Spectrum

a Newsletter for Alumni and Friends of the Department of Physics and Astronomy at the University of Nebraska–Lincoln

No. 19 Winter 1999 Anthony F. Starace, Editor

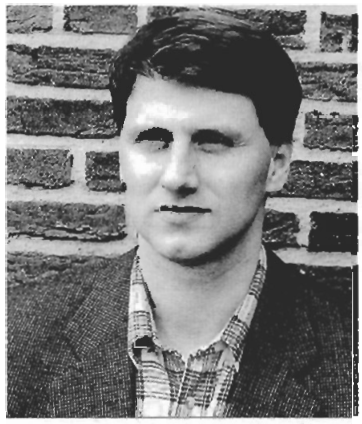
NSF Awards CAREER Grants to Leslie-Pelecky and Doudin

The National Science Foundation has awarded Faculty Early Career Development (CAREER) grants to two UNL Physics and Astronomy Department faculty members, **Diandra L. Leslie-Pelecky** and **Bernard Doudin**. According to NSF's description, these prestigious grants "combine in a single program the support of research and education of the highest quality and in the broadest sense." CAREER grants require the submission of a long-term plan for a faculty member's development as a researcher and educator. The program was designed to emphasize the importance NSF places on integrating research and education in the beginning stages of a faculty member's career. Department Chair Roger Kirby says, "The CAREER program is even more competitive than the regular grants program, so we are especially pleased that two of our faculty members were chosen to receive this important award."

Leslie-Pelecky's award, "Cluster-Assembled Magnetic Nanostructures," will support her studies of nanoscale disorder in magnetic systems, including random anisotropy systems and permanent magnets. An inert gas condensation/compaction apparatus will be used to fabricate clusters with diameters between 5 and 50 nm, and compact them into a bulk material with nanometer-size grains. The education portion of her proposal involves physics majors in outreach to fourth-grade students at Clinton elementary school. This project brings exciting science activities to at-risk children while helping physics majors develop important professional skills, such as communicating science to non-scientists.

Doudin's proposal, "Single Spin Electronics," focuses on the electrical and magnetic properties of electrodeposited wires with widths in the nanometer regime. Doudin will also fabricate ultra small (0.001 mm^2) double tunnel junctions from a variety of materials. His initial results on single junctions showed that the influence of a single electron can be detected in such small structures. The education portion of Doudin's proposal involves developing a new upper-level course in electronics that includes lectures, demonstrations, and a practical laboratory.

Batelaan Joins Department



Hermanus Batelaan

Dr. **Hermanus Batelaan** joined the Department in January 1999 as an Assistant Professor. His research area is experimental atomic physics. Batelaan's background in the field is quite broad. He received his Ph.D. degree in 1991 from the University of Utrecht in The Netherlands, working with H.G.M. Heideman on electron impact excitation of helium. He then held a 3-year postdoctoral research position in the group of Hal Metcalf at SUNY-Stony Brook working on cooling and trapping. During 1994-6 he received a prestigious Lisa Meitner Fellowship to work in the group of Anton Zeilinger at the University of Innsbruck on atom optics. During 1996-8, Batelaan held a Research Assistant Professor position at UNL working in **Tim Gay**'s group, and managed to help develop a new source of polarized electrons and also write a widely-noted article in Physical Review Letters (Phys. Rev. Lett. 79, 4517 (1997)) showing that it is possible to do a Stern-Gerlach experiment with an electron beam. From April 1998 Batelaan was attracted by a 3-year Dutch fellowship to work in the group of H. Beijerinck in Eindhoven on metastable Bose-Einstein condensation, but resigned that position to accept the Department's offer.

At UNL Batelaan has plans for a number of experiments involving matter interferometry. He intends to develop an experiment to demonstrate the Kapitza-Dirac effect, that electrons can be diffracted by a standing light wave. He plans to manipulate atoms using far off-resonance laser light, which might have significant applications in nanofabrication of structured materials. He also plans to construct novel cold atomic beam sources. A longer term goal is to develop a coherent atom laser.

Letter from the Chair


Roger D. Kirby

This past year has provided many signs of the Department's vitality. We have hired our fourth new Assistant Professor in the past three years, **Herman Batelaan**. Our research funding continues to grow. In particular, two of our younger faculty members, Professors **Doudin** and **Leslie-Pelecky**, were awarded highly competitive NSF CAREER grants, which have a success rate of less than 14%. The University of Nebraska system is in the process of reallocating Nebraska Research Initiative (NRI) funds, and we have successfully competed for these funds. These grants are permitting us to hire more postdocs and support more graduate and undergraduate students in research. Both the quality and quantity of our research continue to increase; thus the research future of our department looks bright. Our teaching program is also improving, as more faculty are incorporating active-engagement instructional methods and adding computer- and web-based components, and we have significantly improved our introductory laboratories. Professor **Greg Snow** was honored with a Distinguished Teaching Award, and Professors **Fuller** and **Gay** were selected as Centennial Lecturers by the American Physical Society. Our students also continue to excel, as **Carlo Waldfried** was given one of five Outstanding Graduate Student Awards by the Materials Research Society, and **Lisa Wiese** has been named a finalist for the APS Division of Atomic, Molecular and Optic Physics' Outstanding Doctoral Dissertation Award. Details of these successes are described elsewhere in this issue of the Spectrum.

The Department however is facing a serious problem – the so-called "pipeline" problem - that is affecting our program at all levels, and which could have serious consequences for the entire physical sciences enterprise in our nation. The physical sciences as a group are struggling with reduced enrollments in both undergraduate major and graduate programs. Nationwide, the number of B.S. graduates in physics is at a 40-year low (there are now fewer B.S. graduates than in 1958, when the total college student population was much smaller). Other physical sciences, including chemistry and engineering, have experienced similar drops in enrollment. This nationwide trend is also affecting our Department. While our enrollment in introductory general education and service courses is holding steady and even increasing (especially in astronomy), the number of students choosing to be physics or physics/astronomy majors is at best remaining constant after undergoing a nearly 50% reduction about 5 to 7 years ago. There are many reasons for this, but contributing factors include the recent growth in popularity of biological sciences (viewed as "where the action is" by much of society and particularly by many pre-college students; a degree in biology is also the most common route to medical school), the growth in computer science (fueled by the relatively recent success of many software companies and the rapid development of the internet), and the continued growth of enrollment in business programs of various kinds. There has been a trend for undergraduates to consider a much broader range of career options, which has exacerbated the problem for individual disciplines. Besides, the physical sciences are viewed as "hard" by many students and not an easy path to success.

The pipeline starts with undergraduate majors, but the drop in the number of B.S. graduates is now strongly affecting graduate enrollments in the physical sciences. Certainly another contributing factor is the strength of the national economy. The employment situation for B.S. graduates is now very good, which entices an increasing fraction of our very best students to take jobs immediately after graduation rather than attend graduate school. Physical science departments are increasingly looking to Asia and Eastern Europe to find new graduate students, but most have been unable to fill all of the available slots in their programs. The number of Ph.D. graduates nationwide is now beginning to drop as a consequence. This trend will necessarily continue for at least a few years even if we are successful in increasing undergraduate major enrollments. The thriving national economy is already making it difficult to recruit domestic Ph.D. graduates as postdocs and as new faculty members because of the availability of high- paying jobs in industry. The temporary solution is to recruit at all levels from foreign countries, but this is also becoming increasingly difficult as third world countries continue to develop their educational and scientific capabilities.

It is somewhat ironic that the popularity of the physical sciences is waning exactly at the time when the impact of technology on our society is becoming increasingly widespread and significant, and at a time when research advances in many areas of physics and astronomy are very exciting. Harold Varmus, the Director of the National Institutes of Health, has emphasized the central role that the physics has played in the development of the biological and health sciences. This role is expected to increase in the future as the focus there moves to a more complete understanding of complex biological entities at the molecular level. While our Department cannot influence nationwide or worldwide trends very much, we can take some positive steps to ensure that our programs continue to attract good students. We are increasing our efforts to inform high school Juniors and Seniors about the exciting happenings in physics and astronomy and to inform them about careers in the sciences generally. We are hiring a new Staff Assistant, part of whose job will be to assist with this task, and Greg Snow is leading the development of a Science Day in the College of Arts and Sciences. We are also looking for ways to

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Chair's Letter (continued from page 2)

broaden our offerings, particularly through a "multiple tracks to degree" approach. For example, medical schools value applicants with degrees in physics, and we now have some students taking this route. Similarly, top-notch business schools like Wharton and Sloan prefer to have applicants with degrees in areas other than business. One of our graduates from last year intends to pursue this path. We believe that a solid education in the principles of physics helps develop the thought processes and skills that prepare students to pursue many different career paths. However, students interested in medical school, business school, or other programs may not think of physics when preparing their undergraduate program; our "tracks" will highlight this route. Finally, we are still seeking ways to increase the appeal of our discipline to young students. For many students (and their parents), the possibility of employment after the B.S. degree is a very significant positive. Thus, we hope to broaden our program so that students gain skills that will help them find employment in the private sector. We will offer a new Computational Physics course as soon as resources are available, since advanced computer skills are central to many jobs in industry. We will also broaden our Advanced Laboratory offerings to include more topics in vacuum technology and optics, currently areas of great need in the industrial sector. Finally, more and more of our undergraduates are getting significant experience in the research laboratory through formal course work and as paid research assistants. Many of our students point to these experiences as among the most valuable they have had at UNL. I should emphasize that the above programmatic changes, while being initiated as a consequence of the waning student interest in the physical sciences, are indeed things we should have been doing all along. We expect our students will benefit greatly from them.

Finally, I urge you to keep in touch with us, even if only through a short note, phone call, or e-mail. I find talking with alums to be the most enjoyable part of my job. For your convenience you will find enclosed with this mailing an information card and return envelope to inform us of your activities. We also enjoy seeing you when you are in Lincoln and, with some advance notice, can give you a tour of the Department so you can see the changes that have occurred. Best wishes until next year.

Sincerely,

Roger D. Kirby

Roger D. Kirby
Professor and Chair

UNL Researchers Discover Two-Dimensional Ferroelectricity

A breakthrough in making ferroelectric polymer films by Langmuir-Blodgett (LB) deposition opened up an exciting new field of two-dimensional ferroelectricity with surprising new physics and several potential applications. The films are the first truly two-dimensional ferroelectrics with a unique surface ferroelectric phase, as UNL researchers reported in the journal *Nature* in February 1998. In another paper that same month in *Physical Review Letters* they reported a dramatic change in metallicity at the new surface phase transition. Other fundamental discoveries include the first measurement of the ferroelectric critical point in a ferroelectric polymer, the first measurement of the intrinsic coercive field in any ferroelectric, the first observation of a structure change at both surface and bulk ferroelectric phase transitions, and measurement of bulk and surface Debye temperatures.

Ferroelectric materials, cousins of ferromagnets, are characterized by the appearance of a permanent electrical polarization as they are cooled through the paraelectric-ferroelectric phase transition temperature. The polarization can be reversed, or "switched," by reversing the applied electric field, resulting in a characteristic polarization hysteresis loop analogous to the well-known magnetic hysteresis loop. Most ferroelectrics are inorganic oxides, first identified in the 1920s. Over 30 years ago, researchers found that poly vinylidene fluoride (PVDF), a crystalline polymer similar to Teflon(TM), had many properties in common with ferroelectrics. It was shown to be a true ferroelectric in the early 1980s. Studies of ferroelectric polymers, particularly PVDF and its fluorine-enriched copolymers, proceeded slowly because the samples were relatively poor, composed of several polycrystalline and amorphous phases. The materials proved very useful as piezoelectric transducers and are widely used in ultrasonics, sonar, and electromechanical transduction.

The research that led to the recent advances began several years ago. In early 1995, research teams led by senior scientists Vladimir M. Fridkin and Lev M. Blinov of the Institute of Crystallography of the Russian Academy of Sciences in Moscow managed to make nearly perfect two-dimensional crystals of PVDF and its copolymers using Langmuir-Blodgett (LB) deposition. In LB deposition, a monolayer of the material (the ferroelectric polymer in this case) is dispersed on top of a water tank and transferred by contact to a substrate. Many layers can be built up by repeated transfer, producing films ranging in thickness from 1/2 nm to several hundred nm. Blinov's group, particularly associate Serguei Palto, continues to make films and characterize them with pyroelectric studies and atomic-resolution scanning tunneling microscopy.

Associate Professor **Stephen Ducharme** leads the UNL side of the collaboration, joined by Fridkin's associate, Research

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UNL Researchers (continued from page 3)

Assistant Professor **Alexander Bune** in 1995 and by Professor **Peter Dowben** and Research Assistant Professor **Shireen Adenwalla** in 1997. Ducharme's group specializes in basic studies of the ferroelectric and related dielectric and thermo-electro-mechanical properties. Dowben's group studies surface physical and electronic structure using surface electron spectroscopies. Adenwalla's group studies the structure using X-ray and neutron diffraction. Their success is primarily a result of the diverse skills and approaches taken by the multi-team collaboration.

Several fundamental discoveries arose from the precise thickness control afforded by LB deposition. The polymer films are fundamentally two-dimensional ferroelectrics because their ferroelectric properties change little as the thickness is decreased to 1 nm, according to Bune's measurements. This contradicted theoretical predictions (based on Landau's theory of phase transitions) that ferroelectricity would be suppressed in thin crystals. Graduate Research Assistant **Jaewu Choi** (PhD 1998) and Dowben used inverse photoemission spectroscopy to measure for the first time the surface structure change at a ferroelectric phase transition. (In fact, Dowben's group has recently shown that the heavily-studied ferroelectric oxides are poor systems for such studies because their surface composition is unstable.) A second fundamental discovery was the first measurement of the intrinsic ferroelectric coercive field. The intrinsic coercive field is the electric field required to switch the polarization of an ideal, defect-free, ferroelectric crystal. In practice, switching occurs at much smaller fields because reversed domains can nucleate at sample defects such as impurities, grain boundaries, or trapped strain. Bune, Fridkin, and Ducharme demonstrated for the first time that the thinnest ferroelectric films switch at the intrinsic coercive field of half a billion volts per meter, confirming theoretical predictions that nucleation is inhibited in films thinner than a critical nucleation radius (about 15 nm in the ferroelectric polymers).

Recent research results appear promising for new technological applications. The samples Alexander Bune brought with him to UNL in March 1995 had an unexpected 1000:1 conductance rise controlled by the polarization state. This discovery offers the possibility of making nonvolatile random access memories that do not require destructive readout. A second pleasant surprise is the record dielectric breakdown strength (of several billion volts per meter) afforded by the perfection and uniformity of the films. This high a dielectric strength could result in capacitors storing over 400 J/cm^3, nearly 10 times higher than state-of-the-art batteries and over 100 times more than other capacitors. Capacitors will work fine in cold Nebraska weather when batteries peter out. Broad-band infrared imaging using the pyroelectric properties and ultrasonic imaging using the piezoelectric properties are two current applications that could be improved by the LB ferroelectric polymer films. Finally, PVDF and similar polymers are widely used in protective coatings and solid lubricants; the LB films may prove superior in some of these applications.

This work has involved a number of students. It has resulted in two PhD dissertations from the Moscow group. UNL graduate Jaewu Choi (PhD 1998) devoted his thesis to the surface electronic properties studied by direct and inverse photoemission, under Dowben's direction. Choi now continues this work as a postdoctoral researcher at UNL's beamline at the CAMD synchrotron in Baton Rouge, LA. Several other UNL undergraduate and graduate students are engaged in this work and more theses will result from it.

The work at UNL is supported by the National Science Foundation, the Nebraska Research Initiative (through the Center for Materials Research and Analysis), the Office of Naval Research, and the Air Force Office of Scientific Research. The Russian group is supported by INTAS, the Russian Foundation for Basic Research, and the Inco-Copernicus programme.

APS Celebrates Centennial With 200 Best Speakers

Robert Fuller

The American Physical Society (APS) is celebrating its Centennial in 1999. As part of this celebration, the Society has selected 200 Centenary Speakers, nominated by other APS members, who were chosen for their ability to give exceptional talks of a more general nature than the usual physics colloquium. Our Department has been honored by having two such speakers selected from our ranks: **Robert Fuller** and **Timothy Gay**. Of course, this is no surprise to those of us who have had to sit through faculty meetings with these two in attendance. Fuller will offer talks on two topics: "Preparing Physics for Paperless Pedagogy" and "Physics Teaching for the Development of Reasoning." In the first, he relates his experiences with the exclusive use of computers in the classroom. The second considers the learning theories and research of Piaget, Karplus, and Arons and how they can be used to generalize physics instruction to teach critical thinking. Gay has two topics as well: "Why Isn't God Ambidextrous?" and "The Spinning Electron." In the first, he explores the ideas of parity and chirality in nature. In the second, the history and physics of electron spin are reviewed, with particular emphasis on the role polarized electrons can play in basic and applied physics and technology. We expect that their public speeches on behalf of the APS will bring honor to our Department and enlightenment to their audiences.

Timothy J. Gay

Materials Researchers Awarded Two Large Grants

Department faculty in the condensed matter and materials physics group were recently awarded two large multiyear grants, following a competition funded by the Nebraska Research Initiative (NRI). The NRI is a $12 million/year, state-funded program aimed at enhancing the research capabilities of the University of Nebraska. A 6-year, $1.1 million NRI grant for "Nanoscale Materials for Information Technologies" was awarded to Professors **David Sellmyer, Bernard Doudin, Peter Dowben, Roger Kirby, and Sy-Hwang Liou.** A 4-year, $669,000 grant for "Boron Carbide Thermal Neutron Detectors" was awarded to a collaboration involving Professors **Peter Dowben** and **Shireen Adenwalla** of our Department, as well as Professors Brian Robertson of Mechanical Engineering and W.-K. Chu of the University of Nebraska Medical Center.

The new program on nanoscale materials has two closely related projects. The first, Nanoscale Materials for Information Storage and Magnetoelectronics, includes work on radiation-assisted chemical vapor deposition of patterned magnetic nanostructures, nanocrystalline magnetic films and multilayers, and electrochemically assembled magnetic nanowires and nanodots. These new materials and nanostructures are expected to have unique properties and provide a rich variety of physical phenomena for investigators. These materials also have great potential in next-generation, extremely high-density magnetic recording systems including media, miniaturized field sensors, and actuators. The second project, Nanoscale Materials for Optoelectronics and Displays, is focused on synthesis and processing of materials with unique optical and magneto-optical properties. Research in this area is aimed at new optical methods and materials for data storage at high densities and for fabricating color dc plasma displays. Specific projects will be undertaken in close collaboration with leading companies in Nebraska and the Nation. In addition to faculty, these projects will involve three postdoctoral research associates, four graduate research assistants, and four undergraduate research assistants.

Sellmyer notes that advances in the understanding and control of materials at ever decreasing length scales has propelled a tremendous increase in computer efficiency, spawned an "Information Age" in which the creation, distribution, and manipulation of information are a central wealth-creating activity. For example, in the last decade, the costs of semiconductor and magnetic computer memories have decreased by factors of 10 and 100, respectively. In addition to synthesizing unique nanoscale materials and understanding their physical properties, a main goal of UNL's researchers is to develop novel applications for information technology systems.

The new program on thermal neutron detectors is aimed at developing solid state neutron detectors. The key idea is that boron has a very large capture cross-section (400 barns for ^{11}B and 4000 barns for ^{10}B). Currently, there are no reliable solid state neutron detectors suitable for arrays or for single neutron counting. Successful development of such boron detector materials would have significant practical applications. Pressurized water reactors currently require periodic shutdown to monitor the condition of their structure under the heavy neutron bombardment while in operation. Development of solid state neutron detectors would allow much more precise estimates of the damage sustained by the reactor structures thereby reducing the frequency of reactor shutdowns, lengthening the useful life of the reactor components, and reducing the radiation exposures to reactor personnel. Savings for each of the 100 pressurized water reactors currently operating in the U.S. are estimated to exceed $30 million per year, or more than $3 billion annually for all such reactors. Other important applications for solid state neutron detectors include the use of such detectors in neutron scattering, neutron capture therapy (radiation treatment), weapons, and waste storage.

Department Hosts International Quasar Meeting

In March 1998 the Department hosted an international astronomy meeting on "The Structure and Kinematics of Quasar Broad Line Regions." **Martin Gaskell** chaired the international scientific organizing committee and the meeting was sponsored by both the Department and the College of Arts and Sciences. About 60 of the world's leading researchers in the field attended the four-day meeting. Half of these were from outside the US.

The meeting focused on dense, rapidly-moving gas near giant black holes in the centers of galaxies and on trying to understand how such supermassive black holes produce the tremendous release of energy seen in quasars. "The main impression left at the end of the four days was that there is still surprisingly little consensus on even some of the most basic details of how quasars work," said Gaskell, who gave the conference summary talk. "Although I would personally have hoped for more progress, this lack of a consensus, coupled with the powerful new satellites and ground-based facilities coming on line does mean that this is going to continue to be an exciting field for many years to come. It's a different situation from stellar astronomy, where the basic physical processes have been understood for decades."

The conference proceedings are due out in a few months. Local organizational support for the conference was provided by **Cyrus Hall, Mary Hiller, Marilyn McDowell, Stephanie Snedden**, and others.

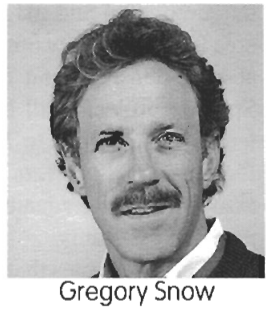
UNL Hosts Summer AAPT Meeting

The UNL Physics and Astronomy Department hosted the 1998 Summer Meeting of the American Association of Physics Teachers in August. Almost 900 physicists and physics teachers from across the country participated in workshops, invited and contributed talks, posters and plenary sessions. Workshop topics included applying the results of physics education research, utilizing new technology such as the World Wide Web and simulation software, and bringing current physics research topics into the classroom. The more than 260 invited and contributed papers focused on topics ranging from ways in which physics departments can respond to the changing professional requirements of other disciplines to the latest in physics education research. UNL's **Timothy J. Gay** was one of three invited plenary speakers and presented a well-received talk about chirality and parity entitled, "Why Isn't God Ambidextrous?" **Steve Ducharme**, **Roger Kirby**, **Greg Snow** and **Ed Schmidt** were invited speakers in a session highlighting ongoing research at UNL. A number of the UNL alumni attending the conference took advantage of the Departmental open house and lab tours to revisit their old haunts. The summer students from the Research Experiences for Undergraduates program in nanostructured materials also participated in an undergraduate poster competition.

The conference received numerous compliments from the attendees and national organizers. The local organizing committee was co-chaired by **Diandra L. Leslie-Pelecky** and **Vicki L. Plano Clark**. The conference's success is attributable in part to the huge volunteer force from UNL, surrounding high schools, Doane College and Nebraska Wesleyan University. The almost 100 volunteers, who did everything from designing T-shirts to making sure that media equipment worked during paper sessions, were invaluable in making the conference run smoothly. The Nebraska Section of the AAPT played a major role by hosting a welcome room and running the 'Corn Olympics' after the conference picnic. One of the most popular events was the demonstration show, in which Nebraska physicists demonstrated everything from the physics of catapults to the physics of ballet.

UNL and surrounding areas also hosted a number of satellite meetings. Sixty-five members of the Two-Year College in the Twenty-First Century project met at the Arbor Day Lodge in Nebraska City. The Urban Physics Teacher Resource Agents workshop was held the week before the AAPT meeting in Manter Hall. Vicki L. Plano Clark coordinated the use of the UNL facilities by the 127 high-school teachers in the program. **Robert Fuller** organized the Physics Education Research Conference (PERC), which attracted 100 graduate students and faculty at the Clifford Hardin Center for Continuing Education.

Snow Wins College Legislative Teaching Award and is Elected to Leadership Post at Fermilab


Gregory Snow

Professor **Gregory R. Snow** of our Department won a 1998 College of Arts and Sciences Legislative Teaching Award, where funding is provided by the Nebraska Legislature upon the recommendation of UNL colleges. Professor **C. Edward Jones** stated in his letter of support for Greg's nomination, "... he is probably one of the very best teachers in the entire College." This assertion was supported by letters from students and faculty, by the high ratings Greg received on student evaluations, and by the very positive comments made about Greg's teaching on the same evaluations. Greg has three times received the Certificate of Recognition for Contributions to Students presented by The Parents Association and the Teaching Council of UNL. In addition he was nominated for the Outstanding Teacher of the Year Award by the ASUN.

The supporting materials submitted with his nomination for the College Distinguished Teaching Award emphasized the qualities which make Greg an outstanding teacher: superbly well organized and clear lectures, a caring and nurturing attitude toward students, and patient and careful explanations of difficult physics concepts for students who come to his office for extra help. In the words of a student: "His lectures were highly organized.... Never before have I had a teacher ... who was so dedicated to his students. ...he made it clear he wanted us to utilize him as a resource."

In addition to his outstanding teaching, Snow has contributed in many ways to improvement of teaching and outreach programs, both here at UNL and nationally. In the summer of 1997 he served on an evaluation team for the UNL Comprehensive Education Program. He is Director of the Cosmic Ray Observatory Project (CROP), a state-wide outreach and education project to involve Nebraska high school students and teachers in cosmic-ray research using school-based detectors. He was Chair of the Subcommittee on Education and Outreach of the Users Executive Committee at Fermi National Accelerator Laboratory (Fermilab), Batavia, IL. He has served the Teacher Enhancement Program of the National Science Foundation as a member of proposal review panels and on-site visit teams. He has helped develop science museum exhibits funded by the NSF and the Department of Energy for both SciTech in Aurora, IL, and COSI in Columbus, OH.

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Snow Wins Award (continued from page 6)

Snow has done this outstanding teaching and educational service, while at the same time maintaining an active research program in High Energy Physics. He is involved with both the D0 experiment at Fermilab and the CMS experiment at CERN. His colleagues regard him highly because he is well organized and gives extremely clear presentations; consequently, he is frequently chosen to speak at scientific meetings, where he represents the several hundred collaborators on one or the other of these experiments. This past fall, he was elected to chair Fermilab's Users Executive Council (UEC). The UEC serves as a liaison between the scientists worldwide who use Fermilab facilities, the lab, and the funding agencies. The UEC organizes an annual meeting and a visit to Washington, D.C., to visit key policy makers. Snow hopes to involve the user community in planning new future accelerators, in getting to know the new director of Fermilab, and in meeting with Department of Energy officials.

Waldfried Wins Two Graduate Student Awards

Carlo Waldfried won both the 1998 Sigma Xi Outstanding Graduate Student Award and one of the five 1998 Materials Research Society Graduate Student Awards given at the spring MRS Meeting. He was nominated for the UNL Sigma Xi award based on his thesis work and for constructing an apparatus for spin-polarized inverse photoemission. The apparatus probes the magnetic properties of conduction bands and makes use of spin-polarized electrons. This project was funded by the NSF in a grant to Professors **Peter Dowben, Tim Gay, Roger Kirby** and **David Sellmyer**. The apparatus was constructed in Dowben's laboratory over a period of 3 years.

The MRS graduate student award was given to Carlo Waldfried mainly because he was the first person to successfully grow very strained crystalline films of a rare earth metal. This has been a goal of thin film growth for more than a decade -- and noted in a review by Steve Barrett of the University of Liverpool as a key problem for the future. Waldfried succeeded while many others have not by being extremely careful about characterizing the structure and the film growth (using a combination of low-energy electron diffraction and scanning tunneling microscopy). He exploited his success by growing strained gadolinium in order to study its band structure, magnetic properties and the critical phenomena of this novel magnetic material. An indication of the importance of this achievement for our understanding of magnetism is the fact that, as Waldfried has shown, strained gadolinium has the highest Curie temperature ever measured for an elemental rare earth (370 K at the surface, 340 K in bulk as compared to the accepted value of 293 K for unstrained gadolinium).

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Wiese's Thesis Research a Highlight of DAMOP Meeting


Lisa M. Wiese, Ph.D.

While most graduate students are pleased simply to have their thesis research accepted for publication in a major physics journal, graduate student **Lisa M. Wiese's** thesis research on Coulomb interactions of hydrogen ions is unusual in bringing her much national attention. First, she was invited to give a half-hour talk at the 1998 Annual Meeting of the American Physical Society's (APS) Division of Atomic, Molecular, and Optical Physics (DAMOP) in Santa Fe, New Mexico last May. Then the APS News issue of August/September 1998 named her talk one of the highlights of the DAMOP meeting. Subsequently, Lisa was invited to give talks on her thesis research at two other major meetings: the Gaseous Electronics Conference held in Maui, Hawaii last October and the International Accelerator Conference held in Denton, Texas last November. Lastly, she was named as one of five finalists for the DAMOP Outstanding Dissertation Award. The winner will be selected after invited presentations at the APS Centennial Meeting in Atlanta in March 1999.

Wiese's DAMOP invited talk was titled, "Measured Correlated Motion of the Three-Body Coulomb Interacting System $H^+ + H^+ + H^-$." As noted by APS News, the talk concerned how "three hydrogen ions share their energy and how they position themselves with respect to each other..., shedding light on the infamous 'three-body problem' in the realm of electrically charged particles. Previous experiments with two electrons and a positive ion can be easily approximated as a two-body problem because the ion remains relatively stationary. Lisa Wiese of the University of Nebraska described smashing a molecular ion H_3^+ against a helium target to produce three ions: H^+, H^-, and H^+....the physicists deduced that the H^- tended to reside in between the two H^+ ions, from near the 'Coulomb saddle point' (where the forces from the other hydrogen ions balance out) to the near vicinity of an H^+ ion. Interestingly, the H^- was never found at the saddle point itself." Lisa's thesis research was carried out with the collaboration and assistance of graduate student **Brandon Thaden**, undergraduate student **Mary Hiller,** research associate **Dr. Orhan Yenen**, and her thesis advisor, Professor **Duane H. Jaecks**.

Lisa's work is important because it has provided new insights into a type of atomic and molecular three-body system that has never before been studied. Using novel and powerful triple coincidence techniques, coupled with newly developed ways of articulating the measured results, she has provided the first

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Wiese's Thesis Research (continued from page 7)

quantitative determinations of the partitioning of available energy between three massive Coulomb interacting particles in the continuum. She has also identified and characterized compound states of $H_2^{**}+ H^+$ which decay to the three-body system. Her novel experimental techniques and newly developed methods of analysis (that include the use of a generalized Dalitz plot and "fractional energy sharing plots") can readily be adapted to a diverse range of three-body problems, such as, e.g., the dissociation of CO_2^+ into three fragments or the double photo-ionization of an atom into an ion plus two electrons.

Lisa Wiese received her Ph.D. degree in May 1998. In the fall, she took a postdoctoral research associate position in the group of Professor Thad Walker in the Physics Department at the University of Wisconsin in Madison.

Joseph Retires


David Joseph

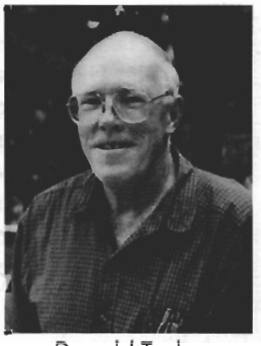
Professor **David W. Joseph** retired this year after 35 years in the Department. Dave came here in fall 1963 following a Research Associate position at Purdue University and the Naval Research Lab in Washington, D.C. His undergraduate degree is from Roosevelt College in Chicago and his graduate degrees are from the University of Chicago, where he did his Ph.D. thesis work with Richard Dalitz.

Joseph's research was in elementary particle theory. His work on symmetry groups won him recognition from one of the giants in the field, Yuval Ne'eman of Tel Aviv University. Ne'eman's name was frequently linked with that of Murray Gell-Mann in the development of our understanding of particle symmetries. In an invited talk at an APS meeting in Washington, D.C., Ne'eman listed many people, both physicists and mathematicians, who had made significant contributions to our understanding of symmetry groups, and D. W. Joseph was included in that list.

Dave is also respected here in the Department for his development of class notes for both undergraduate and graduate courses. His careful and complete notes were greatly appreciated by students in his graduate courses. He exhibited similar care in preparing modules for the various undergraduate courses he taught using the Keller Plan. Indeed, he gained recognition for such efforts in 1975 when he participated, along with Professor **Robert Fuller**, in a national workshop in Boulder, Colorado to write Keller Plan modules for the calculus-based general physics courses. Dave was fond of the Keller Plan method of teaching, which he found better suited to his personality than the standard lecture course. Those students who successfully completed a Keller Plan course under Dave had an exceptional educational experience.

Joseph was responsible for bringing the Berkeley Physics Lab courses here for our calculus-based sequence, and later he became the lab manager for our general physics labs. This may seem surprising for a theorist, but those who know Dave know that he has quite a knack for working with all sorts of equipment. He also taught our digital electronics lab for many years.

Taylor Retires


Donald Taylor

Associate Professor **Donald Taylor**, a member of the astronomy group, retired in May 1998 after twenty-seven years in the Department. During that time it is estimated that he taught Astronomy 103 to more than 8000 students. Taylor devoted considerable effort to improving the astronomy courses. He introduced such innovations as videodiscs and computerized simulations into the lecture. Long before experiential learning became fashionable, he recognized the importance of students observing the skies for themselves. Shortly after his arrival at Nebraska, he instituted observing sessions on the roof of Ferguson Hall. These "roof nights" have been a regular feature of the astronomy teaching program ever since. He also started a telescope loan program, which provided small telescopes on loan to students for use at home. When an astronomy resource room was established on the second floor of Ferguson Hall, Don designed a unique telescope (the "Minnich Telescope") which protruded through a window. Although it was conceived as a solar telescope and provides breathtaking views of the sun, it has also proved useful for nighttime observations of the moon and planets. In more recent years Don participated in obtaining funding for a larger student telescope. Due to fire regulations it was no longer possible to use the roof of Ferguson Hall and the student observatory was eventually put on top of a new parking structure across the street. In 1983 he received a Distinguished Teaching Award.

Taylor played a major role in the establishment and operation of Behlen Observatory. Prior to his arrival at Nebraska, he developed the specifications for the 30-inch telescope. He designed and oversaw the construction of the original instrumentation for the observatory including a photoelectric photometer, a spectrum scanner, and an area scanner. These instruments were unique for their high degree of automation in the era before computerized control systems. Later, Don collaborated extensively in the development of the next generation instrumentation. From 1992 until his retirement he served as Observatory Director.

Don and his wife, Mary, moved to Ruidoso, New Mexico in late October 1998. Don is looking forward to retirement in the dark, clear skies of New Mexico and plans to build telescopes and to play tennis and golf. Their address is 255 Sunnyslope Drive, Ruidoso, NM 88345.

Chemistry & Physics Instrument Shops Merged

In September 1998 the instrument shops of the Chemistry and Physics and Astronomy Departments were merged, both physically and financially. An *ad hoc* committee of faculty and business personnel from both departments had analyzed the possibility of a merger since last Spring. The committee recommended the merger to the faculty of both departments for several reasons. First, the timing was favorable. The Physics and Astronomy Department's Instrument Shop recently lost two long-time staff to disability retirements and its remaining staff of 3 machinists was heavily overused. At the same time the Chemistry Department's staff of 2 machinists was underutilized. Also, both Departments had had to cut shop budgets recently. Thus the timing for consideration of a merger would never be better. Second, it was felt a merged shop of 5 machinists would achieve various economies of scale. It would lead to better workload distribution, would make sick leave and vacation leave less disruptive of shop operations, would allow the merged shop to benefit from the best equipment from both former shops, and would allow charges to users to be reduced from what they would otherwise be. Third, a merged shop would allow the Student Shop to once again be staffed and would also permit its old equipment to be replaced. The faculty of both departments overwhelmingly supported the merger. It is being watched as a possible model for other entities throughout the university.


(L-R) Jack Loos, Mike Jensen, Les Marquarl, Pat Pribil, Jack Gilliam

The newly merged shop is located in Ferguson Hall between the two Departments. **Jack Loos**, former manager of the physics shop, is the manager of the joint shop. **Les Marquart**, former manager of the chemistry shop, is the assistant manager of the joint shop, and has responsibility for the Student Shop. Les Marquart thus returns to the Department and will offer annual courses in shop usage to graduate students and others in order to certify them to use the Student Shop. **Jack Gilliam, Mike Jensen,** and **Pat Pribil** are the three machinists who round out the 5-person shop staff. Oversight of the joint shop is provided by a joint committee comprised of faculty and business personnel from both departments.

Brief Notes

• The May 1998 issue of *Physics Today* celebrated the first 50 years of that magazine by highlighting articles and letters that appeared in its pages. Among those were two by authors having ties to this Department. One of those was the article entitled "Can Physics Develop Reasoning" by **Robert G. Fuller**, Robert Karplus, and Anton E. Lawson, which appeared in the February 1977 issue of *Physics Today* . The other was the October 1990 letter to the editor by **Kevin Aylesworth** (M.S. 1986, Ph.D. 1989) concerning the plight of young physicists in the job market.

• Professor **Richard G. Keesing** of York University in England has published the findings of his investigations that identified the current location of the famous Newton's apple tree in *Contemporary Physics* (1998, Vol. **39**, pp.377-391). A story on Keesing's detective work also appeared in *The Sunday Times* (London) on 11 October 1998. As reported in the Fall 1991 issue of Spectrum, a scion from the original Newton's apple tree was grafted to a Nebraska root stock and planted south of Behlen Lab, where today it is flourishing. No apples, however, have yet appeared. Keesing presented a Departmental Colloquium talk on his investigations as part of the ceremonies marking the planting of Newton's apple tree here in April, 1991.


Norman F. Ramsey

• Nobel Laureate **Norman F. Ramsey** presented a Departmental Colloquium talk on "Exploring the Universe with Atomic Clocks" last April. Ramsey is the Higgins Professor of Physics at Harvard University. Ramsey shared the 1989 Nobel Prize for his development in 1949 of the separated oscillatory fields method of precisely determining atomic and molecular excitation frequencies. This method allowed one to measure time with extreme accuracy, providing the basis for the atomic clock standards of modern time-keeping. In the 1950's Ramsey also helped develop the hydrogen maser. Ramsey was invited by Visiting Professor **Robert C.Hilborn**, of Amherst College, who is a former student of Ramsey.

(continued on page 10)

Waldfried (continued from page 7)

In addition to work done for his Ph.D. thesis, Walfried has made a number of other key discoveries. He has shown that no one has correctly ascertained the surface Debye temperature, despite 20 years of intense investigation. His paper on the perovskite CMR (collossal magneto resistance) materials is the first experimental paper to demonstrate the distinct surface electronic structure of these materials. He has also undertaken the first measurements of molecular orientation of an important class of organometallic compounds: the metallocenes.

Brief Notes (continued from page 9)

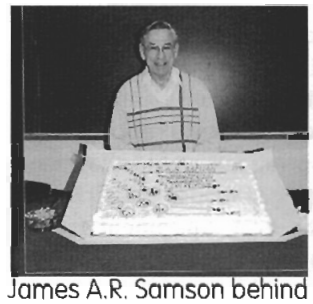
• **Jean Rolofson** retired in March 1998 after 19 years in the Department. Throughout these years she served as the office manager and secretary to the Department Chair. She was hired in May 1979 and served three Chairs: **David Sellmyer** (1979-84), **Anthony Starace** (1984-95), and **Roger Kirby** (1995-98). At a retirement reception for Jean last Spring, Starace noted her excellent aesthetic sense, saying she always made his correspondence and reports "look beautiful." During Jean's tenure in the Department, owing to the computer revolution, the role of the office staff changed markedly from that of simply typing handwritten drafts to functioning as part of the administrative team managing and running the Department. Following Jean's retirement, two of the office staff were promoted: **Beth Wilhelm** has become office manager and assistant to the Chair, and **Kay Haley** has become a Secretary III, serving now as secretary of the Graduate Committee in addition to her technical word processing duties.


David Sellmyer, Jean Rolofson, Anthony Starace and Roger Kirby

• Research of Professor **Duane H. Jaecks** and his group has been selected for inclusion in the booklet, Highlights of the Advanced Light Source 1998. This research, entitled "Production of Purely Spin-Aligned Autoionizing States Which Decay to Orbital-Aligned Ionic States," was carried out by Jaecks and postdoctoral research associates **Kenneth W. McLaughlin** and **Orhan Yenen** and was published in the 13 July 1998 issue of Physical Review Letters. The Advanced Light Source is a third generation synchrotron at Lawrence Berkeley National Laboratory in Berkeley, California. This work measures the production of rather unusual photo-excited states of the argon atom that are devoid of any orbital angular momentum, with the absorbed unit of angular momentum from the exciting photon residing in the spins of the electrons. This work is novel in that the photon interacts with the atom via the spatial coordinates of the electrons; hence production of a spin-aligned state implies a significant influence of relativistic (spin-orbit) interactions.

• An exhibit of 70 pieces of Chinese ceramics from the collection of Professor **Kam-Ching Leung** opened on 19 December 1998 at the Lentz Center for Asian Studies in Lincoln. The exhibit is entitled "6000 years of Chinese Ceramics" and is scheduled to run through March 1999. It includes a 6,000 year old Neolithic water jug. The largest samples are from the Han, Tang, and Song dynasties. Leung began his collection in the 1970's and added to it on his many trips to Hong Kong and elsewhere in Southeast Asia. He emphasized that one needs to know a lot about the works in order to avoid overpaying or getting fakes. Articles about the exhibit have appeared in the Omaha World Herald Thanksgiving special on November 26th (page 1-A) and in the Sunday World Herald on December 27th (Entertainment section, p. 11). The Lentz Center also has a parallel exhibit on Professor Leung's photographs entitled "People and Places in Asia." A majority of the 32 works are of indigenous people in remote places in Asia. Leung's personal involvement in the arts has been recognized by others. He has been appointed by the Governor to the Nebraska Arts Council and by the Chancellor of UNL to the Advisory Board of the Lentz Center for Asian Culture. He also serves on the Nebraska Art Association Board of Trustees at the Sheldon Gallery.

• Professor Emeritus **James A. R. Samson** has returned to Scotland, leaving the Department after 28 years. He officially "retired" from the Department in August 1996, but, as noted in the Fall 1996 issue of Spectrum, he remained active in research, carrying out experiments with his postdoctoral research associates and writing papers for publication. However, he and his wife Mary recently found a house they like in their hometown of Largs, Scotland, and so this fall Jim began dismantling his lab and cleaning out his office. Before Thanksgiving, a reception was held, which included a cake decorated to indicate some of the key photoionization processes Samson and his group studied during his career. At the beginning of December he and Mary moved. We wish them both well. Their address is: 23 Curlinghall, Largs, Ayrshire KA30 8LB, Scotland. (Email: jar.samson@lineone.net)


James A.R. Samson behind his farewell cake. Email: jar.samson@lineone.net

Krupicka Honored With June Kudos

Shelli Krupicka received University Kudos at the June 20 meeting of the NU Board of Regents. Shelli Krupicka is administrative coordinator for the Center for Materials Research and Analysis. Her nominators called her an "ambassador" for the university as she has worked with many distinguished scientists from around the country who have praised her professional and pleasant manner. In addition to her specific responsibilities, Krupicka has served on UAAD (University Association for Administrative Development) and UNOPA (University of Nebraska Office Personnel Association) committees and supported several search committees.

Reprinted from the August 21, 1998 issue of Scarlet, *Faculty and Staff Newsletter*

Chancellor Dedicates Student Observatory

After five years of planning, the new Student Observatory is fully operational. A dedication ceremony was held on January 13, 1998. The event was attended by about 80 Department members, University administrators, former astronomy students, representatives of other institutions, media representatives, and members of the local astronomical community.

Eugene Rudd, president of the international Antique Telescope Society and author of a book on the Department's history, gave an illustrated talk on the checkered history of the Department's attempts to improve its observational astronomical facilities. **Martin Gaskell**, the project director, described the significance of the new observatory and what the telescope could do compared with Behlen Observatory and Hyde Observatory (the public observatory in Lincoln). He also showed a first photograph taken with the telescope. Doug Bell, chairman of the board of Hyde Observatory, presented a plaque and a set of star atlases donated by the board of Hyde Observatory. Brian Foster, Dean of the College of Arts and Sciences, noted the enormous popularity of the Department's introductory astronomy courses and stressed the importance of undergraduate education for the college. He said that the College of Arts and Sciences was proud to have been able to assist in the project. The final remarks were by Chancellor James Moeser. He began by explaining that he was so keen to see through the telescope that he accidentally went to the telescope dome first rather than to Brace 211 (where the dedication ceremony was held). In his remarks he noted the ways in which the observatory helped fulfill the mission of the University and the teamwork without which the project would never have come to fruition.

After the speeches, everyone went over to the new observatory. Chancellor Moeser cut the red ribbon (senior administrators are quite used to dealing with red tape!), pushed the "open" button on the dome shutter, and declared the observatory formally open. The weather cooperated and attendees were treated to views of Jupiter and Saturn in the sky at sunset.

The Student Observatory has now completed a highly successful first year of operation. Thanks to its prominent location, the observatory continues to draw public attention and is featured often by the local media. Monthly public viewings organized by Gaskell regularly draw good crowds (between 200 and 300 people attended the first public viewing). Hundreds of introductory astronomy students have seen through the telescope in weekly viewing nights put on by the astronomy TAs. The observatory was the centerpiece of a new astronomy lab course taught for the first time in spring 1998 by **Ed Schmidt** and **Stephanie Snedden**. Eleven undergraduates have been using the telescope for independent research with Gaskell as part of multinational collaborations. The first results are in preparation for publication.

To see many beautiful pictures taken at the new observatory, visit the Student Observatory pages via links on the Department's web pages (http://www.physics.unl.edu).

Chris E. Kuyatt (1930-1998)

Dr. **Chris Kuyatt** (B.S. 1952, M.A. 1953, Ph.D 1960), a distinguished graduate of the University of Nebraska, died on September 12, 1998 at the age of 67 after a brief battle with cancer. His survivors include his wife Pat, his four sons Steve, Brian, Alan and Bruce, and several grandchildren.

Kuyatt was born on November 30, 1930 in Grand Island, Nebraska. He loved music and was involved with it all his life. During his student days, according to Robert J. Celotta of NIST, "Chris, who stood well over six feet tall, must have been an impressive figure leading the University of Nebraska Marching Band in his 1 1/2 foot tall drum major's hat." His doctoral thesis, entitled "Energy and Angular Distribution of Secondary Electrons Produced by 50-100 keV Protons in Hydrogen Gas," completed under the supervision of Professor **Theodore Jorgensen**, pioneered a new and fruitful field in the study of collisional ionization.

Chris Kuyatt and machinist John Heiser discussing a project in the former shops on the first floor of Brace Laboratory, ca. 1955-58.

After receiving his Ph.D., Kuyatt joined the National Bureau of Standards in Washington, D.C., as a physicist in the Electron Physics Section. He spent the rest of his career at the Bureau, later renamed the National Institute of Standards and Technology (NIST). While there he worked with J. Arol Simpson, who was developing a high resolution electron monochromator-analyzer. After George Schulz's discovery of resonant electron scattering in helium, Kuyatt and Simpson began studying inelastic electron scattering from rare gases and found sharp resonances in the transmitted current. At the same time Robert Madden and Keith Codling, also at the Bureau, found similar resonances in photoabsorption spectra. These were explained by Ugo Fano as due to the creation of doubly excited autoionizing states of the atoms. These states were further explored at Nebraska by Eugene Rudd, who discovered them in the energy spectra of electrons from ion-atom collisions.

In 1968 Kuyatt wrote an often quoted chapter on the measurement of electron scattering cross sections in Volume 7A of *Methods of Experimental Physics*. His work with Simpson in the 1970s on electron optics, especially the design of monochromators, analyzers, and electron guns, is well known to workers in the field.

(continued on page 12)

Kuyatt (continued from page 11)

He also developed specialized electron optical systems for such applications as measuring energy distributions of field-emitted and photo-emitted electrons from surfaces.

In 1978, Kuyatt became Chief of the newly-formed NIST Radiation Physics Division, and from 1979 to 1991 he held the position of Director of the Center for Radiation Research. At the time of his death he was Acting Executive Director of the NIST Visiting Committee on Advanced Technology.

His other positions at NIST involved management and technical consultative services via the following assignments: 1964-69, Chairman of the Atomic and Molecular Physics Division Editorial Committee; 1967-70, member of the NIST Committee on Computer Utilization; 1987-1991, member of the NIST Patent Committee; 1979-1998, Chairman of the NIST Radiation Safety Committee; 1991-1998, Chairman of the NIST Washington Editorial Review Board; 1991-1998, member of the Board of Editors for the NIST Journal of Research; 1991-1993, member of the NIST Calibrations Advisory Group; 1991-1998, member of the NIST Metric Board; 1992, member of the NIST Ad Hoc Committee on Uncertainty Statements; and 1993, member of the NIST Ad Hoc Committee on International Standardization.

Kuyatt's co-workers at NIST say he was a wonderful person to have as a colleague. They speak of his "infectious enthusiasm for science" and say he "probed relentlessly to identify the key phenomena or issues" during scientific discussions. Three of his colleagues, Robert J. Celotta, J. William Gadzuk, and Cedric J. Powell, have graciously permitted us to use information from their obituary of Kuyatt, which will appear in *Physics Today*.

First Salford Exchange Students Arrive

Ellen Day and **Rebecca Grove**, the first British students from the new exchange program with Salford University in England, arrived in August to spend a year in the department. The program is being coordinated by Professor **Peter Dowben**. It offers a chance for University of Salford students to take courses at UNL in areas not covered by Salford and for UNL students to take courses at the University of Salford in areas not offered at UNL. Ellen Day is doing research with **Shireen Adenwalla** in condensed matter physics and Rebecca Grove is doing quasar research with **Martin Gaskell** using the new Student Observatory. Tina Lund, a UNL Chemistry undergraduate, is an exchange student at Salford University this year.

Nieveen Speaks at Recognition Luncheon


Wesley Niveen

Wesley Nieveen (B.S. 1975) was invited back to campus to speak at the May 7th, 1998 Recognition Luncheon for Department graduates. Nieveen is currently a Technical Advisor with Charles Evans & Associates' Surface Science Laboratories of Mountain View, California. Nieveen spoke to graduates on x-ray photoelectron spectroscopy of particular kinds of ferroelectric materials.

Nieveen advised graduates that they should be in physics because they like it. If getting more money or working only 8 hours, 5 days a week is important, then they should go to another field. His own fascination with science and technology began early in life. He noted that he learned electronics from his Dad, a TV repairman, when he was only 10-12 years old. He first met Professor **Robert Fuller** at a science fair. While still in junior high he built his own laser and, a while later, a Michelson interferometer. As a junior in high school he attempted to build an accelerator in his basement, scaring his mother enough that the family laundry didn't get done for a while. He claimed he "was a nerd long before it became popular."

Nieveen's first contact with our Department was as a high school summer intern working with Robert Fuller and Marvin Haas putting together equipment for teaching purposes. Professors **Jaecks** and Fuller subsequently convinced his parents to allow him to enroll at UNL without getting his H.S. diploma. At UNL, however, Nieveen claimed he spent his first two years catching up on his social development and consequently didn't do well academically. However, Professor **Roger Kirby** took him under his wing and he successfully graduated and continued on as a graduate student. He remembered what a stimulating and challenging class of majors he was in, including Ken Burgess (B.S. 1976), Chris Greene (B.S. 1976), Dixie Mager (B.S. 1975), and Fred Pinkerton (B.S. 1976). He remembered the Department's Advanced Laboratory course as where he learned to write a report. He also remembered fondly courses with Professors Kirby, **Pearlstein**, **Sellmyer**, and **Starace**.

In 1978 Nieveen joined the Materials Research Center at Northwestern University as the Manager or the Crystal Growth and Materials Preparation Facility. Over the course of the 13 years he was there he built one of the best central facilities in the U.S.A., as duly noted by the National Science Foundation in one of its reviews of the Center. Consequently in 1991 when the new Hong Kong University of Science and Technology wanted to develop a Materials Characterization and Preparation Center (MCPC), Nieveen was hired as a consultant. This was a unique opportunity as the MCPC, which was aimed to support all sciences at Hong Kong University, was expected to be a facility unmatched in the world for concentration of equipment to characterize materials.

(continued on page 13)

Niveen (conintued from page 12)

He was charged to develop the best facility possible, with money no object. Following his receipt of an M.Sc. degree in Materials Science and Engineering from Northwestern, Nieveen took the job of Associate Director of the MCPC at Hong Kong University in 1994. He helped manage a staff of 24 and most equipment was the best in Asia, and, in some cases, in the world. However, as the 1997 date came for the handover of Hong Kong to China, Nieveen returned to the U.S.A., taking his present position with Charles Evans and Associates.

He described for students some of his present work, especially the detective work he carried out, using x-ray photoelectron spectroscopy (XPS), to figure out why certain kinds of ferroelectric materials were difficult to make. He discovered using XPS that lead was leaching into samples from storage bottles and changing the character of the materials being prepared.

Nelson Elected Fellow of IEEE


Stuart O. Nelson

Dr. **Stuart O. Nelson** (M.A. 1954), Research Agricultural Engineer at the Russell Research Center, Agricultural Research Service, USDA, and Adjunct Professor, Department of Agricultural and Biological Engineering at The University of Georgia, has been elected a Fellow of the Institute of Electrical and Electronics Engineers (IEEE). Election to IEEE Fellow is one of the Institute's most prestigious honors - accorded to fewer than one in a thousand members. Nelson was recognized for his contributions to the measurement of radio-frequency and microwave dielectric properties of agricultural materials and presented the IEEE Fellow certificate at the IEEE Instrumentation and Measurement Technology Conference in St. Paul, MN, on May 20, 1998.

Nelson has been previously honored by election as a Fellow of the American Society of Agricultural Engineers, as a Fellow of the International Microwave Power Institute, and by election to membership in the National Academy of Engineering. In 1985 he was presented the Founder's Gold Medal during Engineers Week observances in Washington, DC, when selected by the National Society of Professional Engineers from nominees of all Federal Government agencies as the Federal Engineer of the Year.

Nelson earned B.S. and M.S. degrees in Agricultural Engineering and the M.A. in Physics from the University of Nebraska in the 1950's, the Ph.D. in engineering from Iowa State University, and received the Honorary Doctor of Science Degree from the University of Nebraska in 1989. He conducted research for the USDA Agricultural Research Service at the University of Nebraska, Lincoln, from 1954 until 1976, when he moved his laboratory to the Russell Research Center in Athens, GA.

SPS Visits Fermilab

The UNL Chapter of the Society of Physics Students (SPS) has been quite active this year, and has about fifteen members. This is due in large part to its energetic and enthusiastic officers, **Jenny Webster** (President), **Mike Roth** (Vice-President), and Christina Lund (Secretary/Treasurer). **Timothy Gay** is the faculty advisor to the group. In November, ten members took a trip to Fermilab, where they got an "insider's" tour of the D0 detector facility, the home-away-from-home for faculty members **Dan Claes** and **Greg Snow**. The group also toured the Museum of Science and Industry in downtown Chicago before heading home. In addition to a seemingly endless round of parties and other social events, the SPS has also heard talks by Greg Snow and **Diandra Leslie-Pelecky**, toured several local research laboratories, and will have a number of money-raising events this spring.

We Heard From...

Anderson, Terry (MS 1971, PhD 1975) Lucent Technologies, Rm 2B-121, Murray Hill, NJ 07974 (908) 582-7013, tla@lucent.com, http://www.gti.net/tla. After teaching Physics and Computer Science for 14 years at Walla Walla College, Terry moved to Bell Labs (then AT&T, now Lucent Technologies) in 1986, where he is now a Distinguished Member of Technical Staff. At Bell Labs he has done research in a number of areas of software engineering including simulation and modeling and documentation tools and now works on Internet Telephony (voice telephony over IP packet networks such as the Internet). "Though I use little of the physics content I learned at UNL in my current work, the basic approaches to problem solving learned doing physics have been very valuable and in many cases have been more helpful than what I might have learned doing graduate study in Computer Science."

Bao, MinQi (M.S. 1992, Ph.D. 1995) P.O. Box 91052 at PHARMA PLUS, 2901 Bayview Ave., North York, Ontario M2K 2Y6, Canada (minqi@physics1.unl.edu). Has just had an article on the motion of a particle in a Paul trap accepted for publication in the *Mathematica Journal*. He continues working at Platform Computing Corp (www.platform.com), a Toronto software firm, which he says plans to go public in 2000.

Burmester, William J. (B.S. 1973, M.S. 1975, Ph.D. 1975), bburmest@ball.com. Bill is still enjoying life in Boulder, where he works for Ball Aerospace developing detector arrays and working on various Hubble telescope components.

Cavagnero, Michael (Former Postdoc) Dept of Physics & Astronomy, University of Kentucky, Lexington, KY 40506-055 (mike@pa.uky.edu). Just completed a year's sabbatical at the Harvard-Smithsonian Institute for Theoretical Atomic and Molecular Physics (*ITAMP*). He has also been elected the Secretary of the Theoretical Atomic, Molecular, and Optical Community , which meets annually at the APS DAMOP meeting and which publishes a periodic newsletter of issues pertaining to AMO theory.

(continued on page 14)

We Heard From...(continued from page 13)

Chung, Yang-Soo (M.S. 1986, Ph.D. 1993) Dept. of Physics, Chungnam National University, Gund-Dong 220, 305-764 Daejon, South Korea (chung@nsphys.chungnam.ac.kr). Is a faculty member at Chungnam U., where he built an energy loss spectrometer for electron-atom and electron-molecule collision studies in his lab. He is also involved with optogalvanic spectroscopy in electric discharges. He reports that fellow UNL classmates Young-Min Chung (M.S. 1985, Ph.D. 1989) and Eun-Mee Lee (M.S. 1985, Ph.D. 1989) are living in Pohang where Young-Min is a research scientist at the Pohang Synchrotron Light Source and Eun-Mee is teaching at a high school. He and Young-Min are planning to collaborate on a photoelectron spectroscopy experiment.

Drucker, Robert (B.S. 1986), drucker@fnal.gov. Since receiving his Ph.D. from the U. of California-Berkeley, Bob has been a postdoctoral research associate at the University of Oregon. He is stationed at Fermilab working on the NuTeV collaboration and is currently seeking permanent employment in the industrial/technology sector. He and his wife have three children.

Feagin, James M. (Former Postdoc) Dept of Physics, California State University, Fullerton, CA 92834 (jim@quantum.fullerton.edu). Has been elected a Fellow of the American Physical Society by DAMOP. His certificate will be awarded at the 1999 Annual DAMOP meeting in Atlanta. His citation reads: "For advancements towards understanding the dynamical symmetries of the few-body Coulomb problem, particularly of low-energy bound and continuum electron pairs."

Halderson, Maxwell H. (B.S. 1934, M.S. 1936), 1529 Dewey Avenue, Bartlesville, OK 74003. Has been retired for many years, but enjoys traveling and spending time with children and grandchildren. Recently attended the All Alumni Newman High Banquet in Newman Grove, NE.

Hartzell, Bert H. (B.A. 1939), 2366 Harrison, Santa Clara, CA 95050-4417. Has had an interesting career as an Optometrist. Embarked on a "world tour" including Thailand and Australia in December 1998.

Kwon, Chulan (M.S. 1983) Dept of Physics, Myong Ji University, Namdong San 38-2, Yongin, Kyonggi-do, Seoul 449-728, South Korea. Is a faculty member at Myong Ji U.working in the field of statistical physics, with interests in the areas of spin-glasses and neural networks. In 1995 he co-organized a workshop at POSTECH in Pohang, South Korea, entitled "Neural Networks: The Statistical Mechanics Perspective." He co-edited the book of proceedings, which was published by World Scientific.

Lu, Ying (Former Postdoc) c/o Black Light Power, Inc., 41 Great Valley Parkway, Malvern, PA 19355.

Marquard, Paul (M.S. 1986). Has been appointed Chair of the Physics Department at Casper College in Casper, Wyoming. In addition to Chairing the Department, Paul is also teaching courses in statics, dynamics, and circuit theory in addition to astronomy. He has recently developed an astronomy course offered over the Internet with an optional lab component held at Casper College. He is currently developing a similar course for elementary and secondary school teachers for the University of Wyoming. His Web site is: wind.cc.whecn.edu/~marquard/astronomy/index.htm (marquard@acad.cc.whecn.edu).

McLaughlin, Kenneth (M.S. 1991, Ph.D. 1995), Department of Physics/Engineering Science, Loras College, Dubuque, IA, kmclaugh@loras.edu. Is an Assistant Professor of Physics at Loras College. Will continue his research collaboration with Duane Jaecks in experiments at the Advanced Light Source in Berkeley, CA.

Meyer, Kurt (B.S. 1988). Suffered a severe head injury in the Courage Classic bicycle race on 17 July 1998 in Colorado. He had returned to Colorado on a vacation from his job in Los Angeles with the Aerospace Corp to enter the race. Following intensive care and rehabilitation in hospitals in both Colorado and Los Angeles over several months, Kurt has now returned to Avoca, where he is living with his parents and continuing with treatment at Madonna Rehabilitation Hospital. He and his mother recently came to the Department, where they visited with Professor Paul Burrow and discussed ways in which our faculty might participate in his recovery.

Oh, Sung Dahm (Former Postdoc) Dept of Physics, Sookmyung Women's University, Chungpa-Dong 2-Ka Yongsan-Ku, Seoul 140, South Korea. Dahm is a faculty member at Sookmyung Women's U. She served on the Advisory Committee for the Asia Pacific Center for Theoretical Physics' program of "International Lectures on Atomic and Molecular Physics," which were held in Seoul, South Korea, in April 1998. Among the invited lecturers were Professor **Anthony Starace** and former Department faculty member **Joseph Macek**, who is now a Distinguished Professor at the University of Tennessee-Knoxville as well as a Distinguished Scientist at Oak Ridge National Lab.

Park, Chang-Hwan (Ph.D. 1984) 16 Orchard Park Dr., Clifton Park, NY 12065. Is an Assistant Professor in the Department of Radiation Oncology at the Albany Medical College.

Rolfes, Richard G. (Former Postdoc) Div. of Science and Math, Transylvania University, 300 N. Broadway, Lexington, KY 40508. Is a professor of physics at Transylvania U., a small liberal arts university.

Schneider, Donald P. (B.S. 1976) Dept of Astronomy, Penn State University. Returned to UNL last March to present a Departmental Colloquium on "Scanning for Violence at the Edge of the Universe."

Wadehra, Jogindra M. (M.S. 1973) Department of Physics, Wayne State University, Detroit, MI 48202. Has been elected a Fellow of the American Physical Society by DAMOP. His certificate will be awarded at the 1999 Annual DAMOP meeting in Atlanta. His citation reads: "For extensive contributions to theoretical atomic and molecular physics, notably studies of the dissociative electron attachment process, scattering of positrons by atoms, and the transport of electrons in gases."

Young, Todd (Ph.D. 1998) 202 Blaine Ave., Apt. A, Wayne, NE 68787. Is an asst. prof. at Wayne State College, Wayne, NE.

Acknowledgments

The Department is very grateful to the following individuals and corporations for their new and continuing financial contributions during the period 1 November 1997—31 October 1998. These contributions have been made in support of major items of capital equipment, an endowed professorship, graduate fellowships, undergraduate scholarships, and invited lectures as well as for unrestricted purposes. Those who have not been contacted by one of the University of Nebraska Foundation's telephone campaigns or who might be considering an additional tax-deductible gift to us should note that we have the following general accounts at the UN Foundation:

(1) Physics & Astronomy Development Fund (for unrestricted gifts) (Account No. 2557.0)
(2) Physics & Astronomy Lecture Endowment Fund (Account No. 3321.0)
(3) Physics & Astronomy Scholarship Endowment Fund (Account No. 3303.0)

Contributions to any of these may be made conveniently using the contribution card and return envelope enclosed with the mailing of this newsletter. Checks should be made payable to the University of Nebraska Foundation and should indicate for which account the money is intended. Those contributors whose employers have a matching gift program should indicate this. Thank you very much!

Richard C. Altrock, (BS 1962 Physics/Math)
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William A. Barrett, Jr., (BS 1952, MS 1953)
Billie Bengston, (BS 1964)
Roger Bengston, (BS 1962)
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Rebecca J. Hoover
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Rebecca R. Richards Kortum, (BS 1985)
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Eugene Rudd, (PhD 1962)
Kendra (Stahl) Sibbernsen, (BS 1993, MS 1995)
Andrew Smith, (BA 1947)
Anthony F. Starace
Terry J. Teays, (PhD 1986)
Alan B. Tveten, (MA 1959)

Kobetich *Chrysalis Fund* Established

Edward Kobetich (Ph.D. 1968) and his wife Jane have, through an estate gift, established the *Chrysalis Fund* which will provide financial support to outstanding graduate or undergraduate students in the Department of Physics and Astronomy. Students selected as *Chrysalis Fund Fellows* will have high potential for significant contributions to science and to society. Ed received his bachelor's and master's degrees from Kansas State University and moved to UNL with Professor Robert Katz to do his doctoral research under Katz's supervision. During 1968-69, while a postdoctoral researcher with Katz, he helped develop what is now known as the Katz and Kobetich model for explaining radiation damage in both matter and in living tissues. He has had an interesting and fulfilling career, holding both academic (Bristol, UK, and University of California-Berkeley) and industrial positions. In 1989 he returned to the Department to speak to Department graduates about technology transfer at that year's Recognition Luncheon. When health considerations forced him to retire, Ed was in charge of the testing laboratory for Toyota Motors North America. Most recently, he and Jane established a new company that is doing marketing for mortgage and real estate companies, and it has been highly successful.

Ed and Jane visited the Department last Spring, and joined several Department faculty for an enjoyable dinner at the University Club, where Ed related many fascinating stories about his interesting career and life.

The Record

A Documentary Record of Facts and Figures for the Department of Physics and Astronomy of the University of Nebraska-Lincoln

No. 19 Winter 1999 Roger D. Kirby, Editor

1997-98 Degree Recipients

Bachelor of Science

Faisal Hussain Mohammad(Aug. 1997) Is working at Icon Trading Co., Halifax, Nova Scotia

Jefferson Barnett (May 1998) Is in an M.S. student at UNL in Engineering Mechanics

Thorvald Solomon Cox (May 1998) Is in U.S. Navy Flight School, Corpus Christi,Texas

Brooks Alan Hitt (HD) (May 1998) Is working for J.A. Woollam Co., Lincoln, NE

Shawn Paul Pebley (May 1998) Is an M.S. student at UNL under the supervision of Professor S. Ducharme

Master of Science

Tara McAvoy (August 1997) Is with Applied Magnetics Corp., Goleta, California

Steven A. Michalski (August 1997) Is a Ph.D. student at UNL under the supervision of Professor R. Kirby

Michael John Bonder(December 1997) Is a Ph.D. student in Materials Physics at Salford University in Manchester, UK

Bogdan Borca (May 1998) Is a Ph.D. student at UNL under the supervision of Professor A. Starace

Chunping Luo (May 1998) Is a Ph.D. student at UNL under the supervision of Professor D. Sellmyer

Jian Shi (May 1998) Is a Ph.D. student at UNL in the College of Business Administration

Scott C. Wadewitz (May 1998) Is a Ph.D. student at UNL in Chemical and Materials Engineering

Donald R. Williamson (May 1998) Is a Ph.D. student at the University of Wisconsin-Madison

Hao Zeng (May 1998) Is a Ph.D. student at UNL under the supervision of Professor D. Sellmyer

Doctor of Philosophy

Brian W. Adrian (August 1997) Is an Assistant Professor of Physics at Bethany College, Lindsborg, Kansas

Kevin M. Lee (August 1997) Is a Lecturer in Physics and Astronomy at UNL

Martin Liphardt (August 1997) Is with J.A. Woollam Co., Inc., Lincoln, NE

Dulip Welipitiya (December 1997) Is with Applied Magnetics Corp., Goleta, California

Martin Hu (May 1998) Is with Fermilab, Batavia, IL

Carlo Waldfried (May 1998) Is with TeraScore, Inc., Chantilly, VA

Lisa M. Wiese (May 1998) Is a postdoc at the University of Wisconsin-Madison

Honors

1997-98 Fellowships

John P. Krane	Parker Fellowship
Brandon J. Thaden	Summer Research Assistantship
Rebecca Lindell Adrian	Graduate Research Traineeship
Cecilia Hernandez	Graduate ResearchTraineeship
Thomas Koch	Graduate Research Traineeship

1997-98 Scholarships

Brooks A. Hitt	Joel Stebbins Fund Scholarship
Elizabeth S. Klimek	Physics and Astronomy Scholarship
Christina M. Lund	John E. Almy Scholarship
Jared R. Males	Henry H. Marvin Memorial Scholarship
Jeffrey Nicolaisen	Ed Hirsch Scholarship Fund Joel Stebbins Fund Scholarship
Amber L. Reinker	U.S. Harkson Scholarship Ed Hirsch Scholarship Fund
Michael P. Roth	Henry H. Marvin Memorial Scholarship John E. Almy Scholarship
Roger D. Stevenson II	U.S. Harkson Scholarship

Elected member of Phi Beta Kappa
Brooks A. Hitt

Sigma Xi Outstanding Doctoral Research
Carlo Waldfried

Materials Research Society Graduate Student Award
Carlo Waldfried

1998 Distinguished Teaching Assistant Awards
Donald Williamson **Cecilia Hernandez**

Fryxell Award for Interdisciplinary Research
John Weymouth

1997-98 Society of Physics Students Officers
Jennifer Webster, President
Jenefer Monroe, Secretary
Michael Roth, Vice President
Tina Lund, Treasurer

Faculty Professional Activities

In addition to service on Department, College and University-wide committees, for 1997-98 a number of the faculty are active in local, national and international professional activities, as follows:

Clifford Bettis: Secretary, Physics Instructional Resource Association

Vicki Plano Clark: AAPT Commmittee on Women in Physics; AAPT Council Member; AAPT Nebraska Section Representative; Lincoln Children's Museum Science Committee (Co-chair); Lincoln Children's Museum Exhibit Development Committee

Peter A. Dowben: Advisory Board, Center for Advanced Microstructure and Devices, LSU; Co-Organizer for the 1998 Heraeus Stiftung Meeting on "Magnetism and Electronic Correlations in Local Moment Systems," Bernau, Germany

Stephen Ducharme: Chair and Proceedings Editor, SPIE Conference on Organic Photorefractive Materials IV, San Diego, July 1998

C.M. Gaskell: Chair, International Scientific Organizing Committee, Quasar Broad Line Region Meeting; Chair, NASA Extragalactic Review Panel; Vice-Chair, Hubble Space Telescope AGN Physics Panel; Member, Board of Hyde Observatory

Timothy J. Gay: Executive Committee, APS Division of Atomic, Molecular and Optical Physics; Co-Chair, APS DAMOP Committee on APS Centennial Meeting; Executive Committee, Gaseous Electronics Conference

Duane H. Jaecks: Users Executive Committee, Advanced Light Source, Lawrence Berkeley Laboratory

Diandra Leslie-Pelecky: Co-Chair of Local Organizing Committee, 61st Annual Summer Meeting of AAPT; Member, Steering Committee for "Building Undergraduate Physics Programs for the 21st Century," NSF/AAPT/APS/PKAL

Kam-Ching Leung: Member, Nebraska Arts Council; Member, Chrétien International Research Award Committee of the AAS; Editorial Advisory Board, *Chinese Astronomy and Astrophysics*; Member, United Nations Working Group on Astronomical Facilities in the Pacific Rim; Member, Planning Committee for the Pacific Rim Conference on Binary Star Research; Distinguished Professor, Chinese Academy of Sciences, Shaanxi Astronomical Observatory; Co-Chair Organizing Committee of the Pacific Rim Conference on Stellar Astrophysics; Guest Professor, Peking University; Guest Professor, Chinese Academy of Sciences, Beijing Astronomical Observatory

Sy-Hwang Liou: Organizer of Midwest Superconductivity Consortium Summer School "Materials Issues Related to the Appplications of High T_c Superconductors," July 1998

Leo Sartori: Member, Steering Committee, Midwest Consortium on Security Studies; Resource Person on Weapons of Mass Destruction for United Nations Association

Edward G. Schmidt: Coordinator, International Astronomical Union Archives of Unpublished Variable Star Observations

David J. Sellmyer: International Organizing Committee, Magneto-Optical Recording International Symposium; Chair, Nominating Committee, APS-GMAG; Member, Nebraska State EPSCoR Committee; Member, Governor's Science and Technology Planning Committee; Executive Committee, APS Group on Magnetism and Its Applications; Program Committee, Conference on Magnetism and Magnetic Materials; Honorary Member of the Academic Committee, State Key Laboratory of Magnetism, Chinese Academy of Sciences

Gregory R. Snow: Chair, Users Executive Council, Fermi National Accelerator Laboratory

Anthony F. Starace: Associate Editor, *Reviews of Modern Physics*; Editorial Board, *Physical Review A*; Member, Task Force to Review *Physical Review A*

1998-99 Visiting Staff Members

Visiting Professors this year are **Sam Cipolla** (Ph.D. 1969, Purdue), **V.S. Rao** (Ph.D. 1965, Andhra U., India) working with Robert Fuller, and **Qinlun Xu** (M.S. 1987, Purdue) working with Sy-Hwang Liou.

Visiting Associate Professor **Jianjun Liu** (Ph.D. 1994, Jilin U., China) working with John Hardy.

Visiting Assistant Professors **Rochelle Ondracek** (Ph.D. 1994, Johns Hopkins) working with David Sellmyer, and **Ralph Skomski** (Ph.D. 1991, Dresden) working with David Sellmyer.

Adjunct Professor **Ronald H. Ono** (Ph.D. 1983, SUNY) working with Sy-Hwang Liou.

Senior Lecturer **C. Martin Gaskell** (Ph.D. 1981, California-Santa Cruz).

Research Assistant Professors **Shireen Adenwalla** (Ph.D. 1989, Northwestern), **Alexander Boune** (Ph.D. 1992, Moscow Institute of Crystallography) working with Steve Ducharme), **J. Ping Liu** (Ph.D. 1995, U. of Amsterdam) working with David Sellmyer, **Renat Sabiryanov** (Ph.D. 1993, Institute of Chemistry of Solids, Ekaterinburg, Russia) working with Sitaram Jaswal, and **Orhan Yenen** (Ph.D. 1986, UNL) working with Duane Jaecks.

Postdoctoral Research Associates **Elaine Kirkpatrick** (Ph.D. 1997, Carnegie Mellon) working with Diandra Leslie-Pelecky, **Mauro Masili** (Ph.D. 1998, Sao Paolo U., Brazil) working with Anthony Starace, **Dejan Milosevic** (Ph.D. 1990, U. of Belgrade) working with Anthony Starace, **Maciej Ossowski** (Ph.D. 1998, UNL) working with John Hardy, **You Qiang** (Ph.D. 1997, Albert-Ludwigs-University, Freiburg, Germany) working with David Sellmyer, **Hong Tang** (Ph.D. 1996, Institute of Metal Research, Academia Sinica, P.R. China) working with David Sellmyer, and **Min Zheng** (Ph.D. 1997, Institute of Physics, CAS, China) working with Roger Kirby and David Sellmyer.

Lecturer **Kevin M. Lee** (Ph.D. 1988, UNL).

1997 Fall Semester Colloquia

September 5
Professor Michael S. Lubell, City College of New York
"Science in Crisis: Fact or Fiction?"

September 11
Professor Laurie McNeil, University of North Carolina-Chapel Hill
"Light From Sand? Luminescence From Silicon-Oxide-Based Films"

September 18
Professor Don Madison, University of Missouri-Rolla
"Why Would Anyone Be Interested in Electrons Ionizing Atoms?"

September 25
Professor Clifford M. Will, Washington University, *The Montgomery Lecture*:
"Was Einstein Right?"

October 2
Dr. Robert C. Hilborn, Amherst College, *The Jerry E. Ruckman Lecture*:
"The National Science Education Standards and Undergraduate Physics Reform – A Source of Conflict or an Opportunity for Cooperation?"

October 9
Dr. William J. Nellis, Lawrence Livermore National Laboratory
"Metallization of Fluid Molecular Hydrogen"

October 16
Dr. Belinda J. Wilkes, Harvard-Smithsonian Center for Astrophysics
"The Infrared Continuum of Quasars: Thermal vs. Non-Thermal"

October 20
Dr. Leslie Camilleri, CERN, Geneva, Switzerland
"Experimental Searches for Neutrino Oscillations"

October 23
Professor Edward Guinan, Villanova University
"Planets Above and Beyond the Solar System: Results of Photometric Transit Searches"

October 30
Professor Chun C. Lin, University of Wisconsin-Madison
"Electron-Atom Collisions: From the Franck-Hertz Experiment to Atom Traps"

November 6
Dr. David Rudman, National Institute of Standards and Technology
"Application of High Temperature Superconductors to Electronics"

November 13
Professor J. M. D. Coey, Trinity College, Dublin, Ireland
"Chromium Dioxide – The Ideal Ferromagnet"

November 20
Professor Talat Rahman, Kansas State University
"Structure and Dynamics at Solid Surfaces"

December 11
Professor Sitaram S. Jaswal, University of Nebraska-Lincoln
"First-Principle Studies of the Properties of Permanent-Magnet Materials"

1998 Spring Semester Colloquia

January 15
Professor Norman R. Simon, University of Nebraska-Lincoln
"A Magnetic Study of Sleep"

January 22
Professor Robert C. Hilborn, University of Nebraska-Lincoln and Amherst College
"Experimental Tests of the Spin-Statistics Theorem"

February 5
Dr. Ken Babcock, Digital Instruments
"New Directions in Scanning Probe Microscopy"

February 9
Dr. Curtis Bradley, Electron Physics Group, National Institute of Standards and Technology
"Atom Optics, Bose-Einstein Condensation and Nanolithography"

February 12
Dr. Helmut A. Abt, Kitt Peak National Observatory
"Lifetimes of Papers in Various Sciences"

February 17
Dr. Herman Batelaan, University of Nebraska-Lincoln
"Using Matter Waves to Illuminate Interferometry"

February 19
Dr. Eric R. Abraham, JILA/University of Colorado
"Atom Fiber Optics"

February 24
Dr. M.W. Reynolds, Van der Waals–Zeeman Institute, University of Amsterdam
"Optical Study of Atomic Hydrogen on the Surface of Liquid Helium"

February 26
Dr. Barry Walker, University of California-San Diego
"Dynamics of Light-Matter Interactions"

March 5
Professor Donald P. Schneider, Penn State University
"Scanning for Violence at the Edge of the Universe"

April 2
Professor Leon Sanche, University of Sherbrooke (Canada)
"Mechanisms of Electron Stabilization and Trapping at Dielectric Surfaces"

April 9
Professor Chang Kee Jung, State University of New York at Stony Brook
"Neutrino Oscillation: Is It Real? (Findings from Super-Kamiokande)"

April 16
Professor Norman Ramsey, Harvard University
"Exploring the Universe with Atomic Clocks"

April 23
Professor Luz Martinez-Miranda, University of Maryland
"Depth-dependent Study of the Structure of Ferromagnetic Films"

April 23
Dr. David Singh, Naval Research Laboratory
"Novel Thermoelectric Materials: What do the Band Structures Say?"

1997 FACULTY PUBLICATIONS

ASTRONOMY AND ASTROPHYSICS

C. M. Gaskell and S. A. Snedden, "The Nature and Origin of Structure in Broad Emission Line Profiles," in *Emission Lines in Active Galaxies: New Methods and Techniques*, eds. B. M. Peterson, F.-Z. Cheng, and A. S. Wilson, ASP Conference Proceedings **159** (Astronomical Society of the Pacific, San Francisco, 1997), p. 193.

C. M. Gaskell and R. McKim, "Mars," International Astronomical Union Circular 6693 (1997).

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S. A. Snedden and **C. M. Gaskell**, "An Analysis of Broad Emission-Line Profiles from Hubble Space Telescope Data," in *Emission Lines in Active Galaxies: New Methods and Techniques*, eds. B. M. Peterson, F.-Z. Cheng, and A. S. Wilson, ASP Conference Proceedings 159 (Astronomical Society of the Pacific, San Francisco, 1997), p. 195.

I. Wanders, ..., C. **M. Gaskell**, S. A. Snedden, *et al.*, "Steps toward Determination of the Size and Structure of the Broad-Line Region in Active Galactic Nuclei. XI. Intensive Monitoring of the Ultraviolet Spectrum of NGC 7469," Astrophysical Journal Supplement **113**, 69 (1997).

E.G. Schmidt, "Photometric Investigation of the Evolved Contact Binary System DN Anr," Astrophysics and Space Science **246**, 291 (1997).

S. N. Goderya, **K. C. Leung**, and **E. G. Schmidt**, "Photometric Study of Selected Zero Age Contact and Evolved Binary Systems," in *Third Pacific Rim Conference on Recent Develoments in Binary Star Research*, ASP Conference Series **130**, 219 (1997).

A.D. Silber, ... **E.G. Schmidt**, *et al.*, "The Noah Project: Detection of the Spin-Orbit Beat Period of BY Camelopardalis," Monthly Notices of the Royal Astronomical Society **290**, 95 (1997).

E.G. Schmidt, "Light Curve Changes in the Eclipsing Binary V719 Mer," Information Bulletin on Variable Stars #4552 (1997).

N.R. Simon and T.S. Young, "The Cepheid Instability Strip and the Calibration of the Primary Distance Scale," Monthly Notices of the Royal Astronomical Society **288**, 167 (1997).

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ATOMIC, MOLECULAR AND OPTICAL PHYSICS

A.P. Hitchcock, S.G. Urquhart, A.T. Wen, A.L.D. Kilcoyne, T. Tyliszczak, E. Rühl, N. Kosugi, J.D. Bozek, J.T. Spencer, D.N. McIlroy and **P.A. Dowben**, "Inner Shell Excitation Spectroscopy of Closo-Carboranes," Journal of Chemical Physics B **101,** 3483 (1997).

P. Ayotte, J. Gamache, A.D. Bass, L. Sanche, and **I.I. Fabrikant,** "Absolute Cross Sections for Dissociative Electron Attachment to Condensed CH_3Cl and CH_3Br: Effects of Potential Energy Curve Crossing and Capture Probability," Journal of Chemical Physics **106,** 749 (1997).

I.I. Fabrikant, K. Nagesha, R. Wilde, and L. Sanche, "Dissociative Electron Attachment to CH_3Cl Embedded into Solid Krypton," Physical Review B **56**, R5725 (1997).

M. Reicherts, T. Roth, A. Gopalan, M.-W. Ruf, H. Hotop, C. Desfrançois, and **I.I. Fabrikant**, "Controlled Formation of Weakly Bound Atomic Negative Ions by Electron Transfer from State-Selected Rydberg Atoms," Europhysics Letters, **40**, 129 (1997).

V.S. Lebedev and **I.I. Fabrikant**, "Semiclassical Calculations of the l-Mixing and n, l-Changing Collisions of Rydberg Atoms with Rare-Gas Atoms," Journal of Physics B **30**, 2649 (1997).

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H. Batelaan, T. J. Gay, and J. J. Schwendiman, "The Stern-Gerlach Effect for Electron Beams," Physical Review Letters **79**, 4517 (1997).

L.M. Wiese, O. Yenen, B. Thaden, and **D.H. Jaecks**, "Measured Correlated Motion of Three Massive Coulomb Interacting Particles," Physical Review Letters **79**, 4982 (1997).

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Y.-K. Kim, W. Hwang, N.M. Weinberger, M.A. Ali, and **M.E. Rudd**, "Electron-Impact Ionization Cross Sections of Atmospheric Molecules," Journal Chemical Physics **106**, 1026 (1997).

M.A. Ali, Y.-K. Kim, W. Hwang, N.M. Weinberger, and **M.E. Rudd**, "Electron-Impact Total Ionization Cross Sections of Silicon and Germanium Hydrides," Journal Chemical Physics **106**, 9602 (1997).

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Yong-Ki Kim, M. Asgar Ali, and **M. Eugene Rudd**, "Electron-Impact Total Ionization Cross Sections of CH and C_2H_2," Journal of Research of the National Institute of Standards and Technology **102**, 693 (1997).

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W.C. Stolte, Y. Lu, **J.A.R. Samson**, O. Hemmers, D.L. Hansen, S.B. Whitfield, H. Wang, P. Glans and D.W. Lindle, "The K-Shell Auger Decay of Atomic Oxygen," Journal of Physics B **30**, 4489 (1997).

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Q. Wang and **A.F. Starace**, "Classical Interpretation of the Quantum Description of H^- Photodetachment in Parallel E and B Fields," Physical Review A **55**, 815 (1997).

M. Marinescu and **A.F. Starace**, "Three-Body Dispersion Coefficients for Alkali-Metal Atoms," Physical Review A **55**, 2067 (1997).

B.J. Davies, C.W. Ingram, D.J. Larson, C.-N. Liu, and **A.F. Starace**, "Resonance Feature in Al^- Photodetachment Below the Al ($3s^24s\ ^2S$) Threshold," Physical Review A **56**, 378 (1997).

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CONDENSED MATTER PHYSICS

B. Doudin and J.-Ph. Ansermet, "Nanostructuring Materials For Spin Electronics," Europhysics News, **28/1**, 14 (1997).

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J. Löffler, W. Wagner, H. Van Swygenhoven, J. Meier, **B. Doudin**, J.-Ph. Ansermet, "Magnetic Properties of Nanostructured Ferromagnetic Metals," Materials Science Forum **235-238**, 699 (1997).

J. Löffler, W. Wagner, H. Van Swygenhoven, J. Meier, **B. Doudin**, J.-Ph. Ansermet, "Influence of Grain Size and Oxidation on the Magnetic Properties of Nanostructures Fe and Ni," Nanostructured Materials **9**, 523 (1997).

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1997 FACULTY PUBLICATIONS (continued from page 22)

INTERDISCIPLINARY PHYSICS

Archaeometry

J.W. Weymouth, "Final Report on Magnetic and Resistance Surveys of Mounds on the Wright-Patterson Air Force Base," Chapter IV in *Geophysical Surveys at Two Earthen Mound Sites, Wright-Patterson Air Force Base, Ohio*, Edited by Mark Lynott, National Park Service, Midwest Archeological Center, Lincoln, Nebraska (1997).

J.W. Weymouth, "An Analysis of Magnetic Gradiometer Surveys at the Fort Clatsop National Memorial, Oregon," Report submitted to the Fort Clatsop National Memorial (January 1997).

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Physics Education

Norman F. Derby, **Robert G. Fuller** and Phil W. Gronseth, "The Ubiquitous Coffee Filter," The Physics Teacher **35**, 168, March 1997.

Norman F. Derby, **Robert G. Fuller** and Thomas A. Summers, "A Football Chase on Video," The Physics Teacher **35**, 359, Sept. 1997.

Track Physics

F. A. Cucinotta, J. W. Wilson, M. R. Shavers, and **R. Katz**, "Calculation of Heavy Ion Inactivation and Mutation Rates in Radial Dose Model of Track Structure," NASA Technical Paper 3630, June 1997.

New Research Grants and Contracts (continued from page 24)

Principal Investigator	Title (Source of Funds)	Amount ($Thousands)
Sellmyer	Fundamental and Magnetic-Hardening Studies of Nanocrystalline and Nanocomposite Magnets (DOE)	75.0
Sellmyer/Doudin/Dowben/ Kirby/Liou	Nanoscale Materials for Information Technologies (NRI)	250.0
Sellmyer/Jaswal/Leslie-Pelecky/ Liu	Advanced High-Temperature Magnetic Materials (AFOSR)	93.8
Sellmyer/Kirby	Magnetism & Magneto-Optics of Novel Nanoscaled Materials (NSF)	64.5
Snow	CROP Support (Subcontract) (UND)	5.0
Snow	The Cosmic Ray Observatory Project (CROP) (LTF)	7.5
Starace	Coherent Control of Continuum Quantum Processes (NSF)	78.0
Starace	International Supplement for NSF Award PHY-9722110 (NSF)	13.3
Supriyo/Liu/Sellmyer	Self Assembled Nanostructures (ARO)	24.5
Weymouth	Remote Sensing at the Cowan Site, 13wd88 (UI)	5.0
	Total	**$2,702.5**

AAPT – American Assoc. of Physics Teachers
ACS – American Chemical Society
AFOSR – Air Force Office of Scientific Research
ARO – Army Research office
DE – Dale Electronics
DOE – U.S. Department of Energy
EPSCoR – Experimental Program to Stimulate Competitive Research
IBM – International Business Machines
KC – Kalamazoo College
LTF – Layman Trust Fund
NASA–National Aeronautics and Space Administration
NRI – Nebraska Research Initiative
NSF – National Science Foundation
NSIC – National Storage Industry Consortium
NTDC – Nebraska Technology Development Corporation
ONR – Office of Naval Research
PU/MISCON – Purdue University/Midwest Superconductivity Consortium
SU – Syracuse University
UI – University of Iowa
UND – University of Notre Dame
UNF – University of Nebraska Foundation

New Research Grants and Contracts

during the period 1November 1997–31 October 31 1998 the following new and renewal grants and contracts were received by our faculty

Principal Investigator	Title (Source of Funds)	Amount ($Thousands)
Adenwalla	Single and Multi-Layered Magnetic Arrays: A Study of Their Magnetic Properties (NSF)	90.7
Burrow	Temporary Anions and Dissociative Attachment: Probes of Intra- and Intermolecular Interactions (NSF)	110.0
Doudin	EPSCoR II Project (NSF-EPSCoR)	20.0
Dowben	High Temperature/High Speed Junction Devices & Contacts (AFOSR)	74.8
Dowben	Double Pass CMA (NDTC)	1.6
Dowben	Syracuse Subcontract (SU)	50.3
Dowben	Beam Monitor (IBM)	11.0
Dowben/Liou/Adenwalla	The Metal-Nonmetal Transition in Magnetic Local Moment Systems (NSF)	97.6
Dowben/Langell	Upgrade of a Synchrotron Radiation Beamline (NSF)	75.3
Dowben/Adenwalla	Boron-Carbide Thermal Neutron Detectors and Cameras (NRI)	66.0
Ducharme	Ferroelectricity in Langmuir-Blodgett Polymer Films (NSF)	79.7
Ducharme/Dowben/ Adenwalla	ONR-DEPSCOR/Structure of Ferroelectric Polymers (ONR)	107.3
Fabrikant	Kansas State Subcontract (DOE)	70.0
Fabrikant	Collision Processes Involving Low-Energy Electrons (NSF)	60.0
Fabrikant	Atomic Processes Involving Negative Ions (NSF)	7.1
Fuller	PERC (Physics Education Research Conference) (NTDC)	2.5
Fuller	Bicycle Project (KC)	12.1
Fuller	EPSCOR National Physics Conference (NSF-EPSCoR)	5.0
Fuller	Tacoma Narrows Bridge (AAPT)	2.8
Fuller/Clark	Information Technology in Physics Classrooms for Bioscience and Pre-Medical Students (UNF)	49.0
Fuller/Dunbar	Multimedia Mathematics: Across the Curriculum and Across the Nation (DOE)	60.8
Fuller/Moore	Color Images of Physical Phenomena-a CD (AAPT)	13.6
Gaskell	MRK 42 and MRK 957: Two Extreme Narrow-Line Strong Fe II Emitting Quasars (NASA)	17.8
Gay	Polarized Electron Physics (NSF)	200.0
Gay	REU Supplement-Polarized Electron Physics (NSF)	15.0
J. Hardy	Studies on the Microwave Optics of Ionic Molecular Solids (ARO)	90.0
Jaecks	Correlated Motion, Energy and Angular Momentum Partitioning in Multielectron and Massive Three Body-Coulomb-Interacting Quantum Systems in the Continuum (NSF)	204.5
Jaecks	Supplement to PHY-9419505 (NSF)	10.0
Kirby/Sellmyer	Fellowship Stipend (IBM)	17.4
Leslie-Pelecky	Metastable Phases in Chemically Synthesized Nanoparticles (ACS)	10.0
Leslie-Pelecky	AAPT National Meeting (NSF/EPSCoR)	5.0
Leslie-Pelecky/Ducharme	Research Experiences for Undergraduates in Nanostructured Materials (NSF)	63.0
Leslie-Pelecky/Rohde	Carbon-Encapsulated Magnetic Nanostructures (LTF)	7.3
Liou	The Acquisition of an Atmosphere Controlled Glove Box (PU/MISCON)	15.0
Liou	Multilayer Process for the Fabrication of HTS Circuits (PU/MISCON)	10.0
Liou	Hg- and Ti-Based Superconducting Films (PU/MISCON)	93.5
P.Liu/Sellmyer	Intergrain Exchange Coupling in Nanostructured Composites (NSF)	31.2
Sellmyer	Rare Earth Metal Nexaboride for Plasma Displays (DE)	25.0
Sellmyer	Materials Research on Nanostructured and Complex Systems NSF/DPSCoR	5.0
Sellmyer	Advanced Magnets for Power Systems (ARO)	100.0
Sellmyer	NSIC-Fundamental Media Limits on EHDR (NSIC)	24.0

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