.umsl.edu

Bob L. Henson

Currently, my activities in the Department are mostly in the areas of instruction at the graduate and undergraduate levels plus service in the curriculum area. This has been the typical case for me for several years now. However, I am still active in theoretical research, but at a very reduced level of activity. My main scholarly activity now is writing a text at the senior-graduate level on the topic of atmospheric physics. I am approaching this by writing up and expanding my class notes for Physics 4354 (Atmospheric Physics), which I have taught several times over the past thirty years.

Mary Jane Kernan

My primary activities in the Department are pedagogical. I supervise the undergraduate labs, and for the last four years I taught the physics course for Biology majors. I'm also the webmaster for the department, and right now we're in the

process of creating a completely new website. I would welcome your input with comments or suggestions.

Wayne Garver and I are continuing our collaboration on an internet lab course for Electricity and Magnetism. As a result of the hard work of several work-study students, we expect to have enough prototypes of the hardware built to run an internet lab section in 2005.

My research area is condensed matter-I use nuclear magnetic resonance (NMR) to characterize the structural, electronic, and optical properties of photovoltaic materials. The various types of hydrogen present in amorphous semiconductors have unique NMR signatures - the NMR signal gives us insight into the fundamental nature of the semiconductors. Thanks to the generosity of Professor Larsen in the Chemistry Department, I now have a pulsed NMR spectrometer. Modifications are underway so the spectrometer can be used for material analysis, and much of the progress is a result of projects by students in our Advanced Lab course. Some projects on our "wish list" for the future are a pulse programmer and temperature controller.

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Jacob J. Leventhal

With Charlie Burkhardt, I have written a textbook *Topics in Atomic Physics*. The book has been published by Springer in October. *Topics in Atomic Physics* provides a foundation for students to begin research in modern atomic physics. It can also serve as a reference because it contains material that is not easily located in other sources. A distinguishing feature is the thorough exposition of the quantum mechanical hydrogen atom using both the traditional formulation and an alternative treatment not usually found in textbooks. The book is intended for graduate students who have had introductory quantum mechanics, but undergraduates who have had such a course can also benefit from it. There are more than eighty problems at the ends of chapters with all answers given. A detailed solutions manual, in some cases giving more than one solution, is available to instructors.

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Frank E. Moss

The overall objective of this research is to study the role of noise, or random processes on the foraging behavior of the zooplankton, *Daphnia*. The emphasis is on certain swimming characteristics that may be constant across several species with different sizes and behaviors. The hypothesis is that if such characteristics exist they are the result of evolution in order to maximize survival. Our studies are both experimental, using two species cultured here and five others in collaboration with a group at the Great Lakes WATER Institute of the University of Michigan - Milwaukee. Theoretical/numerical analyses of this problem are done in collaboration with a group at Humboldt University in Berlin, Germany. Invited lectures on this topic were presented at three conferences held in Europe last summer. Our research is carried out within the interdisciplinary Center for Neurodynamics funded in part by the Department of Defense and other agencies. Faculty, visitors, and students from the Departments of Physics and

Astronomy and Biology carry out research within the Center for Neurodynamics.

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Wilfred H. Sorrell

Main research focus is theoretical astrophysics. Previous research work was focused on models for interstellar solid particles with a special emphasis on the physical and chemical properties of graphitic solid particles producing the interstellar ultraviolet absorption band at wavelength 2175 Angstroms. The research work was published and appears in a peer-review journal as Sorrell (1990, Monthly Notices Royal Astronomical Society, 243,570). Other research works on the chemical properties of hydrogenated amorphous carbon solids in diffuse interstellar clouds appeared as Sorrell (1991, Monthly Notices Royal Astronomical Society, 248,439), and on dust grain processing in the Orion Nebula as Sorrell (1992, Monthly Notices Royal Astronomical Society, 255, 594). Research work on the interstellar dust grain alignment problem appeared as Sorrell (1994, Monthly Notices Royal Astronomical Society, 268, 40 and 1995, Monthly Notices Royal Astronomical Society, 273, 169-200). Research work on the issue about a massive black hole at the center of the Milky-Way galaxy appears in the Bad-Honnef Conference on Cosmic Jets, July 3-7, 1995. Recent research focused on the Origin of Life problem appears in Sorrell (2001, Astrophysical Journal Letters, L129-L132). Recent research work on the nature of the T-Tauri binary system appears in Sorrell (2002, Monthly Notices Royal Astronomical Society, 334, 705-712). Current research is focused on cosmological models for the universe that have nothing to do with the Big Bang. The cosmological models I am now constructing are based upon my idea that says the Big Bang is a cosmic myth.

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Bruce A. Wilking

Young brown dwarfs continue to be the focus of my research. Using the Hubble Space Telescope, we have obtained infrared spectra of six fields in the NGC 1333 star-forming region. The goal of this project, which is in collaboration with graduate student Tina Fanetti and University of Arizona Professor (and UM-St. Louis alum) Michael Meyer, is to investigate the lowest mass brown dwarfs that are forming in the cloud and see where the mass function truncates. I am continuing a program with graduate student John Robinson and Michael Meyer to characterize the ages and masses of optical stars that lie at the surface of the Rho Ophiuchi star-forming region (see 2005, Astronomical Journal, v130, p. 1733-1751 for first results). We are finding evidence for two distinct waves of star formation in the Ophiuchus region. I am completing work on a review chapter on star formation in the Ophiuchus cloud for a book entitled "Handbook of Low Mass Star-Forming Regions" in collaboration with Marc Gagné (West Chester University) and Lori Allen (Harvard-Smithsonian Center for Astrophysics). The book should be published in 2006. I attended and made poster presentations at the 205th meeting of the American Astronomical Society in January

held in San Diego, CA and the *Protostars and Planets V* meeting in October held in Hawaii.

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Alumni Information

1974

Charles F. Jones (B.S.) is retired from Belcan Corporation. He works part-time as a GED instructor. He attended the Chancellor's Address to the community in May.

1989

Linda Berger (B.S.) is still working at British Petroleum in London. She was recently promoted to the position of Commercial Support Manager, and leads the Middle Office function in BP's global financial derivatives structuring, marketing and trading business.

1990

Jeff Tentschert (B.S., M.S. 1992) founded Blue Giraffe Software, a software company focused on consumer applications. The company plans to release its first product in the first quarter of 2006.

1991

Michael J. Way (M.S., Ph.D. 1998) continues to work in the Space Science Division at NASA Ames Research Center. He visited the department this month and presented a colloquium entitled "New Approaches to Galaxy Photometric Redshifts in the Sloan Digital Sky Survey".

1995

David Dawkins (B.S.) and David Findley (B.S. 1996) attended the Chancellor's Address to the Community in May.

Dave Dawkins is an application architect and developer at Southwestern Bell. Dave and his wife Kim have two boys, Riley and Ian, and a dog, Raven. Dave reports that his job takes him away from his family more than he would like, but it is rewarding and pays the bills. He closes that "We miss the people and the atmosphere of UMSL".

1996

Srinivasa Varadharajan (M.S., Ph.D. 2002) is on the faculty at the Elite School of Optometry in Madras, India. He recently organized a three day scientific meeting to celebrate the 20th anniversary of the School which attracted 600 participants. He is currently setting up his lab to continue his research in electrophysiology, wavelets, and pattern vision. He is also the proud father of a one-year old daughter.

1997

Wentao Qin (M.S., Ph.D., 2001) and his wife welcomed a new baby girl, Isabel, into their family in March. Wentao is employed by Freescale Semiconductor, Inc.

1998

Tina Fanetti (B.S., M.S. 2005) completed her Master's thesis with Bruce Wilking entitled "Determining the Spectral Type of Brown Dwarfs Using the Water Index".

1999

Zhongyu Zhang (M.S., Ph. D. 2004) moved to northern California in February and works at Tom Sawyer Software in Oakland, CA. His job title is software engineer and he does data analysis, layout and visualization.

2001

Michelle Kirchoff and Tim Kirchoff (M.S. 1999) have made an addition to the family this year. Born on June 17 their first child was a boy they named Lyle Timothy Kirchoff. He weighed in at 8 lbs 9 oz and was 20.5 inches. Lyle has become quite the "ladies man" and can put a smile on anyone's face. Tim is now in his fifth year teaching physics at Fort Zumwalt South High School in St. Peters. Michelle continues her studies of Planetary Science at Washington University. She is studying methods of mountain formation on Io, a moon of Jupiter, which will lead to her doctoral thesis.

Rich Schuler (M.S.) ran several highly successful NASA-supported outreach programs for K-12 students. He is currently an assistant professor at Fontbonne University in the Department of Biological and Physical Sciences.

2003

Sally Breite (B.S.) is completing her Master's degree with thesis in Environmental Engineering at UM-Rolla. She already has a job with the St. Louis office of Jacobs Engineering Group, Inc.

Danny Franke (B.S., M.S. 2005) completed his Master's thesis with David Kraus entitled "Design and Application of a PC Interfaced Cosmic Ray Detection System for Secondary School Physics". Danny currently works as a research assistant in the neuroimaging lab at Washington University Medical School, programming and providing computer technical support.

2005

Oliver Weihberger (M.S.) completed a Master's thesis with Sonya Bahar entitled "Alternating Low and High Degrees of Synchronization in an Array of Coupled Neurons". Oliver has returned to the University of Stuttgart and plans to pursue his doctoral studies at the Bernstein Center for Computational Neuroscience in Freiburg, Germany.

Michael Kraus (B.S.) is currently employed at MEMC Electronic Materials. He is now working on a study to examine the accuracy of a test that has been used to characterize bulk defect densities in the denuded zone of Si wafers- the portion of the wafer upon which devices are built and the lithography process takes place.

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