

# SPECTRUM

A Newsletter for Alumni and Friends of the Department of Physics and Astronomy of the University of Nebraska—Lincoln

No. 10 Winter 1989

M. Eugene Rudd, Editor

## Jaecks Receives Distinguished Teacher-Scholar Award



Duane H. Jaecks

In April 1989 Professor Duane H. Jaecks received the Burlington Northern Distinguished Teacher-Scholar Award. This award of \$3000, given annually to only two faculty members on the Lincoln campus, is presented on the basis of outstanding teaching in combination with exemplary scholarly achievements. Jaecks, who holds a Ph.D. from the University of Washington, joined the staff in 1966 after a post-doctoral appointment at the F.O.M. Laboratory in Amsterdam. Shortly after coming to Nebraska, he made a complete

revision of the junior-senior laboratory course, redesigned the sophomore electronics course, and introduced the advanced electronics course. In 1974 he started the Saturday Science course for 5th and 6th grade students; this course is now in its 14th year of operation. His research in atomic collisions has focused on the alignment and orientation of atoms. In particular, in collaboration with former Professor Joseph Macek, his work on atomic photon-particle coincidence measurements laid the foundations for this new field of investigation. In addition, he has done pioneering research on the optical properties of 18th and 19th century telescopes.

## Fabrikant and Woods Join Department

Two additional new faculty members have been hired by the Department in the past year to strengthen programs in theoretical atomic physics and experimental condensed matter physics. The balance between theory and experiment in the atomic physics program, which was upset by the departure of Joseph Macek two years ago, has now been restored to its former position: two theorists and five experimentalists. Associate Professor Ilya I. Fabrikant, the new theorist, comes from the internationally renowned atomic physics group in Riga, Latvia, USSR, in part as a result of the sweeping political changes occurring in that part of the world.

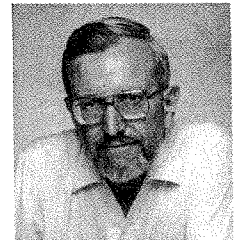
The experimental condensed matter position continues the expansion of the number of experimentalists in the Department in general and of the condensed matter group in particular. Assistant Professor Joseph Woods, the new experimentalist, will increase the Department's expertise in the area of magnetic materials research. Set-up funds for his new laboratory for studies of surface magnetism will exceed \$200 K, funded in large part by Governor Orr's Research Initiative through the new Center for Materials Research and Analysis.

Fabrikant received his Candidate of Science degree, equivalent to the Ph.D. degree, from the Institute of Physics in Riga, USSR, in 1974. His undergraduate degree is from the Latvian State University in Riga. His doctoral dissertation concerned collisions of slow electrons with alkaline earth atoms and was supervised by R.J. Damburg. From 1974-1988 Fabrikant was a researcher in the Institute of Physics of the Latvian Academy of Sciences. During this period he published over 70 articles in Soviet and European scientific journals, establishing a significant reputation in the areas of electron scattering from polar molecules and of photodetachment of negative ions in the presence of a static electric field. In 1988, Fabrikant emigrated to the United States. Prior to joining the Department, he held Visiting Scientist appointments at both the James Franck Institute at the University of Chicago and the Institute for Theoretical Atomic Physics at the Harvard-Smithsonian Center for Astrophysics.

Woods received his Ph.D. degree in physics in 1986 from the Uni-

## Hardy Receives 1989 ORCA Award

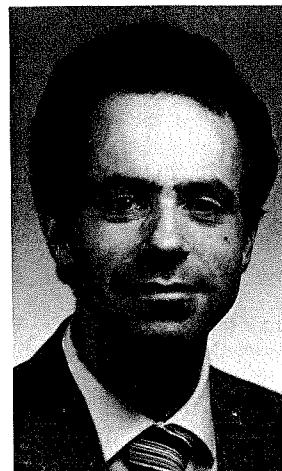
John R. Hardy received the 1989 University of Nebraska Award for Outstanding Research and Creative Activity (ORCA) at a ceremony on March 8th, 1989. Hardy was cited for his pioneering work on the lattice dynamics and statics of crystalline materials, his origination of the deformation dipole model, which is used widely to calculate basic properties of both pure materials and materials containing defects, his extensive work on the theory of shock propagation in solids, and his recent identification of the possible origins of



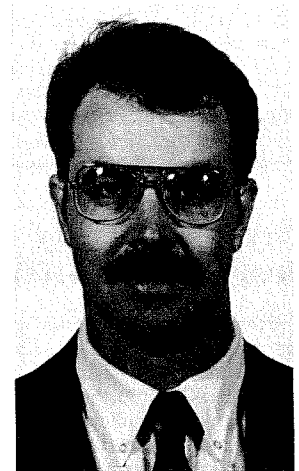
John R. Hardy

high temperature superconductivity. Hardy received his B.S. degree in 1956 and his Ph.D. in 1959, both from Bristol University in England. Following postdoctoral fellowship appointments at Reading University and Harwell, Hardy held a visiting position at UNL during 1966-67. He joined the Department the following year, becoming a Professor of Physics in 1968. In 1982 he received the University of Nebraska Chapter of Sigma Xi's Distinguished Scientist Award. He currently serves as a consultant to both Lawrence Livermore Laboratory and the Naval Research Laboratory. His research is supported by both the Army Research Office and the Office of Naval Research. He has supervised the research of six Ph.D. students at UNL and at least twice as many postdoctoral researchers as well as a few M.S. and B.S. degree students.

The ORCA award is the highest accolade the University can bestow in recognition of a faculty member's research. It was established in 1978. Previous Department award winners are Joseph H. Macek (1979) and James A.R. Samson (1987).



Ilya I. Fabrikant



Joseph Woods

versity of Texas at Austin. He holds B.S. degrees in both mechanical and electrical engineering from the University of Rochester, which he received in 1979. His doctoral research, which was supervised by J. Erskine, was in surface physics with an emphasis on polarized electron spectroscopy. From 1986 to the end of 1989, Woods has been a post-doctoral research associate at Massachusetts Institute of Technology doing research in surface magnetism. At UNL Woods plans to set up one of the few laboratories in the world studying surface magnetic properties of a wide range of ferromagnetic materials and artificially-constructed magnetic multilayer systems.

# Chairman's Letter

Dear Alumni and Friends,



Anthony F. Starace

Major changes continue to sweep through the Department. These affect our staffing, our academic and research programs, and our physical facilities.

For the second year in a row the Department has successfully recruited two excellent new faculty. As noted elsewhere in this issue of *SPECTRUM*, Ilya Fabrikant, a theoretical atomic physicist, and Joseph Woods, a condensed matter experimentalist, joined the Department this academic year. A search for another condensed matter experimentalist is currently under way. As also noted elsewhere, Professors John W. Weymouth and Edward J. Zimmerman retired last summer and this year Professor Edgar Pearlstein has reduced his appointment to half-time.

Fortunately, management of these changes is made easier by the fact that the Department knows where it is going and knows that our plans have the support of UNL's upper-level administration. Of most significance, is that the Department is moving to establish better balance between our theoretical and experimental programs by increasing the number of experimental faculty to 50%-60% of the total faculty from roughly 30% a few years ago. In particular, the Department is expanding its experimental condensed matter physics program in conjunction with the University's establishment last year of the new Center for Materials Research and Analysis. The Department's research focus in the Center is in the areas of magnetic materials and high temperature superconductivity. Furthermore, the Department has joined with the University of Colorado and 8 or so other western and mid-western university physics departments to seek funding for the establishment of a regional high energy physics laboratory. The purpose of this lab is to design the state-of-the-art detectors needed for research on the Superconducting Super Collider, which is being built in Texas, as well as to expand the number of experimental high energy physics programs in the region.

All of these changes, in addition to maintaining the strengths of our programs in atomic, molecular, and optical physics and in astronomy and astrophysics, are in accord with the University's goal, announced by Chancellor Massengale last September, to move UNL into the ranks of the nation's top 50 research universities. Governor Orr's Research Initiative, which comprises both substantial faculty and staff salary increases and an eventual \$20 million of new money for research programs, makes the achievement of this goal within reach. For the Department, the increase in experimental activity, the participation in a research center, and the involvement in the "big science" field of high energy physics, will most likely result in significant increases in external research funding, which is one of the key measures by which departments and universities are ranked.

Do not think, however, that, we are losing sight of our teaching and service missions. On the contrary, the new experimental programs we are establishing will go a long way toward meeting the needs and wishes of our students. Furthermore, the physics community nationally is gearing up to revitalize both the undergraduate and the K through 12 curricula, and we are part of this activity. In particular, Professor Robert Fuller has been enormously successful this past year in obtaining both Department of Education and National Science Foundation grants for the improvement of instructional materials, the development of new curricula, and the study of ways to increase the number of women and minorities who embark on physics careers. A number of faculty in the Department are experimenting with ways to increase the use of computers in our undergraduate majors program. And in the area of public service, Dr. Clifford Bettis, who coordinates our Saturday Science program for 5th and 6th graders, has developed a new summer course on physics demonstrations for public school teachers, which will be offered for the first time next summer. Bettis has also been involved in the establishment of the Lincoln Children's Museum, whose opening is imminent.

All of this activity in the Department has not occurred without problems. In particular, we have about run out of suitable laboratory space for new experimentalists. This year we are moving our library from the second floor of Behlen to smaller quarters on the first floor of Brace, where the floors have much higher load bearing capacity. This move, together with some rearrangement of our space in both Brace and Behlen, will result in three new rooms of prime laboratory space on the second floor of Behlen. These new labs, however, are being filled by the new experimentalists we are hiring now. Additional laboratory space is therefore on our agenda for the future.

As in the past, I wish to take this opportunity to thank you, our alumni and friends, for your continuing financial support. Continuation of this support is vitally needed now to assist our efforts to recruit new faculty, assist increased numbers of undergraduate and graduate students, improve our teaching laboratories, support the activities of our Society of Physics Students, and underwrite some of the expenses of our service programs to further science education in Nebraska at all levels.

Finally, I urge you to keep in touch with us. 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 our "new" Department. Best wishes until next year.

Sincerely,

Anthony F. Starace  
Professor and Chairman

## Physics Faculty Attain High Professional Offices

During the past decade no fewer than four members of the Department have been elected to head national professional organizations, which is an affirmation of the outstanding reputation of the faculty. Professor Anthony F. Starace, chairman of the Department of Physics and Astronomy, was recently elected vice chairman of the 3809-member Division of Atomic, Molecular, and Optical Physics of the American Physical Society. He will become Division chairman in 1990. The Division is one of 12 subgroups of the major American professional organization for physicists. Professor M. Eugene Rudd was chairman of the same division in 1980 when it was known as the Division of Electron and Atomic Physics. In 1984 Professor Leo Sartori was chairman of the Forum on Physics and Society, the 5000-member Division of the American Physical Society which is concerned with problems at the interface of physics and society, such as arms control, energy sources and utilization, and environmental issues. In 1980 Professor Robert G. Fuller was the president of the American Association of Physics Teachers, the leading professional organization in this country for high school and college level physics teachers.

## Department of Education Grant Awarded to Fuller

A 2-year, \$590,815 grant has been made by the U.S. Department of Education to the American Association of Physics Teachers (AAPT) Instructional Materials Center, located at the University of Nebraska. Professor Robert G. Fuller is the editor. The grant is for a project to identify outstanding films for teaching physical sciences in secondary schools. These films will be transferred to video and distributed on videotape and videodisc. In addition, national, regional, and local teacher training workshops in the use of these materials will be held. The project is supervised by Dr. Jack M. Wilson, Executive Officer of AAPT. Fuller, aided by Dr. Charles R. Lang of Omaha Westside High School, will direct the video transfer part of the project and Dr. David Winch of Kalamazoo College, who spent a semester here in the Department in 1981, will supervise the workshops.



## Research Highlights

We present here a selection of recent research results by the Department's faculty, staff, and students. Two of the works presented have appeared in *Physical Review Letters* (PRL), a journal "dealing with important new discoveries or topics of high current interest." The third work has appeared in the Letters section of the *Astrophysical Journal* (ApJL), which publishes brief manuscripts having "significant immediate impact . . . or . . . special current interest in astrophysics." The works are presented chronologically.

In the 23 January 1989 issue of PRL postdoctoral researcher **Chih-Ray Liu** and Professor **Anthony F. Starace** presented theoretical work on "Low-Energy Features of the  $e^-$ -H( $n=2$ ) System Exhibited in Fast  $H^-$  Detachment Collisions." High-energy negative ion detachment collisions are important for the production of fast neutral particle beams, which have applications in plasma heating processes among others. Due to the kinematic transformations which relate measurements in the laboratory to energies in the frame of the  $H^-$  projectile, it turns out that large features in the laboratory cross sections for H( $n=2$ ) production depend very sensitively on extremely low energy excitations in the  $H^-$  frame leading to slow electrons detaching from H in the  $n=2$  state. In this work, these low energy features of the H( $n=2$ ) -  $e^-$  system are related in detail to the laboratory frame detachment cross section measurements. Some of the laboratory frame features predicted here will require higher experimental angular resolution to resolve.

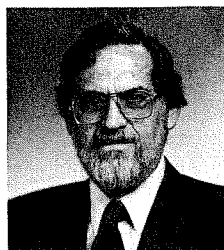
In the 24 July 1989 issue of PRL graduate student **Zheng-Sheng Shan**, Professors **David J. Sellmyer** and **Sitaram S. Jaswal**, and visiting researchers **Y.J. Wang** and **J.X. Shen** reported combined experimental and theoretical work on "Magnetism of Rare-Earth-Transition-Metal Nanoscale Multilayers." The factors governing the magnetism exhibited by ultrathin layers and multilayers of magnetic elements are not well understood. Furthermore the ability to control this magnetism through manipulation of the microstructure of these multilayers will have important applications in various magneto-optic data storage technologies. In this work the layer thickness dependence of various magnetic properties for rare-earth/transition-metal multilayered magnetic materials is reported and a new theoretical model is presented for understanding this dependence. Agreement between the measurements and the theoretical model is excellent, indicating the possibility in the future of designing materials with specified magnetic properties.

In the 1 August 1989 issue of ApJL, Professor **Norman R. Simon** presented theoretical work "On the Masses and Luminosities of RR Lyrae Stars." RR Lyrae stars play an important role in our current understanding of stellar evolution, the history of the Milky Way galaxy, and the size of the known Universe. Despite their obvious importance, there is no general agreement on their two most important characteristics: their masses and their luminosities. In this paper Simon provides a detailed comparison between the predictions of theoretical hydrodynamic stellar pulsation models for the RR Lyrae stars and experimental observations. This comparison shows that estimates of RR Lyrae masses and luminosities based upon stellar evolution theory or upon the direct measurement of stellar radii are probably not correct. Because these estimates have been used to derive ages and distances to globular clusters (rich star clusters which comprise the oldest objects known in the Galaxy), Simon's results call into question the basis for some current ideas regarding galactic evolution and the cosmic distance scale. To remedy these deficiencies, a new framework, built upon the hydrodynamic pulsation models, is proposed and new observations of pulsating stars are suggested.

## Department History Project

The writing of the Department history book is nearing completion with about 100 pages written so far. That brings the history from the beginning up to about 1980. Many fascinating stories have turned up (did you know that Nebraska's failure to hire a certain physics professor may have had a profound influence on the outcome of World War II?) and some interesting facts have emerged (do you know that nearly 40% of all the physics and astronomy professors hired over the 120-year history of UNL are on the staff now?) Your editor has poured over many dusty records in the library archives and the Departmental files and has had enthusiastic help from several present and past staff members and administrators and a few alumni. He would like to hear from more of you alumni, however. Stories about favorite (or infamous) faculty members, photographs, clippings, and letters are all welcome.

## Weymouth Retires



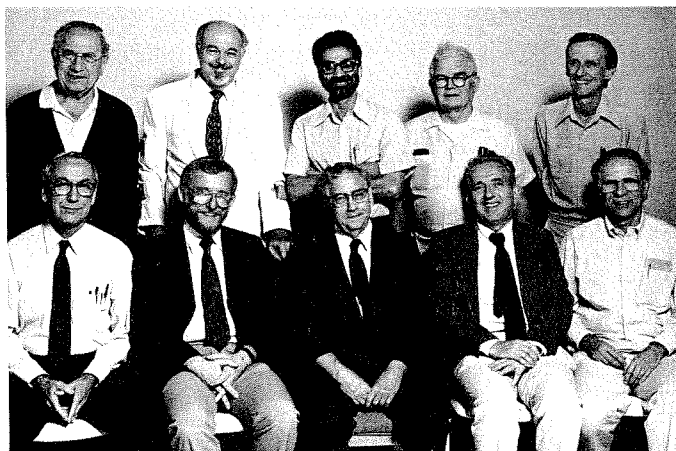
*John W. Weymouth*

Professor **John Weymouth**, a member of the Department since 1958, retired this spring. Weymouth was born in Palo Alto, California and received his B.A., M.A. and Ph.D. from the University of California-Berkeley. Before coming to Nebraska, he served on the faculties of the University of San Francisco, Vassar College, and Clarkson College of Technology, now Clarkson University. His early research was in x-ray diffraction of solid state materials, but since the late 1970's he has worked on the development of physical methods to do non-destructive studies of archaeological sites. He has had numerous contracts with the National Park Service and other federal and state agencies. A retirement dinner was held for him in June which was attended by out of town guests as well as by members of the Department.

While Weymouth has retired from teaching, he continues to pursue his research in archaeo-physics. During a 5-week trip in September and October 1989 he travelled to Athens, Greece to consult with a group of geophysicists with whom he meets every six months. This group, supported by the NATO program "Science for Stability," studies applications of geophysics to the delineation of archeological sites in order to prevent loss by land development. He also went to Thessaloniki, Greece to visit archeological sites and to Brussels to confer with the director of the NATO program. His work involves both magnetic surveying and electrical resistance surveying. The group has further plans for using ground-penetrating radar. Landsat data from French and American satellites are also used to check for features which reflect subsurface changes, possibly indicating interesting places for excavation.

## Zimmerman Retires

After 38 consecutive years on the faculty, Professor **Edward Zimmerman** has retired. His length of service in the department has been exceeded only by that of Prof. **John Almy** who served from 1900 to 1943. Zimmerman received his B.A. degree at the University of Kansas, his M.S. and Ph.D. from Illinois and has served his entire career at Nebraska. While his Ph.D. thesis work was in nuclear physics, his early research at Nebraska had to do with stopping powers of solids and gases and the scintillation response of crystals. More recently his interests have been in the foundations of quantum mechanics and in the philosophy of physics. He was the chairman of the Department from 1962 to 1966, a period of very active growth. During that time 13 new professors were added, the largest number hired by any chairman in the history of the Department. These were Paul Byerly, David Joseph, Murray Muraskin, Thomas Morgan, Dan Schlitt, Donald Forster, William Campbell, Paul Finkler, Paul Moravek, Eugene Rudd, Duane Jaecks, Sitaram Jaswal, and Robert Katz. Those still in Lincoln recently gathered for a photograph with Zimmerman.



*Left to right, back row: Katz, Finkler, Jaswal, Byerly, and Joseph. Front row: Rudd, Campbell, Zimmerman, Morgan, and Jaecks.*

## Staff Activities

Lecture Demonstrations Manager and Research Assistant Prof. **Clifford Bettis** was elected as the representative to the American Association of Physics Teachers from the Nebraska Section. Bettis recently contributed ideas for experiments that are to be used on the "Mr. Wizard" television science program for children. He also serves on the Board of Directors of the Children's Museum, which will open in Lincoln in December 1989. He will present shows there on the physics of music and on the ABC's of radiation. In November 1989 he presented an optics show to 500 grade school students at the Kahoa School in northeast Lincoln.

Professor **Paul Burrow** was among the first group of 62 faculty members at the university to receive the Recognition Award for Contributions to Students sponsored by the UNL Parents Association and the Teaching Council. At the 41st Gaseous Electronics Conference in October 1988, one of Burrow's papers was cited as "one of the outstanding contributions to the conference." This was the paper "Temporary Negative Ions in Complex Molecules: Angular Distributions and Vibrational Excitation" by T.M. Stephen (M.S. 1972, Ph.D. 1988) and Burrow.

**Joe Dierking** of our office staff will be Recording Secretary and a member of the University of Nebraska Office Personnel Association for 1989-90.

Professor **David Duquette** was awarded a \$5,500 James H. Clark Summer Fellowship for 1989.

Professor **Robert Fuller** has been appointed to the search committee for a person to succeed Ronald Roskens as president of the University of Nebraska. In recent months Fuller has conducted educational workshops at Carnegie-Mellon University, at California Polytechnic University, and at the annual Midwest Section meeting of the American Society for Engineering Education. In addition, he has been elected to serve a four-year term on the national Board of Higher Education and Ministry of the United Methodist Church.

Electronics Shop Manager **John R. Kelty** was a co-author of a recent Physical Review Letter (27 February 1989) entitled "Test of Newton's Inverse-Square Law in the Greenland Ice Cap." Kelty built the electronics used in the 2033 m-deep borehole as part of his work for UNL's former Polar Ice Coring Office. No unambiguous violation of Newton's inverse square law (predicted by certain unified field theories) was found since the observed violations might be attributed to unexpected geological features of the bedrock at the bottom of the borehole.

Professor **Kam-Ching Leung** was appointed Distinguished Professor at the Yi Culture Research Institute in China. The Lentz Center for Asian Culture had an exhibit in November of clothing, cultural relics, and photographs of the Yi people of China which were supplied by Leung from his private collection. He has also edited a book, "Critical Observations versus Physical Models for Close Binary Systems," which was published by Gordon and Breach.

Professor **Sy-Hwang Liou** received a \$5,500 Maude Hammond Fling Faculty Summer Fellowship for 1989 and also a University of Nebraska Foundation grant of \$28,200 for equipment for his superconducting and magnetic thin film research. Liou was a coauthor of the Journal of Applied Physics paper "Evidence for weak link and anisotropy limitations on the transport critical current in bulk polycrystalline  $Y_1Ba_2Cu_3O_x$ " which received the 1988 Outstanding Paper Award of the Center for Electronics and Electrical Engineering of the National Institute of Standards and Technology (NIST). One of his coauthors, Jack Ekin, is an employee at NIST.

Professor **M. Eugene Rudd** was elected a Fellow of the Center for Great Plains Studies at the University of Nebraska in March, 1989.

Professor **Edward Schmidt** has edited a book entitled "The Use of Pulsating Stars in Fundamental Problems in Astronomy" published this past summer by Cambridge University Press.

## Kobetich Speaks at Recognition Luncheon



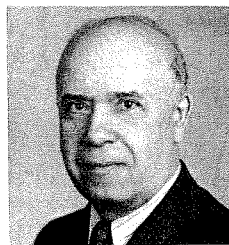
*Edward J. Kobetich*

**Edward J. Kobetich** (Ph.D. 1968) spoke to faculty, staff, and students on the topic "The Future Lies in Technology Transfer" at the 1989 Recognition Luncheon in honor of 1988-89 Departmental bachelor's, master's, and doctoral degree recipients. Kobetich 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 the 1968-69 academic year, when he was a post-doctoral research associate with Katz, he helped develop what is now known as the Katz and Kobetich model for explaining radiation damage in matter and in living tissues. During 1969-79, Kobetich held a variety of scientific positions. He had post-doctoral research appointments in both Bristol (doing radiological physics) and Berkeley (doing cosmic ray physics). From 1972-77 he was a Senior Research physicist at E.I. Dupont (developing advanced organic and inorganic materials) and in 1977 he switched to ARCO Chemical Company. Then in 1979 he was in a small-engine plane crash. He survived and decided to change the direction of his career. He received an M.B.A. degree from Wharton and became the Director of Transport and Storage Research for the Gas Research Institute. Then in 1987 he became involved in technology transfer by founding his own company, Finger Lakes Innovation Center, which assists Cornell University faculty to bring their ideas to the marketplace.

Kobetich began his presentation with some advice for UNL graduates. "Never stop learning," he urged, "you've only just begun." He advised each graduate "to understand the purpose of your efforts—don't just carry out tasks assigned to you." Finally, he noted that "what you have fun at is what you will be best at." Among his personal mottos, which he shared with the audience, is to "always look for that win-win situation in interacting with other people." Finally, he urged graduates to be flexible in their careers. The fact that they have successfully completed their present studies is an indication that they can be successful at many other kinds of tasks. Kobetich then spoke on the general topic of technology transfer and the work of his Innovation Center in particular. He emphasized that faculty have many ideas and concepts which need to be investigated for commercial potential. His company provides such studies and assists in finding space, funds, a management team, and accounting and legal services. The 3M's for success are: entrepreneurial Management, astute Marketing, and plenty of Money (seed funds).

Among other alumni who attended the Luncheon was Captain **James R. Carey** (B.S. 1964), who has served for many years with the Navy's nuclear submarine program and who is now assigned to the Navy ROTC program in Ithaca, New York.

## Marvin Scholarship Increased



*Henry H. Marvin, Sr.*

**Henry H. Marvin** was a professor of physics at the University of Nebraska from 1919 until 1952 and chairman of the Department from 1922 to 1949. After his death in 1954 his wife and children established the **Henry H. Marvin Memorial Scholarship Fund**, which has helped in the education of 38 students since that time. One of his sons, **Dr. Henry H. Marvin, Jr.**, recently retired after a 42-year career as a chemist. At the time of his retirement he was Vice President of Brunswick Corp. of Skokie, Illinois. Dr. Marvin and the Brunswick Corp. recently made gifts totaling \$20,000 to enlarge the principal of the scholarship fund named after Marvin's father. The income produced from the enlarged fund will be about three times what it previously was, allowing more and larger scholarships to be given. All six children of Prof. and Mrs. Marvin graduated from the University of Nebraska.



## Sabbatical Year Activities

Three members of the faculty were on sabbatical leave during this past academic year; Professor **Leo Sartori** for the entire year, and Professors **Kam-Ching Leung** and **M. Eugene Rudd** for the second semester. Their activities and travels were extensive and interesting.

Sartori spent July and August at the Stanford Center for International Security and Arms Control. While there, he completed his contributions to a study on the future of land-based missiles, carried out under the auspices of the Forum on Physics and Society of the American Physical Society. This study has now been published by the American Institute of Physics. He also collaborated with Sidney Drell and George Bunn on a short piece which was published as an op-ed column in the July 27, 1988 Los Angeles Times. The remainder of the year he was at the Office of Arms Control of the Department of Energy in Washington, D.C. DOE has always been responsible for nuclear weapons production and testing, but has recently become more directly involved in the formulation of defense and arms control policy. He participated in the intensive policy review conducted by the Bush Administration after it took office. After the resumption of the START negotiations, Sartori represented DOE in the working group which "backstopped" the US delegation in Geneva.

Leung's sabbatical was spent in China, Korea, Thailand, and Hong Kong. He engaged in a cooperative research project with Chinese colleagues at the Yi Culture Research Institute in southwest China. The six million people in the isolated Yi group have a very different language and cultural heritage from the rest of the country. Leung was especially interested in the astronomical aspects of the culture. For example, until recently the Yi used a 10-month calendar. Leung and his colleagues are preparing an article for the National Geographic Magazine on the Yi culture. In April he also continued his joint research project on close binary stars with colleagues at the Yunnan Observatory. He planned to return to China in June to work at the Beijing Observatory, but cancelled his trip after the Tiananmen massacre.

He spent a month at Yonsei University Observatory in Korea working on very long period contact and near contact binary systems in preparation for an international conference on close binaries which will be held in Seoul in 1990. Leung also continued work with astronomers at Chiang Mai University in Thailand, assisting them with the development of a photometer used on their 14" telescope and with plans for a 40" telescope. While at his former home in Hong Kong, Leung was able to complete three manuscripts for publication.

Rudd spent most of his semester in Lincoln, preparing for a number of trips made in the late spring and summer. In addition, he worked on several papers, including a review paper on differential cross sections for electron ejection by proton impact. He also did extensive research for the Department History Project (see article about this). In May he made visits to laboratories in Munich, Germany and in Innsbruck, Austria and gave the opening address at the Tenth Symposium on Microdosimetry held in Rome, Italy. He returned to Europe in June to present a lecture to the International Commission on Radiation Units and Measurements (ICRU), a body formed in 1925 to develop internationally acceptable recommendations on radiation units and associated data. As a result of the presentation, Rudd was commissioned by the ICRU to head an international committee to produce a comprehensive report on secondary electron emission. In July he presented a paper at the International Conference on the Physics of Electronic and Atomic Collisions in New York City. In between trips to Europe, he attended his daughter's wedding!

## Jay Gallagher Assumes New Position

Dr. **John S. Gallagher**, a former astronomy instructor at Nebraska has been appointed Vice President of the Association of Universities for Research in Astronomy (AURA). He had been the director of the Lowell Observatory since 1986 and prior to that was at the National Optical Astronomy Observatories (NOAO). AURA operates NOAO for the National Science Foundation and also the Space Telescope Institute for NASA. Gallagher was a Research Associate and Visiting Assistant Professor here from 1972 to 1974 and in 1988 he returned to Lincoln as part of a 3-man team chosen to conduct a review of the Department.

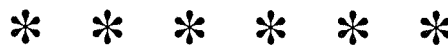
## UNL Physicists Experience California Earthquake

Four members of the Department did not know what was in store for them when they journeyed to Palo Alto, California to attend the Gaseous Electronics Conference in October 1989. Professors **Paul Burrow** and **Duane Jaecks**, Research Associate **Orhan Yenen** and Research Assistant **Paul Chu** were outside relaxing after the close of the session on Tuesday October 17 when the earthquake struck. They reported considerable difficulty staying on their feet and found it to be a very exciting experience. Burrow noticed the tops of trees and telephone poles swaying and also saw a yellow material, probably pollen from trees, being squirted up from cracks in the sidewalks where it had accumulated. Nearly a foot of water from the hotel's swimming pool sloshed out.

Although Palo Alto is situated between the earthquake's epicenter in Santa Cruz and the San Francisco-Oakland area, it suffered relatively minor damage. The electric power to the hotel where the meeting was held was out for about 8 hours, leading to the postponement of the evening poster session. Burrow found lamps and personal items scattered about in his room. On a visit a few days later to SRI, a research institute in Palo Alto, the UNL people saw the office of Dr. Roberta Saxon, a researcher who had been out of town. Most of the books and computer printouts from her shelves had been shaken off and lay in a pile on the floor. The Stanford University library was closed due to disarray of books there.

Yenen had witnessed the results of the 1977 earthquake in Bucharest, Romania, which also registered 7.0 on the Richter scale. He said that in that case, half of the city was destroyed.

The four were happy to return to Nebraska where they have "good old mother earth" to stand on and where they need worry only about tornadoes.



## deRijk Designs Microwave Sterilizer

A UNL graduate has utilized his knowledge of physics in his career in dentistry research to produce a device which may have widespread usefulness in the dental profession. **Dr. Waldemar G. deRijk** (M.S. 1970, Ph.D. 1974), a physicist and dentist at the National Institute of Standards and Technology, has designed a system to utilize a microwave oven as a sterilizer for dental and medical instruments. The method was reported in the New York Times on June 22, 1989.

Conventional sterilizers operate at 120-170° C., killing bacteria by the high temperature applied over a period of time which may be as long as 90 minutes. Unfortunately, the heat may damage some delicate instruments. So deRijk sought a method which would be faster and less likely to harm the instruments. Putting metal objects into microwave ovens normally damages the ovens, but deRijk and Dr. John A. Tesk, the head of the Institute's Dental and Medical Materials Group, came up with a way around the difficulty. They put the instruments into a glass container which is evacuated to a low pressure. In the microwave environment, there is an electrical discharge in the rarified gas which heats the instruments only to about 60° C. A treatment of about 30 seconds is sufficient in this method which, because of its lower temperature and shorter period of exposure, is suitable for use with nonmetallic instruments as well. In this method, it is the bombardment of microorganisms by ions rather than the high temperatures which produces the desired sterilization.

Dr. deRijk did his Ph.D. thesis research here with Professor **Duane Jaecks**. While his present work may seem far removed from his thesis project, which had the title "Polarized Photon Correlation Studies in He<sup>+</sup> + He Collisions," it should be pointed out that the radio-frequency ion sources used on the accelerators in the laboratory where he worked operate on a very similar principle to the one he used in his sterilizer. This is another example of the usefulness of a broad education in a basic subject such as physics.



## Schneider Discovers Most Distant Quasar

Donald P. Schneider (B.S. 1976) of the Institute for Advanced Study in Princeton, N.J., together with Maarten Schmidt of California Institute of Technology and James Gunn of Princeton University, reported in mid-November the discovery of the oldest, most distant quasar (or quasi-stellar object) yet found in the Universe. It is located 14 billion light years from Earth in the constellation Ursa Major. The discovery was made with the 200-inch Hale Telescope at Palomar Observatory, which is near San Diego. A detailed report on the discovery is scheduled for the December issue of the *Astrophysical Journal*.

The significance of the discovery is that it indicates the Universe developed its current "clumpy" structure of stars and galaxies much sooner after the Big Bang than previously expected. Assuming an age of the Universe of 15 billion years, this quasar was formed only 1 billion years later. This is more than 2 billion years sooner than previously expected. This discovery will therefore require cosmologists to revise their theories on the evolution of the Universe after the Big Bang.

## UNL Graduates Involved in Neptune Project

The recent visit of the Voyager probe to the planet Neptune was one of the great scientific events of the year. Two University of Nebraska graduates, **Raymond Achey** (B.S. 1979, Engineering) and **Bruce Waggoner** (B.S. 1984, Astronomy) were deeply involved in that mission. Achey was the engineer for Voyager's power subsystem, while Waggoner was a science sequence designer who helped design computer instructions to operate Voyager's scan platform, where the four remote sensing instruments are mounted to take visible light pictures as well as infrared and ultraviolet images of Neptune and Triton. Achey and Waggoner, who knew each other as students, both work at the Jet Propulsion Laboratory at Pasadena, California.

## DuBois Awarded Fulbright Fellowship

Dr. **Robert D. DuBois** (B.S. 1970, M.S. 1972, Ph.D. 1975) has been granted a Fulbright fellowship for the 1989-90 academic year to do research in atomic physics at the University of Frankfurt, Germany. DuBois is a physicist at Battelle Pacific N.W. Laboratories in Richland, Washington where he has been since 1981. His research adviser for his Ph.D. was Professor **M. Eugene Rudd**. DuBois has held postdoctoral research appointments at the Joint Institute for Laboratory Astrophysics in Boulder, Colorado, at the University of Aarhus in Denmark, at the Hahn-Meitner Institute in Berlin, and at Kansas State University before going to Battelle. As it turned out, Rudd was at Battelle on a leave when DuBois started work there, and they collaborated on several projects.

DuBois will be working with Dr. Horst Schmidt-Böcking in Frankfurt on multiple ionization experiments. Schmidt-Böcking has been a recent visitor to the Department. Interestingly, he found during his visit that he was related to Emeritus Professor **Henry Holtzclaw** of the Chemistry Department.

## Honorary Degree Awarded to Stuart Nelson

At its May 13, 1989 commencement, the University of Nebraska awarded the honorary degree of Doctor of Science to **Dr. Stuart O. Nelson** (M.S. 1954). Nelson, a native of Pilger, Nebraska, is a research agricultural engineer with the USDA Agricultural Research Service in Athens, Georgia. In addition to his master's degree in physics, he holds bachelor's, master's, and doctor's degrees in agricultural engineering. Some of his many achievements have been reported in previous issues of the *Spectrum*. He has, eg., pioneered the measurement of dielectric properties of grain and seed and has shown that exposure of seeds to RF fields could improve the germination of several crop species. This is yet another example of the many applications of physics in other fields.

## Boating Accident Claims the Life of Allen Blocher

**Allen Blocher** (M.S. 1958) and his two sons John and Steven drowned in a boating accident on the Wisconsin River in June 1989. They were crossing the rain-swollen river just above a spillway in a 12-foot fishing boat and were evidently unable to overcome the strong current. Blocher was an associate professor of physics and astronomy at the University of Wisconsin-Stevens Point where he had been on the physics faculty since 1958. Actively involved in the use of computers in physics instruction, he was also instrumental in organizing the campus planetarium and was its director. He also served in a variety of offices in faculty government at Stevens Points.

## Acknowledgments

The Department is very grateful to the following individuals and corporations for their new and continuing financial contributions during the period 1 October 1988-30 September 1989. These contributions have been made in support of major items of capital equipment, 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 them 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 to which account the money is intended. Those contributors whose employers have a matching gift program should indicate this.

### Anonymous

**William A. Barrett, Jr.** (B.S. 1952, M.S. 1953)

**Thomas E. Bullock** (M.S. 1979)

**Louis J. Caplan** (M.S. 1964, Ph.D. 1975)

**CBS Inc.**

**Mr. & Mrs. James C. Coe**

**Robert D. Dubois** (B.S. 1970, M.S. 1972, Ph.D. 1975)

**Daniel E. Dunn** (B.S. 1984 Engineering Physics)

**Exxon Corp.**

**C. Fred Gayton**

**Richard Gleeson** (B.S. 1967)

**Donald L. Hagrman** (B.S. 1962)

**Alan J. Heeger** (B.S. 1957)

**Gregory G. Henry** (B.S. 1972)

**IBM Corp.**

**ISCO Inc.**

**Mr. & Mrs. Paul J. Marquard** (M.S. 1976)

**Mr. & Mrs. Charles B. Minnich** (B.Sc. EE. 1937)

**Burton E. Moore**

**NCR Foundation**

**Mr. & Mrs. Joseph L. Parker** (Ph.D. 1940 Chemistry/Physics)

**Perkin-Elmer Corp.**

**Gail R. Quackenbush** (B.S. 1972)

**Rebecca Richards-Kortum** (B.S. 1985)

**Rockwell International**

**Jerry E. Ruckman** (B.S. 1962)

**M. Eugene Rudd** (Ph.D. 1962)

**James J. Schmidt** (B.S. 1956, M.S. 1957)

**David S. Sellmyer**

**James E. Shewmaker** (Ph.D. 1951 Chemistry/Physics)

**Charles E. Skov** (Ph.D. 1963 Physics/Math)

**Anthony F. Starace**

**Terry J. Teays** (Ph.D. 1986)

**Bruce C. Waggoner** (B.S. 1984)

**Mrs. Rebecca Willman**

## We Heard From . . .

- Ahmed, Mohammed**, (M.S. 1970, Ph.D. 1984) Pespur House, 8 Tilak Marg, Lucknow, 226001, India. Is a Visiting Associate with Thapar Corporate R & D Centre. Enjoyed receiving *SPECTRUM* this year.
- Allen, Glenn** (B.S. 1989) 8767 Contee Rd., Apt. #401, Laurel, MD 20708. Is a graduate student at the University of Maryland.
- Bruegman, Otto** (B.S. 1984, M.S. 1987) 9931 Good Luck Rd., Apt. #201, Seabrook, MD 20706. Is a Staff Engineer with CTA, Inc. "I recently resigned from spacecraft operations at NASA's IUE Observatory to start work on the Space Telescope Data Archive and Distribution System (ST-DADS). I am currently working on systems design requirements and will start working on system validation and verification when the prototype is developed this summer."
- Carey, James R.** (B.S. 1964) 121 Birchwood Dr., Ithaca, NY 14850. After serving with the Navy's nuclear submarine program for many years, Carey is now involved with the Navy's ROTC training programs.
- Chakrabarti, Swapan** (M.S. 1982) 4023 Parkway Ct., Lawrence, KS 66046. Is an Assistant Professor in the Department of Electrical and Computer Engineering at the University of Kansas. "Thanks for sending me *SPECTRUM*. It provides a good overview of the current activities of the Department."
- Chasson, Robert L.** (Former Professor, 1951-1962) 3255 So. Albion St., Denver, CO 80222. Professor Emeritus. "Yes, Jean Claire Davis was the first woman major and successfully resisted all of my pleading to become its first woman graduate student. I was ahead of my time, I guess! All the best."
- Cooke, David B.** (B.S. 1983) received the Ph.D. degree in Applied Mathematics from the University of Minnesota this year.
- Crooks, Geoffrey B.** (B.S. 1965, M.S. 1967, Ph.D. 1972) 417 So. Cotner Blvd., Lincoln, NE 68510. Is Corporate Vice President for Engineering with Spectrum Inc. "I retired from ISCO, Inc., in September 1988. My retirement lasted only 3 months. My new position involves quite a bit of travel [to cover] 8 divisions spread from Houston, Dallas, San Diego, and Los Angeles to Portland Oregon.
- Eby, Harold H.** (Ph.D. 1949 Chemistry/Physics) 2521 Bluestem, Ponca City, OK 74604. He retired in May 1985 from the Research and Development Division of CONOCO Inc. He was the Director of the Corporate Services Section, which comprises groups in Radiochemistry, Environmental Research and the R & D Library.
- Eddy, Stephan M.** (B.S. 1978) 2780 Forest Pt., League City, TX 77573. Is a Test Project Engineer with Schlumberger. "Doing well in the oil patch. I don't like Texans, so I married one (Elizabeth) 4 years ago! She's an Aggie: she didn't know any better . . ."
- Fox, David H.** (B.S. 1985, M.S. 1988) 705 W. 27th St. South, Apt. #201, Wichita, KS 67217. Is an Engineer with Boeing Military Airplane Plant. "I am working in the Operations Analysis group doing mathematical modeling and computer simulations. The first model I'm working on is intended to assess the effects that different fighter planes can have on ground battles."
- Gibson, Richard A.** (B.S. 1965) 19916 Donora Ave., Torrance, CA 90503. Is a Physicist with Airesearch Corporation.
- Gray, David M.** (B.S. 1977) 1413 Northgate Sq., Apt. #2A, Reston, VA 22090. Staff Scientist with CTA, Inc. He finished a Ph.D. in Computer-Based Education at the University of Illinois in 1987 and has since been working in McLean, VA designing computer-based training software.
- Gustavson, David B.** (B.S. 1962) 1946 Fallen Leaf Lane, Los Altos, CA 94022. Staff Member, Computation Research Group with the Stanford Linear Accelerator Center. "After getting my Ph.D. at Stanford in 1969 in Elementary Particle Physics, I continued as a staff member in an experimental physics group for about 10 years, then followed my interests across the street to Computation Research. I work mainly on design of high performance computer bus standards, like IEEE 960 Fastbus, IEEE896.1 Futurebus, etc., and am now leading [work on the] IEEEEP1596 Scalable Coherent Interface [which will handle] 1 GByte/sec for each of 64K processors if we succeed in reaching our declared goal! (We will!). I'm also an associate editor of IEEE Micro, and do some desktop publishing for fun.
- Hornady, Robert (Bear) S.** (B.S. 1962, M.S. 1968) 1437 Lillian St., Livermore, CA 94550. Is a Senior Scientist at Lawrence Livermore National Laboratory. "My greetings to all my old friends at the University of Nebraska. I am now the facility manager of the 100 MeV electron LINAC. Other experimenters are welcome. I am also working on an experiment searching for free quarks in matter."
- Jeane, Theresa** (B.S. 1988) 27 Titan, San Pedro, CA 90732. Is a Senior Analyst with Arinc Research Incorporated.
- Li, Yan-Feng** (M.S. 1984, Ph.D. 1986) 1519 F St. #2, Lincoln, NE 68508
- Meyer, Kurt** (B.S. 1988 with High Distinction) 211 B Windsong Lane, Hampton, VA 23666. He has accepted a Graduate Research Scholar Assistantship in Astronautics at the Joint Institute for Advancement of Flight Sciences in Hampton, Virginia. This is a joint program between the George Washington School of Engineering and the NASA Langley Research Center. He spent the summer on an atomic physics research project in Bonn, West Germany. "I would like to thank the Physics Department for preparing me well as an undergraduate."
- Minnich, Charles B.**, 5120 Monet Ave., Orlando, FL 32812-1049. "[I was] very pleased to see the Telescope article in the recent *SPECTRUM*."
- Schlitt, Dan** (Former Professor 1964-1986) 445 Broadway Apt. #3-I, Hastings Hudson, NY 10706. Science Division Computer Facility Administrator with the City College of New York. "My second year in this new position is about over. The work continues to be challenging and rewarding. I look forward to connecting the facility to the Enternet in the near future. Not being connected allowed us to avoid the "worm," but not the problems of patching the relevant software. Attending the celebration for A. Pais at Rockefeller University brought back many memories of the past three decades of particle physics. Saw Larry Boyer [M.S. 1968, Ph.D. 1970] when he was here last spring.
- Schneider, Donald P.** (B.S. 1976, Ph.D. Cal. Tech.) is at the Institute for Advanced Study at Princeton, New Jersey. He married Jet de Zeecen from Holland on Sept. 11, 1989.
- Schuldts, Ted** (B.S. 1959, M.A. 1961) 3936 N. Verde Vista Drive, Thousand Oaks, CA 91360. Is a Project Engineer and product team leader for the Space Shuttle Main Engine Avionics and Controls at the Rocketdyne Division of Rockwell International. His daughter Julie Doerr (B.S. 1987), son-in-law David Doerr (B.S. 1987) and brother-in-law Sanford Shuster (B.S. 1960, M.S. 1963, Ph.D. 1969) are also department graduates.
- Schuck, Elmer (Jim)** (B.S. 1961) 20 Vine Circle, Whitesboro, NY. Sub-section Manager in Engineering at General Electric Co.
- Smith, Andrew Nowell** (A.B. 1947 Physics/Math) Star Rt 1 Box 33, Eldridge, MO 65463-9602. Consulting Engineering Physicist. Has just completed a high voltage and electronic design for a new low frequency communication transmitting antenna system to be constructed for the Naval Facilities Engineering Command, at Niscemi, Sicily. Construction is to be started in fiscal year 1990.
- Stepp, Robert E.** (A.B. 1970) Backman Institute for Advanced Science and Technology, 405 N Mathews, Urbana, IL 61801. Is an Assistant Professor in the Department of Computer Science at the University of Illinois.
- Suemitsu, Hidetoshi** (Former Staff) 38-407 Oshima, Momoyama, Fushimi, Kyoto 612, Japan. Research Associate at Kyoto University. "Thank you for sending me the *SPECTRUM*. It was very interesting and I was glad to learn of recent activities."
- Sullivan, George A.** (Ph.D. 1964) 4202 Kota Avenue, Harrisburg, PA 17110. Statistical Analyst for the State of Pennsylvania. Is currently an expert on the design of parole decision guidelines, risk classification, SPSS computer statpacks, etc.
- Wade, Theodore E.** (M.A. 1962) Gazelle Publications, 5580 Stanley Dr., Auburn, CA 95603. Self-employed. "Although now far removed from the study of physics, it's nice to get the Newsletter and remember past endeavors. I see that the big lecture room has a fresh new look. Actually the antique meters, etc., made it special too. Do teachers of beginning physics still get brave students to stand with the back of their head against the chalkboard and pull the ball of the pendulum up to their nose, then release it? I now am writing and publishing. The 3rd Edition of *Home School Manual* is now out."
- Zeidler, James R.** (Ph.D. 1972) 11829 LaColina R., San Diego, CA 92131. Scientist at the Naval Ocean Systems Center. "In November I started a new position as Adjunct Professor in the Ultra-High Speed Integrated Circuits and Systems Research Group of the Department of Electrical Engineering and Computer Science at the University of California at San Diego. I was also appointed as one of the U.S. members of the US/UK/Australia/Canada panel on Satellite Communications in conjunction with my full time job in the Satellite Systems and Technological Division of the Naval Ocean System Center."

# THE RECORD

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

No. 5 Fall 1989

Anthony F. Starace, Editor

## 1988-89 Degree Recipients

### *Bachelor of Arts*

**Tony C. Robak** (May 1989). Has joined the U.S. Navy and is stationed at the Great Lakes Naval Training Center in Chicago.

### *Bachelor of Science*

**Leif E. Johnson** (December 1988). Is an accelerator systems operator at Stanford Linear Accelerator Center in Menlo Park, CA.

**Kurt W. Meyer** (with High Distinction, December 1988). Has enrolled in the graduate program in astronautics at the Joint Institute for Advancement of Flight Sciences in Hampton, Virginia.

**Linda S. Nettland** (December 1988). Is job hunting.

**Glenn E. Allen** (May 1989). Has enrolled in the graduate physics program at the University of Maryland.

**Kevin G. Bailey** (May 1989). Is working at Argonne National Laboratory.

**Levio J. Orsi** (May 1989). Manager of Kinko's in Lincoln.

**Jay R. Pralle** (May 1989). Has enrolled in the graduate music program at UNL.

**Lisa Wiese** (May 1989). Has enrolled in the graduate physics program at UNL.

**Bradley A. Gross** (Astronomy, August 1989). Is applying to graduate school.

### *Master of Science*

**David H. Fox** (December 1988). Is an engineer with Boeing Aircraft Co. in Wichita, Kansas working in the Operations Analysis Group.

**Nijanand G. Haridas** (December 1988). Is in the graduate physics program at UNL.

**Hanumantha R.V. Mantrala** (December 1988). Has returned home to India.

## 1988-89 HONORS

### *1988-89 Fellows*

**Brian Moudry**  
**Zheng Sheng Shan**  
**Zueyin Shi**

Avery Teaching Fellow  
Presidential Fellow  
Johnson Fellow

### *1988-89 Scholarships*

**Glenn Allen**  
**Toby Brown**  
**Timothy Goeke**  
**Bradley Jacobsen**  
**Kevin Larsen**  
**Kurt Meyer**  
**Christopher Potter**  
**Giles Schildt**  
**Eileen Shavilk**  
**Lisa Wiese**

U.S. Harkson Scholarship  
Physics & Astronomy Alumni Sch.  
Joel Stebbins Scholarship  
U.S. Harkson Scholarship  
Joel Stebbins Scholarship  
Henry H. Marvin Scholarship  
U.S. Harkson Scholarship  
Joel Stebbins Scholarship  
Joel Stebbins Scholarship  
John E. Almy Scholarship

*1989 Departmental Distinguished Teaching Assistant Awards*  
**Nijanand Haridas** **K.A. Fernando**

*1988 Department of Energy Certificate of Appreciation*  
**Robert Katz**

*1989 Outstanding Research and Creative Activity Award*  
**John R. Hardy**

*1989 Burlington Northern Outstanding Teacher-Scholar Award*  
**Duane H. Jaecks**

### *1988-89 Society for Physics Students Officers*

**Lisa Wiese**, President **Scott Wesely**, Vice President  
**Glenn Allen**, Secretary **Jane Peterkin**, Treasurer

## 1989-90 Visiting Staff Members

Visiting our Department in Academic Year 1989-90 as a Visiting ADAPT Fellow is **John Ricketts** (Ph.D. 1953, Case-Western Reserve University), Simeon Smith Professor of Chemistry, DePaul University, Greencastle, Indiana.

On our staff as Visiting Professors this year are experimental atomic physicist **Sam J. Cipolla** (Ph.D. 1969, Purdue) from Creighton University; and condensed matter theorist **John Flocken** (Ph.D. 1969, Nebraska) from the University of Nebraska-Omaha.

Visiting Associate Professor this year is elementary particle theorist and computational physicist **Glen A. Sowell** (Ph.D. 1982, Florida State) from the Supercomputer Computations Research Institute at Florida State.

Visiting Assistant Professor this year is experimental condensed matter physicist **Charles G. Robbins** (Ph.D. 1969, Illinois).

In our Department as Postdoctoral Research Associates this year are experimental condensed matter physicist **David Billesbach** (Ph.D. 1987, Nebraska), working with Professors J. Hardy and Ullman; theoretical atomic physicist **Ning-Yi Du** (Ph.D., 1989, LSU), working with Professor Starace; experimental atomic physicist **Mark Gealy** (Ph.D. 1987, Denver), working with Professor Rudd; theoretical atomic physicist **Chih-Ray Liu** (Ph.D. 1988, Nebraska), working with Professor Starace; theoretical condensed matter physicist **Lu Hsiao-Ming** (Ph.D. 1988, Arizona State), working with Professor J. Hardy; experimental condensed matter physicist **Anthony S. Nazareth** (Ph.D. 1988, Kansas State), working with Professor Sellmyer; theoretical atomic physicist **Cheng Pan** (Ph.D. 1988, Virginia), working with Professor Starace; experimental condensed matter physicist **Jian Xiang Shen** (Ph.D. 1984, Lanzhou University, China), working with Professor Sellmyer; and experimental atomic physicist **Orhan Yenen** (Ph.D. 1986, Nebraska), working with Professor Jaecks.



## 1988 Fall Semester Colloquia

- September 22: Professor Wai-Yim Ching, MASUA Honor Lecturer, The University of Missouri-Kansas City  
**"Optical Properties of High Temperature Superconductors"**
- September 29: Dr. Klaus H. Berkner, Director, Accelerator & Fusion Research Division, Lawrence Berkeley Laboratory  
**"Atomic Physics Experiments with High Energy Heavy Ion Beams"**
- October 6: Dr. Clifford Bettis, University of Nebraska-Lincoln  
**"Some Interesting Physics Demonstrations"**
- October 13: Professor Richard C. Lamb, MASUA Honor Lecturer, Iowa State University  
**"High Energy Gamma Ray Astronomy"**
- October 20: Professor Koichi Ogura, Nihon University, Japan  
**"Searches for GUTs Monopoles with Track-Etch Detectors"**
- October 31: Professor James F. Williams, University of Western Australia  
**"Structure of Atoms in Solids"**
- November 3: Professor Frank Peterson, Iowa State University  
*The Jerry E. Ruckman Lecture:*  
**"Laboratories and Computers in Physics Instruction"**
- November 10: Dr. Richard J. Hughes, Los Alamos National Laboratory  
**"The Search for New Gravitational Forces"**
- November 17: Professor Bernard R. Cooper, West Virginia University  
**"Predicting Magnetic and Charge Instabilities in Solids"**
- December 1: Professor Mark A. Samuel, MASUA Honor Lecturer, Oklahoma State University  
**"Symmetry in Nature"**
- December 8: Professor John R. Hardy, University of Nebraska-Lincoln  
**"A Possible Origin of High Temperature Superconductivity"**
- December 15: Dr. Jorge Sahade, MASUA Distinguished Foreign Scholar, University of LaPlata  
**"Interacting Binaries"**

## 1989 Spring Semester Colloquia

- January 12: Drs. Ton Ellermmeijer and Cees Mulder, Department of Physics Education, University of Amsterdam  
**"Using Computers in Physics Curricula"**
- January 19: Professor Stephen R. Lundeen, University of Notre Dame  
*The ISCO, Inc. Lecture:*  
**"Spectroscopy of High L Rydberg States of H<sub>2</sub>: A Sensitive New Probe of the H<sub>2</sub><sup>+</sup> Molecular Ion"**
- January 26: Professor Glenn A. Sowell, University of Nebraska-Lincoln  
**"Physics on a Computer: A Symbolic Approach"**
- February 2: Professor Norman Simon, University of Nebraska-Lincoln  
**"RR Lyrae Stars as a Key to the Age and Evolutionary History of the Galaxy"**
- February 9: Professor Radford Byerly, MASUA Honor Lecturer, Center for Space and Geoscience Policy, University of Colorado-Boulder  
**"Space Policy and the Challenger Accident: Was the Accident Foreordained in the 70's?"**
- February 16: Dr. Ilya Fabrikant, University of Chicago  
**"Photodetachment of Negative Ions in a Stark Field"**
- February 20: Dr. Michael Cavagnero, University of Nebraska-Lincoln  
**"The Sizes, Shapes, and Modes of Small Atoms and Molecules"**
- February 23: Dr. Klaus Bartschat, Drake University  
**"Atomic Collision Processing—Looking Beyond Cross Sections"**
- February 27: Dr. Robert Potvliege, University of Southern California  
**"Second Order, Eikonal, and Optical Model Theories of Electron-Atom Scattering at Intermediate Energy"**
- March 2: Dr. Steven Blundell, University of Notre Dame  
**"The Relativistic Atomic Many-Body Problem"**
- March 9: Professor Michael S. Lubell, City College of the C.U.N.Y.  
**"Polarized Electron Physics"**
- March 16: Professor John W. Clark, Washington University—St. Louis  
**"Neural Networks and the Brain: A New Challenge for Theoretical Physics"**
- March 17: Professor Robert Devaney, Boston University  
**"Exploding Julia Sets"**
- April 6: Professor Carl Rau, Rice University  
**"Novel Studies of Spin-Polarized Electrons Emitted During Grazing Ion Reflection at Magnetic Surfaces"**
- April 13: Professor Robert P. Kirschner, Harvard Smithsonian Center for Astrophysics  
**"Supernova of a Lifetime"**
- April 20: Dr. Hanspeter Helm, SRI International  
**"Stable and Unstable Configurations of Three Protons and Three Electrons"**
- April 21: Dr. Joseph Woods, Massachusetts Institute of Technology  
**"Surface Magnetron Measured with Spin-Polarized Low Energy Electrons"**
- April 27: Professor James A.R. Samson, University of Nebraska-Lincoln  
**"Photoionization: Its History and Applications"**
- May 1: Dr. Robert Johnson, California Institute of Technology  
**"Stages in the Amorphization Reaction of Compositionally Modulated Thin Films of Elemental Cu and Y"**
- May 3: Dr. Alan Wachs, Lawrence Livermore National Laboratory  
**"Positron Annihilation Studies of the Electronic Structure of High T<sub>c</sub> Superconductors and Related Materials"**
- May 8: Dr. J. Raynien Kwo, AT&T Laboratories  
**"Low-Dimension Structured Materials Produced by Molecular Beam Epitaxy: From Magnetic Heterostructures to High T<sub>c</sub> Oxide Thin Films"**

# 1988 Faculty Publications

## ASTRONOMY AND ASTROPHYSICS

- X.F. Liu, H.S. Tan and K.C. Leung, "UBV Observations of a Short Period Binary: V392 ORI ONIS," *Astrophysics and Space Science* 141, 21-25 (1988).
- K.C. Leung, "Observational Approach to Close Binary Evolution," in *Critical Observations vs. Physical Models on Close Binary Systems*, edited by K.C. Leung (New York: Gordon and Breach, 1988), p. 93-130.
- G.J. Qiao and K.C. Leung, "A Photometric Study of Starspots and Gaseous Streams in the Systems of YY GEM ER VUL, U HER and SZ CAM," in *Critical Observations vs. Physical Models on Close Binary Systems*, edited by K.C. Leung (New York: Gordon and Breach, 1988), p. 61-76.
- X.F. Liu, K.C. Leung and H.S. Tan, "Photometric Studies of Eclipsing Systems BD + 37°2356 and V392 ORI," in *Critical Observations vs. Physical Models on Close Binary Systems*, edited by K.C. Leung (New York: Gordon and Breach, 1988), p. 247-256.
- H.N. Zhou and K.C. Leung, "The Influence of Radiation Pressure on Equipotential Surfaces in High-Temperature Binary Systems," *Astrophysics and Space Science* 141, 257-271 (1988).
- K.C. Leung, "Early-Type Systems," in *1988 IAU Transactions: Reports on Astronomy*, edited by J.P. Swings (Dordrecht: D. Reidel, 1988) p. 582.
- K.C. Leung, "W UMA Systems," in *1988 IAU Transactions: Reports on Astronomy*, edited by J.P. Swings (Dordrecht: D. Reidel, 1988) p. 586.
- Q.Y. Liu, Y.L. Yang, K.C. Leung, D.S. Zhai, and Y.F. Li, "ER ORIONIS: A Unique Almost Contact W UMA System," *Astronomy and Astrophysics Supplement Series* 74, 443-448 (1988).
- X.F. Liu, K.C. Leung, and H.S. Tan, "Observation on the Study of IU Aurigae," *Acta Astronomy* 29, 168 (1988).
- Z.F. Li, K.C. Leung, and Y.R. Ding, "Long-Period Contact and Semi-detached Systems: 5 CETI, CoD-3005135, and HD 104901B," *Acta Astronomica Sinica* 29, 374-380 (1988).
- Z.Y. Li and K.C. Leung, "Supergiant Close Binary Systems," *Vistas in Astronomy* 31, 313-316 (1988).
- E.G. Schmidt, "Cepheids," in *1988 IAU Transactions: Reports on Astronomy*, XXA, 263 (1988).
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- N.R. Simon, "The Fourier Decomposition Technique: Interpreting the Variations of Pulsating Stars," in *Pulsation and Mass Loss in Stars*, edited by R. Stalio and L.A. Wilson (Dordrecht: D. Reidel), p. 27.
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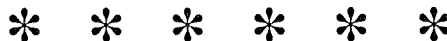
## INTERDISCIPLINARY PHYSICS

### (a) History of Science

- M.E. Rudd, "The Rainbow and the Achromatic Telescope: Two Case Studies from the History of Optics," *The Physics Teacher*, February 1988, pg. 82-89.

### (b) Track Physics

- W. Hofman, R. Katz, and Zhang Chunxiang, "Reply to Lung Cancer Risk from Rn in Chinese Study," *Health Physics* 54, 221-227 (1988).



## New Research Grants and Contracts

During the period 1 November 1988—31 October 1989 the following new and renewal external grants and contracts were received by our faculty:

Principal Investigator	Title (Source of Funds)	Amount (\$ Thousands)
P.D. Burrow	Electron Scattering Studies of Temporary Anion Formation in Hydrocarbons (NSF)	\$ 74.0
R.G. Fuller	Bridges, Bicycles, and Traffic: Thematic Physical Science Lessons (NSF)	\$ 57.4
R.G. Fuller	National Interactive Media Project for Secondary Physical Science (Department of Education)	\$ 95.5
R.G. Fuller	Physics Vignettes (J. Wiley & Sons)	\$ 14.5
R.G. Fuller	Transforming Physics Content Using New Technologies: A Leadership Development Workshop (NSF)	\$113.0
J.R. Hardy/ F.G. Ullman	Incommensurate Phases and Superlattice Production (ARO)	\$130.0
J.R. Hardy	Theoretical Studies of Fundamental Lattice Absorption in Highly Transparent Solids (ONR)	\$103.7
D. Jaecks/ M.E. Rudd	Inelastic Processes in Atomic Collisions (NSF)	\$321.0
D. Jaecks	Experimental Tests of Excitation Mechanisms for keV Ion-Molecule Collisions (NATO)	\$ 6.0
R. Katz	Theory of Relative Biological Effectiveness (DOE)	\$ 47.0
K.C. Leung	Contact and Semidetached Systems of Case B Mass Exchange (NSF)	\$ 14.0
S.H. Liou	Superconductivity (NASA)	\$ 10.1
S.H. Liou	Equipment for Superconducting and Magnetic Thin Film Research (UN Foundation)	\$ 28.2
J.A.R. Samson	Interaction of Radiation with Planetary Gases (NASA)	\$ 39.2
J.A.R. Samson	Photoionization Studies of Atoms (NSF)	\$ 85.0
E.G. Schmidt	Survey of Poorly Studied Variable Stars (NSF)	\$ 54.5
D.J. Sellmyer	Fundamental Studies of Strongly Magnetic Rare Earth-Transition Metal Alloys (DOE)	\$ 59.7
D.J. Sellmyer	Magnetic Properties and Anisotropy in Rare Earth Metal Multilayered Films (NSF)	\$ 23.9
D.J. Sellmyer	Magnetic Characterization of Particulate Coatings (CDC)	\$ 30.0
D.J. Sellmyer	Magnetism and Magneto-Optics of Artificially-Structured Materials (NSF)	\$ 66.5
D.J. Sellmyer	Vacuum Sputtering Chamber (3M)	\$120.0
D.J. Sellmyer/ J.A. Woollam	Physics of Compositionally-Modulated Disordered Magnetic Films (NSF)	\$ 60.0
A.F. Starace	Dynamics of Collision Processes (DOE)	\$ 62.0
A.F. Starace	Dynamics of Photon-Atom Interactions (NSF)	\$ 50.0
J.W. Weymouth	Cheney Creek Project (University of North Dakota)	\$ 1.0
TOTAL		\$1,731.2

## Faculty Professional Activities

In addition to service on Departmental, College, and University-wide committees, for 1989-90 a number of the faculty are active in local, national, and international professional activities, as follows:

**Clifford L. Bettis:** Board of Directors, Lincoln Children's Museum; Physics Instructional Resource Association.

**William B. Campbell:** Western SSC Coalition; Organizing Committee, Western Education, Science, & Technology Association (WESTA).

**Robert G. Fuller:** Author, Ask the Medium Column, AAPT Announcer; Editor, AAPT Instructional Materials Center; Member, AAPT Publications Committee; Member, Journal of College Science Teaching, Editorial Review Board.

**John R. Hardy:** Consultant, Lawrence Livermore National Laboratory.

**Robert J. Hardy:** Consultant, Lawrence Livermore National Laboratory.

**Duane H. Jaecks:** National Research Council Graduate Fellowship Evaluation Panel for Physics and Astronomy.

**Robert Katz:** Scientific Committee, 15th International Congress on Nuclear Track Detectors, Marburg, Germany, September 1990.

**Kam-Ching Leung:** Chrétien International Research Grant Committee of the A.A.S.; Organizing Committee, Commission 38 (Exchange of Astronomers), I.A.U.; Organizing Committee, Commission 42 (Close Binary Stars), I.A.U.; Co-Chair, Planning Committee, I.A.U. Symposium/Colloquium on Close Binary Stars, Argentina, 1991; Editorial Board, Chinese Astronomy and Astrophysics (Pergamon Press).

**M. Eugene Rudd:** Organizational Committee, Conference on the Application of Accelerators in Research and Industry; Chairman, Report Committee, International Commission on Radiation Units and Measurements; Chairman, Fellowship Committee, Division of Atomic, Molecular, and Optical Physics of the American Physical Society.

**James A.R. Samson:** Accelerator and Fusion Research Division Review Committee (Lawrence Berkeley Laboratory); Nominating Committee, APS Division of Atomic, Molecular & Optical Physics; Program Committee, 6th National Conference on Synchrotron Radiation Instrumentation; X-Ray and Ultraviolet Techniques Committee, Optical Society of America.

**Leo Sartori:** Consultant, Department of Energy.

**David J. Sellmyer:** Program Committee, Magnetism & Magnetic Materials Conference; Board of Directors, Michigan State University, Physics and Astronomy Alumni Association.

**Anthony F. Starace:** General Committee, International Conference on the Physics of Electronic and Atomic Collisions; Vice Chairman, APS Division of Atomic, Molecular and Optical Physics.