Dowben, Gay, and Snow Join Department

Three new junior experimental faculty joined the Department this fall. These hires bring the number of experimental physics faculty in the Department to twelve, or about half the physics faculty. This increase from seven physicists ten years ago has required finding space for five new laboratories in the Department, as well as offices for laboratory-related students and postdoctoral researchers. Doing so has been an arduous and time-consuming effort, enabling separate building modification projects over a ten-year period. The result, however, is that we are becoming a more "normal" Department of Physics and Astronomy with a much wider range of experimental programs.

Associate Professor Peter A. Dowben in a condensed matter/atomic physicist who holds a joint appointment in the Department and in the Center for Materials Research and Analysis. He received his B.A. in 1973 from Harvard College and his Ph.D. in 1981 from Cambridge University in the U.K. Following a three-year postdoctoral stint at the Fritz-Haber-Institut in Berlin, Dowben was an Assistant and then an Associate Professor at Syracuse University before coming to Nebraska. He won a Sigma Xi Outstanding Faculty Research Award in 1989 and has authored over 140 research articles and submitted 3 patents. His research is supported by several sources of funding, including NSF, DOE, IBM, and APOSS. Dowben's research interests include metallic and magnetic properties of thin films as well as novel cluter structures.

Professor Timothy J. Gay is an atomic physicist who was hired to fill the vacancy left when Professor M Eugene Rudd retired this year. He received his B.S. in 1975 from California Institute of Technology and his Ph.D. in 1980 from the University of Chicago. Following a three-year appointment as a lecturer and assistant professor at Yale, in 1983 Gay joined the University of Missouri—Rolla, where he rose through the ranks to become a Professor of Physics. In 1992, Gay moved to his current position at UNL. Gay has won numerous outstanding teaching and outstanding faculty awards. His research interests are fundamental atomic collision processes, particularly regarding spin-dependent effects, as well as the development of polarized electron technologies. Gay is chairing a conference in May 1994 to be held in honor of M. Eugene Rudd's contributions to atomic collision physics.

Associate Professor Gregory R. Snow is a high-energy physicist hired to form an experimental group in this field at Nebraska. Snow received his A.B. degree from Princeton in 1976 and his Ph.D. in 1983 from The Rockefeller University. Following a postdoctoral appointment at Rockefeller, Snow joined the faculty at Michigan in 1987. He was awarded an NSF Presidential Young Investigator in 1988. Snow is a leading member of the D0 experiment at Fermilab. Among the goals of this experiment is the search for the top quark. Snow is a leader in a high-energy physics group studying products of proton-proton and proton-antiproton collisions. Snow has also been active in physics education programs at the SCITech museum in Aurora, Ill, and at the Hands-On museum in Ann Arbor, an avid runner, he ran recently in the New York Marathon.

Hardy Named George Holmes Professor

Professor John R. Hardy, a native of Great Britain and a scholar of the Department faculty since 1987, was named George Holmes Professor of Physics in September. He was recommended for this honor by the Distinguished Professorships Committee upon nomination by Professors David J. Bellmeyer and Anthony R. Marace. Hardy is a noted theoretical solid state researcher in the areas of lattice dynamics and statics of solids, the principle of instant symmetry, and the origin of high temperature superconductivity. Hardy has an outstanding record of training graduate and postdoctoral students and collaborating with other scientists. His students have gone on to distinguished careers in theoretical condensed matter physics. He is also noted for his collaboration with experimentalists.

Hardy's demonstration that he could exhibit such properties as effective Debye temperatures and moments of the lattice vibrational spectrum made him an international authority in the field of lattice dynamics, a field in which he has been active for many years. In 1997 he co-authored a book with A.M. Korn called, The Lattice Dynamics of Atlas Halide Crystals.

For seven years, Hardy, in collaboration with one of his former students, UNESCO Regional Professor J.W. Fitchen (Ph.D. 1983), went a long way toward developing a new theory of high temperature superconductivity, one of the outstanding problems in condensed matter physics. The standard theory places an upper limit on the transition temperature of superconductors which is much lower than the temperatures achieved experimentally. Hardy and Fitchen proposed a novel mechanism, a double-well potential, which leads to a radically higher predicted transition temperature for the superconducting phase transition. While it is too early to know the final outcome of the proposed theory, it has received support from Dr. Muller, Dr. who won the 1987 Nobel Prize in physics for discovering this effect experimentally.

Physics Laboratory Manager Hired

Vicki L. Plano (M. Illinois State University 1995) has been hired as the new physics laboratory manager. Vicki is a native of Lakeview, Michigan, and is a physics graduate of Lakeview High School. She comes to UNL after a year as a research assistant in experimental atomic physics at Western Michigan University. Vicki has a strong interest in physics education and outreach programs. Her experiences with the Science Theatre group at MUSC raised her to shift her career goals from research in atomic physics to physics instruction. Vicki said the introductory physics labs at UNL are very similar to the ones I have experienced as a student and a teaching assistant. These experiences equipped me with work in experimental atomic physics have been a huge help, and are part of the new degree of efficiency of this position. She is looking forward to improving the introductory physics labs. Her goals include the introduction of a multimedia format.

M. Eugene Rudd, Editor
Chairman's Letter

Graduates in most fields and professions are facing a more difficult time now finding employment than in the recent past. The fields of physics and astronomy have not escaped this generality. In my own experience, the outlook for the current job market is comparable to that for a generation ago. In 1927, as a young boy, I remember reading the New York Times on the day after the 1929 Wall Street crash. The world's first man-made orbiting satellite, the scientific and technological advancements, and the strong science and mathematics preparation young Soviet students received in school. There was the implication that America needed more administrators to compete. I was already inclined toward science anyway, but this event determined the major course of my life. I entered graduate school in the 1930s, the world market for scientists was booming. Universities, government labs, and industry were hiring. However, by the time I received my doctorate in the early 1940s, the boom had turned to a bust. I felt very lucky to get a faculty position at Princeton.

Censure of the 'Right' Job Market

The current job market appears to stem from an unfortunate clustering of a number of events, all of which have led to fewer job offers or more competition for the available number of jobs. These events include the end of the Cold War, growing federal government budget deficits, the current world-wide recession, the end of mandatory retirement, and foreign political events. Let's consider each of these in turn.

We shall, of course, all be grateful that the Cold War is over. It is, however, resulting in structural changes in the US economy. Specifically, the defense and aerospace industries are cutting back and government laboratories associated with them are also downsizing. These industries and labs have been major employers of science and engineering graduates.

The US government's budget deficit is forcing legislators' attention on that fraction of the US budget in which spending is discretionary, i.e., not part of an entitlement program such as Social Security, Medicare, Medicaid, etc. A major casualty so far is the cutting of the Superconducting Super Collider and the jobs associated with it. More generally, the government's support of science and technology is clearly needed. Pending the development of such a model, science funding and government laboratory employment are likely to be cut further.

The world-wide recession has dripped up employment in industry. It used to be a safe bet to specialize in some field of science or engineering that was in use by industrial employers. Thus, if one failed to locate a "job in academia" one could "always" get a job in industry for a few years until he knew what was wrong. If it was revealed that industrial applications which formerly regarded layoffs as unthinkable (e.g., IBM) were trimming major research groups.

In academia, over the next decade there is likely to be a massive cutback in the number of faculty members as the many faculty hired in the 1960s retire. However, mandatory retirement ages will no longer be legal after January 1, 1994. Hence long-term planning for replacement hiring is more difficult than in the past. Of course, regardless of the effect on the employment market, we should all applaud the recent improvements in medical care and healthier lifestyles are making ages of 65 and 70 not seen so old fashioned anymore. But these are indications of problems which arise when people are more physically and intellectually vigorous and productive in their retirees.

Research and educational activities throughout the world have increasingly impacted the US job market in science and engineering. One could give many examples. First, in Great Britain, government restrictions on support of science in universities coupled with recession has made a number of our nation's scientists and engineers in Germany, the high cost of refinancing additions to residence has had a similar effect. In the former Soviet Union, the fall of Communism has given Soviet scientists the opportunity to travel abroad, and inflation has so decimated the currency that emigration seems ahead for better opportunities and a means of survival. In China, the tainted events of Tiananmen Square have led many extremely capable students studying abroad to seek to remain for political reasons. Conditions such as these have resulted in increased numbers of applicants for every US job opening in science and engineering.

Some Perspectives

What can one do about this situation? Everyone feels sad, with our good friends of this country's best people fighting this battle. Some of us have felt this way for years. I have not thought much of this situation. If there were fields that were not hot, one could probably go into those fields. However, I know of none. Hence, after describing the current job situation, I shall emphasize two things. First, that the decades or more needed to prepare for a career in science is far longer than it may take for a change to occur in one of the other of these drastic areas described above. Second, again, with some justification, that such events have a 4 to 5 year time scale, the length of a presidential term. Hence, it is not really possible to predict what the job situation will be 5-10 years hence when students currently embarking on a scientific career may be in the market for a permanent job.

Second, emphasis the necessity of flexibility. Scientists have been trained to analyze complex sets of data and to make predictions for decision based on the results. Such abilities are of great value in many non-traditional careers in addition to the usual academic ones. Thus, if it turns out that the job situation is severe when one is looking for employment, teaching in science and engineering will aid in the search for a job as long as one remains willing to search widely.

Examples abroad. A study by the AAPT in the early 1980s found that many analytical skills were highly desired by businesses of science, who are a group expressed great interest in attracting more physics majors to their MBA programs. A recent issue of The Economist magazine reported that many physicists knowledgeable in nonlinear dynamics (chaos) are being hired by financial firms to analyze financial market data. Many of these graduates have, in fact, experimental and theoretical, have subsequently earned M.B.A. degrees in the relatively new area of medical physics, and are testing in medical schools or working in hospitals in both diagnostic and treatment of various medical conditions. Many, many more graduates of this Department have reported back to us that the laboratory skills they acquired here undergraduate have been invaluable to them in their careers, about which these have been in fields far removed from physics.

Last, while the current employment situation looks grim, it should not be so severe as to be a greater perspective. Indeed, one looks at the challenges society may face in the areas of environmentalism, and changes, development of alternative energy sources, and world-wide economic development. What is apparent is that these issues will remain in the forefront of the job market.

The current issue of Spectrum. Look advised graduates to be flexible in their pursuit of a career. He found his physics training extremely valuable in his career as an army control coordinator.

Career Survey

Kevin Ayersworth (Ph.D. 1989) has just been elected a General Counsel at Applied Sciences, a small company. He had been a member in this position to get the AES more involved with the current job market. He said it was one of the best jobs in the country. We would like to thank Sheila Tobias to survey physicists nationwide on their careers, both to find new and innovative ways to keep in touch with the present job situation and to provide anecdotal evidence of the wide range of career options available to physicists with various backgrounds. A copy of the survey he is conducting is being mailed to all alumni with this newsletter. I hope you will give it your attention and send in your response.

Department News

As this issue of Spectrum reports, this Department is doing its share to help with the employment crisis. Three new faculty and a laboratory Manager have been hired in the past year to assist in obtaining external grants for research and education are at record levels, being the number of gram-relevant personnel in the Department to record levels. These additional people and the affable and labs they require are squeezing somewhat that. We've completed the major renovation of our Department offices to the first floor of Straus Lab so that the entire second floor of Biology research labs and offices for the faculty, students, and other researchers who use the lab. Just when I thought we could breathe easy, the Department received a large NSF ESF grant that will bring in even more grant-related personnel. What do we do? Well, we're in the Chronicle of Higher Education recently (1995), p. A90 that new faculty on the Board to those where they inquired about
IN MEMORIUM: JAMES C. COE
(1900-1993)

Jessie B. and James C. Coe
James C. (Kentucky) Coe, one of the Department's major benefactors, died May 31st in Phoenix. A military funeral ceremony was held in Yankton, South Dakota. He is survived by his wife, Jessie B. Coe.

Coe was born in 1900 in Noboba, Nebraska to Gustav and Josephine Kentucky. His parents had emigrated to this country in 1871 from Europe. They encouraged each of their seven sons to attend the University of Nebraska. Four sons played varsity football. All retained a deep loyalty to their alma mater throughout their lives.

James Coe went to graduate school at M.I.T. and was struck by the cost of student equipment in the teaching labs. In 1965, he and his wife Jessie took steps to ensure that Nebraska students had state-of-the-art equipment in their educational programs. They established the Kentucky Memorial Equipment Fund, in honor of his parents, to benefit students in the Department of Physics and Astronomy, in the College of Business Administration, and in the College of Engineering and Technology. The Kentucky Fund is an endowment, so the income will benefit students at the University in perpetuity.

Over the past 30 years this Department has received about $240,000 in equipment money from the Kentucky Fund. The money has been used to buy modern experimental laboratory equipment for our teaching and research labs, lasers demonstration equipment for our large enrollment courses, and computers and software for our Physics Learning Centers. These funds have been used whenever possible to match additional funds from other sources, thereby leveraging the benefits even further. For example, Kentucky funds along with NSF and University grants were used to establish the James and Jessie Coe X-Ray Materials Characterization Facility. The funds from the Kentucky endowment have made a measurable improvement in the quality of our teaching and research programs in only the first 15 years they have benefited us. This Coe foresight is emphasizing the quality of the tools of learning seems certain to have a growing impact on our students and our programs in the future.

Jessie B. and James C. Coe

Anthony F. Starace
Professor and Chairman

Books Published by Department Faculty

While most of the publications that come from the Department are articles in journals, occasionally someone publishes a book. Now within our last three years books have been published by Professor Kenneth C. Davis, the book Fundamentals of Relativity will be published by the University of California Press in 1940. Based on a course taught at the University for the past ten years, the book is aimed at a non-specialist audience and focuses on the geometry of Minkowski space-time. Analytical material is included. Another feature is a detailed analysis of relativistic paradoxes. The last two chapters contain an introduction to general relativity and cosmology.

The book has received enthusiastic pre-publication reviews. One reviewer stated: "I am unaware of any other book at this level that presents the ideas of relativity in such a complete and convincing manner, yet without the use of any but the most elementary mathematics... This work leads to a new wave in the teaching of relativity at an undergraduate level."

Professor Theodore J. Greenbaum's interest in golf led to an article several years ago in the American Journal of Physics on the physics of golf. This attracted widespread interest and ultimately led to its expansion into the book The Physics of Golf which was published in October 1993 by the American Institute of Physics and advertised in the Physics Today issue of that month. In the book, Ted analyzes the golf swing using a mathematical analysis based on the equations of motion of the double pendulum. The results of his analysis are compared with data obtained from stereoscopic photographs of actual golf swings. Ted contends that minor adjustments in the swing can have substantial effects on the distance the ball travels. While he says that mastering the swing is the most important part of golf, his book also treats other aspects such as the aerodynamics of golf, the matching of clubs, the flexibility of shafts, and the handicap system.

In 1964 Professor Earl W. McNab of Georgia Institute of Technology wrote a highly successful graduate level textbook on atomic collisions. A few years ago he began updating it with a new two-volume version. The first volume, published in 1989 by John Wiley & Sons, was entitled Atomic Collisions: Electron and Photon Collisions. However, in 1993 he had a new two-volume version. The second volume is entitled Atomic Collisions: Atomic, Molecular, and Chemical Reactions, which updates the first book and includes an expanded section on atomic reactions, chemical reactions, ionization, chemical transfer, negative ions, atomic and molecular reactions.

Recent Progress in Atomic Microscopy Research is the title of Vol. 38 of the Astronomical Society of the Pacific Conference Series published by the University of California Press on the occasion of a conference at the University of California. The three coauthors of the book, Eugene Rudd of the University of Nebraska, Colorado and Professor Mike Stelzer, edited the book.

The book Atomic Collisions: Heavy Particle Projections, also published by Wiley, which was published in 1993.

Rudd says the 681-page book is a bargain at only $125 (tooth). Chapters of the book deal with elastic scattering, excitation, dissociation, chemical dynamics, ionization, chemical transfer, negative ions, intermolecular reactions, recombination, and recombination.

New Frontiers in Atomic Microscopy Research is the title of Vol. 38 of the Astronomical Society of the Pacific Conference Series published by the University of California Press on the occasion of a conference at the University of California. The three coauthors of the book, Eugene Rudd of the University of Nebraska, Colorado and Professor Mike Stelzer, edited the book.

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Research Highlights

We present here a selection of recent research results by the Rapid Communications Society (RCS) in the Rapid Communications section of the Physical Review Letters (PRL). The results in this issue cover a wide range of topics, including low-temperature superconducting materials, the study of light-matter interactions, and the detection of single-photon emission.

The Scientific and Technical Historian

In the 20th century, the development of superconducting materials has been a major focus of research in physics. These materials exhibit extremely low electrical resistance and zero magnetic field at temperatures below a critical value. This property makes them ideal for use in magnets, energy storage, and electrical transmission. In this issue, we highlight recent advances in the field, including the discovery of high-temperature superconductors and the development of novel superconducting devices.

The Impact of Superconducting Materials

The rapid progress in superconducting technology has led to a wide range of applications, from magnetic resonance imaging (MRI) to high-speed data transmission. In this issue, we discuss the latest developments in superconducting materials, including the search for new high-temperature superconductors and the use of superconducting circuits in quantum computing.

The Future of Quantum Computing

Quantum computing is a rapidly growing field that promises to revolutionize computing and cryptography. In this issue, we explore the latest advances in quantum computing, including the development of new quantum algorithms and the construction of larger, more powerful quantum computers.
New Laser Course Instituted

Although lasers have been studied by students in various courses in the Department, the rapid growth of their technology and the increasing demand for workers trained in their use in research and industry justifies a separate course. As noted in the 1969 report "Laser and Modern Optics in Undergraduate Physics," nearly one-third of today's experimental papers in physics and chemistry report on research involving the use of lasers. Professor Stephen Ducharme has designed such a course. It has now been approved to be offered in the spring semester.

With the prerequisites of Physics 142 or 212 plus a laboratory course in atomic physics, the course should be able to register for Physics 390, Physics of Laser and Modern Optics. The course, comprising one hour of lecture and three hours of laboratory per week, will deal with such topics as detector physics, geometrical optics, reflection and refraction, polarization, lasers and their applications, opto-mechanical systems, interferometry, holography and phase conjugation, atomic spectroscopy, fiber optics, and nonlinear optics. Students in this advanced laboratory course Physics 442 and 443 may also elect to do some of the laser experiments developed for this course.

Ducharme, along with Professors Paul Burrow and David Duquette are reestablishing a proposal to the National Science Foundation for funds to purchase a laser and optical equipment used in the upper-level laboratories.

Jaswal Awarded Distinguished Teaching Award

Professor Sitaran S. Jaswal received a College of Arts and Sciences Award for Distinguished Teaching in April 1969. He came to UNL in 1966 after two years of postdoctoral work at the University of Pennsylvania. Jaswal was born in India and received his B.Sc. and M.Sc. degrees from Punjab University and in 1964 his Ph.D. from Michigan State University. He is active in Department affairs and is a productive researcher with more than 50 publications in refereed journals. His experimental work in the search field is the theory of the electronic structure of magnetic and magnetically ordered materials. Perhaps the most outstanding characteristic of his teaching method is the love of personal concern he has for his students. As one student said, he is not a "licker" lecturer, but his concern for the studentsprovides an excellent learning atmosphere. He has the knack of getting students to restate what they are learning in physics to their other students. Professor Jaswal is a versatile teacher who does well teaching advanced courses for majors as well as elementary courses for non-majors. He is involved in teaching activities beyond the classroom and is the faculty advisor for the campus chapter of the Society for Physics Students.
Staff Activities

Among the recipients of the UNI Parents Association "Recognition Award for Contributions to Students" in January were Professors Clifford L. Bettis, Robert G. Fuller, Evelyn Tonska Patterson, Norman Stiman, and Donald J. Taylor.

Patsy Christen, the Accounting Clerk for the Department, received the Sigma Xi Support of Research Award for her outstanding work in managing the internal purchasing and accounting systems which serve all of the research grants as well as the Department's expenditures. Especially cited was her ability to solve the difficult problems encountered in tracking several million dollars of expenditures each year. In 1981 she received the Region's KUDOS award in recognition of the superior way in which she handles her job.

A $10,000 Partner In Science grant from the Research Corporation supported work done last summer in Professor Stephen Ducharme's laboratory by Biotech High School physics teacher Robert McGinnell (1965). The collaboration will continue through the 1994-95 academic year. This year's program provides high school physics teachers with opportunities to work at the cutting edge of science by collaborating with university research scientists. It enables them to bring first-hand experience of research and careers to their students. McGinnell is making a study of the anisotropy of the electro-optic response of photorefractive polymers and will examine the effects of polymer preparation and temperature. He was also able to build a dice laser which he will use in his classroom teaching.

Jack Loos, a machinist in our Instrument Shop for many years and Acting Manager of the shop since the death of Don Fehrling in July 1992, was appointed Manager of the Shop on December 1, 1992.

Electronics Technician Donald Miller retired in April after 18 years in the Electronics Shop. A luncheon was held at Valentine's and Don was presented with a certificate of appreciation from the University and gifts from the Department. He is now living in Alliance, Nebraska with his son. Dan has been replaced by Brian Flesch, who for several years had been employed by the Polar Ice Core Project but had done his work in our ElectroScience Shop.

Professor Duane H. Jacobs has been appointed to a National Science Foundation review panel for their Instrumentation and Laboratory Improvement Program.

Gallup and Rudd Retire

Professor Gordon A. Gallup, who has been in the Department of Chemistry since 1958, was given a courtesy appointment in the Department of Physics and Astronomy in December as recognition of his collaboration with members of this Department including Professors Gyorgy Csernus, R. J. Fenn, and R. P. N. Barnes. He has been the "outside member" of the graduate committees of numerous Ph.D. candidates in physics. Gallup's A.B. degree was from Washington University in St. Louis and his Ph.D. from the University of Kansas. He has done extensive theoretical research in quantum chemistry, the theory of electron scattering, and in atomic structure, and has been a frequent attendee at atomic physics seminars and physics colloquia. It may be officially retired from the university position but has moved his office to the芝shaheen Laboratory to continue his active collaboration with members of the Department. In May 1988 a symposium in his honor was sponsored by the Chemistry Department. At that symposium four of his 21 Ph.D. graduates were speakers.

Retiring at the end of August, Professor Eugene Rudd has also continued to be active in research. He received his B.A. degree in 1950 at Conneaut College in Meadville, Pennsylvania, his M.A. in 1956 at the University of Rochester. During his eleven years on the faculty at Conneaut College, he had a two-year leave of absence in which he finished his Ph.D. at Nebraska in 1962. He returned to Nebraska to join the faculty as an Associate Professor in 1965. Since then he has had a major role in bringing the atomic physics group at UNL to its current internationally-prominent position. His work on secondary electrons ejected in collisions of ions and electrons with atoms and molecules has been supported by one of the longest-running grants of the National Science Foundation. He became a Professor in 1965 and served as Acting Chairman of the Physics Department from 1970 to 1972 following Henry Veliky's move to Georgia Tech. He is a fellow of the American Physical Society and served in 1989 as Chairman of his national professional society, the American Physical Society Division of Electronics and Atomic Physics.

Seven students have received their Ph.D. degrees with Rudd and two more are currently finishing their research. A small amount of residual grant money will keep an undergraduate working on an electron impact project until next May. He also chairs an international committee charged with writing a comprehensive report on secondary electron spectra. As such he and his associates publish their research results, plans to divide his time between possible future research collaborations and his hobby of collecting antique scientific instruments and rare books in science. A symposium in honor of his retirement is planned for May 13-14, 1994.
Indiana Kam & the Magic Staff of Lake Toha

Kam-Ching Leung, professor of physics and astronomy at UNI, was in Indonesia in the summer of 1992 collecting wood carvings and other native art pieces. Some of the islands of Indonesia are world renowned for their folk wood carvings produced by their native populations.

Siberut is an island of low hills, swamps, rivers and dense rain forest 70 miles off Sumatra. There are very few villages on Siberut, and those who make the journey from Sumatra dieback from Padang in a barrel-like steam from the east coast and dangerous side of the island where Leung was heading. He had to hire a guide with a small canoe to take him to a small village on a group of isles.

The inhabitants of Siberut welcomed him hospitably as he approached their village. They weren't hostile or openly aggressive like the refined headhunters of Borneo were, Leung was relieved to observe.

"All of the people are inhabited by retired headhunters and cannibals," he stated. "But those people look like they retired longer ago than the natives in Borneo.

Most of the year Leung has his head turned toward the heavens. He is a specialist of linearity stars—paired stars that constitute up to 80 percent of the stars in the universe—and his studies of their behavior have resulted in a number of significant discoveries. It is only during brief periods, generally during the summer, that he looks away from the universe to examine our own planet.

Leung spent his visit in Siberut into a summer of professional visits and consultations with astronomers in southeast Asia, Korea, China, and Tibet. In Tibet, he spent several days on a 14,000 foot mountain plateau about two hours ride from Lhasa, evaluating the site for a medium to large sized telescope planned by the Chinese government.

In southeast Asia, he visited both Indonesia and Thailand, working with astronomers and government officials to find a way to obtain funds to build an observatory somewhere in the region.

Leung enjoyed a reputation as a seasoned world traveler well before his last summer. Last year some of his graduate students tapped a sign over the door of his office in Ferguson Hall, proclaiming that the仙ization was that of "Indiana Kam.

Kam moved easily among the Siberut natives. He made friends and watched them at work and play, sometimes participating in both activities with them. He recalled, a month or two later in his office that despite having few of the trappings of modern civilization, the people of Siberut living on this tropical island quickly adapted to new, modern innovation—marriage. "We (Leung and his guides) didn't get married," Leung confided. "We just spent the entire night together when we bedded down in the outdoors that night.

He admitted that his guides were generous, free, and thorough woodcarvers. Amongst the Siberut natives, Leung left the island with some souvenirs—a tobacco pouch carved from a cocoon, and a bone fork made for him from the back of a true. Most of the best additions to his collection are in his living room, where he keeps them on a small shelf as chow nor kel nor kong. Leung said the magic staff is from an island in the volcanic region of Indonesia. He said he felt like a true Indian in the 1800s while there.

The fact that he occasionally occupies himself in the same way he did during this trip is a sign that one can simply enjoy life and not worry. "It's not all that bad. But, he recalled, there were some moments.

Like that time in Easton.

His 14-year-old son, Kam was, he had been in a tense way during most of the summer of 1992, for a crocodile and piranhas infested tributary of the Amazon River. Leung's son and his guides stopped at a native village deep in the rain forest, and were 50 feet in the water in it to experience a crocodile. "They wanted our gasoline, and we couldn't convince them that we needed it to get them out of there," Leung said. "It was very, very uncomfortable. It was a long, long, long, two hour and 1/2 with only hunting knives against 50 or more native Indian people armed with wooden spears, arrows and blowguns with poison darts. It didn't take us long to figure out who would come out ahead in that confrontation, so we figured out of many of their clothes as we could and then got out of there.

"I don't like to talk to people uninvited," he said. "What does that mean, anyway? That they don't wear a suit and tie? No. That's not a

Professors Make Scientific Pilgrimages

A trip to Denmark in July to attend the International Conference on the Physics of Electrons and Atomic Collisions gave Professors Duane H. Jacobs and M. Eugene Rudd an excuse to stop in England to make a pilgrimage to a few of the "holy places" in the history of science. First on the agenda was a trip to Woolsthorpe Manor, the birthplace and family home of Isaac Newton, which is north of London near the city of Grantham. What is probably the original apple tree of the famous legend still grows in the yard. A church in the nearby village of Colsterworth contains a stone medieval made by Newton and the school in Grantham attended by Newton still has the window all where he earned his degrees. Rudd also visited the Trinity College Library in Cambridge, a splintered building designed by Sir Christopher Wren, where he was able to examine some of the books from Isaac Newton's personal library. Newton is said to have practiced reading over a corner of a page in a book to mark references to his own work. Rare enough, in Newton's copy of William Malchus's "Disputes" from the sentence "as is noted by the admirably learned Mr. Newton in his incomparable levitation..." was so marked.

In Bath, England, the two visited William Harben's home where they saw the workshop where he made the best reflecting telescopes of the late 18th century and stood in the garden where he used one of his telescopes to discover the planet Uranus. Next they found Joseph Priestley's home where William Henry Fox Talbot invented the negative-positive photographic process. The two pilgrims found the famous bat painting by window painted in the earliest dated negative photograph, now at a museum at the University of Texas. On their way back to London they stopped to see at one once occupied by Joseph Priestley, the scientist who discovered oxygen.

In a later trip Rudd went to a museum at the site of Old Rome's 15th century observatory near Copenhagen. This is where the Danish astronomer made his observations of the moon of Jupiter that first proved that light had a finite velocity. In Florence, Italy, Rudd found one of the villages where Galileo had lived. In the Museum of the History of Science in Florence he not only saw two telescopes made by Galileo, but also the bones of one of Galileo's fingers preserved for all to see.
Ducharme Visits Former Soviet Union

The present and former scientists of the former Soviet Union (FSU) are the subject of recent news reports and articles. But in August, Professor Stephen Ducharme witnessed the situation firsthand — he attended the International Meeting on Photovoltaic Materials, Effects and Devices in Kiev, and when he and his wife were guests of Moscow physical Professor Vladimir M. Frishkin for three weeks. Frishkin, who is Head of the Electron Materiales Laboratory at the A. Shubchinsk Institute of Cryochemistry of the Russian Academy of Sciences, is the discoverer of the bulk photovoltaic effect and other phenomena, and is the author of several books. Frishkin and his wife were in Lincoln from May to July pursuing collaborative research with Ducharme concerned on confined optical and superconductive behavior. Ducharme says that while the political and economic situation in Russia is undergoing a great upheaval and the situation is complicated by unemployment and crime, people still have hope. Scientists are in an especially critical situation because of the lack of adequate government funding. In many cases, they can work only by developing international cooperation and funding support outside the FSU. One of Frishkin’s associates makes a print of a living and comes to the laboratory only in his spare time, spending his personal funds to subsidize the ex-Soviet laboratory budget. A typical Ph.D. researcher in Frishkin’s group earns only $25 a month, which is not a living wage in Moscow. Ducharme and Frishkin have submitted a proposal for joint funding to the NSF International Opportunities for Scientists and Engineers Program. If funded, one of Frishkin’s colleagues will spend two years in Ducharme’s laboratory and reciprocal visits will be made on a regular basis.

Vladimir M. Frishkin and Stephen Ducharme.

Look Speaks at 1993 Recognition Luncheon

George W. Look (85-91, 92) was the invited alumni to speak at the May 6th Recognition Luncheon which the Department holds annually to recognize Department graduates of the past year and to honor students and faculty who have received awards or honors. Look is the Deputy Representative of the Special Verification Commission for Security Policy Division of the Defense Department. He spoke on Russia, Nuclear Arms Control and the Washington Bureaucracy — A Riot Act Speech.

Prior to his talk, Look reminisced about his days at Nebraska. The late 1960s and early 1970s were politically turbulent because of the Vietnam War. He remembered especially the draft lottery, student antiwar demonstrations, football Saturdays and some of his interactions with our faculty. He credited Ted Jorgensen’s remarks on building his house and on his studies of the golf swing. He remembered advice Diane Jakus gave him never to throw away any experimental results since, if the experiment is reliable, the punch that don’t fit one’s expectations are the most interesting ones. He believed that there’s a lot of great work in science when Ken Leung employed him to do numerical analysis using grid software, work related to Leung’s efforts to establish the Bahrman Observatory. He was grateful to be hired by the Department after graduation as a lab assistant to set up experiments in our teaching laboratories.

Look did graduate work at Virginia Polytechnic Institute and Purdue University, where he received a Ph.D in high energy physics in 1977. He served three years on the National Security Council staff where he attended meetings of the NSC. He became a consultant for proposed testing. He recently worked as a consultant on the verification of an experiment for the INF Treaty. This included traveling to the former Soviet Union, which he did, to resolve major treaty implementation issues. Details of what equipment could be used to carry out inspections had to be negotiated after the treaty was signed. He told many interesting insights for these negotiations. For example, laser-ready flashlights were not allowed, but another level was acceptable.

Look stated that arms control is a part of national security policy and none follows the ups and downs of political events. He emphasized to our graduates that his background as a physicist was invaluable in his career in arms control. This background gave him the ability to structure arguments and to serve as a mediator between technical and political people. He told students that if they enjoy problem-solving then there are many job opportunities for physicists in addition to the traditional ones.

Look was accompanied by his wife, Karen, who is a lawyer and is also engaged in arms control. She is a division leader at the Arms Control and Disarmament Agency.
Michael Day Uses National Guard Artillery to Teach Physics

The complications of projectile motion have been illustrated in dramatic fashion to students at Lebanon Valley College in Annville, Pennsylvania. Their physics teacher, Michael A. Day (Ph.D. 1983), recently wrote an article with Martin H. Walker on the experiments in the March 1993 issue of The Physics Teaching. Walker, a major in the Pennsylvania Army National Guard, is the logistics officer for the 9Bth Division Artillery. With data on such things as muzzle velocity supplied by the Guard, Day and his class worked out the expected ranges of shells for different projection angles. Then, in a field trip, their predictions were tested at the National Guard firing range at Fort Indiantown Gap using nine firings of a 155-mm M198 howitzer shooting a 95-pound shell.

The students quickly learned that the elementary textbook equations for projectile motion requires numerous corrections to yield accurate predictions. In addition to atmospheric drag, wind, and the curvature of the earth, they also needed to take account of muzzle effects as the dependence of the drag coefficient on temperature and elevation, the angle of paw of the shell in its trajectory, the Coriolis force, and the direction of spin of the shell. The range, which was between 4000 and 7000 m, was measured by tracking radar and the muzzle velocity by Doppler radar. The ranges predicted by the class were typically within 2.5% of the measured values, almost as good as the ranges predicted using the Army's published firing tables. The class also calculated such effects as the average force on the shell, the pressure in the gun, and the resultant momentos.
Aylesworth Elected to APS Governing Board

Last year's Spectrum reported on the organization of the Young Scientists' Network (YSN), an informal federation of young physicists concerned about the job market for new Ph.Ds. A Nebraska graduate, Kevin Aylesworth (Ph.D. 1989) started the YSN and has continued his efforts to draw attention to the plight of many young scientists seeking employment by his letters to Physics Today and his updates on the electronic mail network used by YSN members for communication. One of Aylesworth's goals was to form the YSN into a political force. He has recently succeeded in that plan by initiating a petition drive in which he and YSN member Zohary Levita of Ohio State University sought positions on the governing board of the American Physical Society. Their campaign, carried out through their electronic bulletin board, was successful and, as reported in the October 1 issue of Science, the two were able to defeat the candidates nominated by the APS.

Aylesworth contends that the physics establishment is partly to blame for the scarcity of jobs because it continues to train large numbers of Ph.D.s at a time when the job market for them is shrinking. More emphasis on the employment situation in APS actions might be expected now that Aylesworth and Levita will be sitting on the Council. "This election certainly sends a message to the Council," notes APS president-elect Barton Richter. "It's an indication that a big part of the membership wants more emphasis on the employment problem." However, others on the Council, while admitting there is a problem, are not convinced that the APS is in a position to do anything about it. Still others, such as Council member Michael Turner, are not convinced that there is an overproduction of physicists Ph.D.s. "We tend to overreact in this Country," he says, "and try to turn off the spigot as soon as there is a problem. We need more Ph.D.s in the physical sciences, not fewer, because it's technological progress that's going to keep this country afloat." The transactions of the APS Council will surely be watched with interest after the two newcomers take office at the end of the year.

Meanwhile, Aylesworth is now turning to the practical matter of helping physicists find jobs. He is collaborating with well-known seminar observer Sheila Tobias on a Research Corporation survey "that looks beyond in-class education to the experiences and prospects of careers for science majors." In order to gather data for a book on non-traditional employment for scientists, surveys are being sent to alumni of physics departments in order to reach not only those who have remained in science but also those who have entered other fields. All are being asked to provide anecdotal evidence of how their science education has been used in their careers.

Each alumni of this Department is receiving a copy of this survey with this issue. You are urged to fill it out and return it to Sheila Tobias at the address indicated on the survey. Results of this survey will provide raw data for the planned book.

Acknowledgments

The Department is very grateful to the following individuals and corporations for their new and continuing financial contributions during the period 1 November 1990 - 31 October 1993. 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 campaign 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. 3052.0)
(2) Physics & Astronomy Lecture Endowment Fund (Account No. 3011.0)
(3) Physics & Astronomy Scholarship Endowment Fund (Account No. 3003.0)

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. Albrecht (B.S. 1962)
Amoco Foundation
William A. Barrett, Jr. (B.S. 1952, M.S. 1963)
Blaine D. Bryan (B.S. 1969)
Thomas E. Bullock (M.S. 1979)
Lois J. Caplan (M.S. 1964, Ph.D. 1975)
Jessie Coo
FMC Foundation
David M. Gray (B.S. 1977)
Andrew T. Graether (B.S. 1989)
Bert H. Hartnell (B.A. 1839 Math/Physics)
Phillip L. Harkins (M.S. 1989, Ph.D. 1990)
Alan J. Heeger (B.S. 1957)
Howard L. Helmsch (M.S. 1968, Ph.D. 1972)
Louise C. Howell
Kyle W. Hoffinan (B.S. 1988)
Goyne (M.S. 1891 Math/Physics)
IBM Corp.
Studebaker J. Jawaal
David W. Keffer (B.S. 1968)
William J. Lattman (M.A. 1956)
Richard D. MacMillan (M.S. 1970)
Ralph L. McKenzie (B.A. 1948)
Charles B. Minnich (B.S.R.E. 1937)
Burton E. Moore
Joseph J. Parker (Ph.D. 1949 Chemistry/Physics)
Phillips Petroleum Foundation
Kevin D. Heilig (M.S. 1962 Physics/Math)
Rocksewell International
Jerry E. Rockeman (B.S. 1982)
M. Eugene Rudd (Ph.D. 1962)
James J. Schneid (B.S. 1956, M.S. 1957)
Donald P. Schneider (B.S. 1976)
Theodore J. Schubert (B.S. 1959, M.A. 1961)
David J. Sellmyer
Michael R. Stamm (M.M. 1966, Ph.D. 1978)
Anthony F. Starace
Alan R. Tweedy (M.A. 1959)
Maurice H. Witten (M.A. 1960)

* * * * *
No. 9 Fall 1993

1992-93 DEGREE RECIPIENTS

Bachelor of Arts


Bachelor of Science


Master of Science


Doctor of Philosophy


Anthony F. Starace, Editor

HONORS

1993-94 Fellows

Kenneth W. McLaughlin - Buekley Memorial Fellowship; Henry F. & Jean D. Holtsclaw Fellowship; Donald Walters Miller Fellowship

Alan P. Rusie - CMRA Summer Fellowship

Edra Serra - Richard H. Lanes, Fellowship

Jian-Xiang Shen - Buekley Memorial Fellowship

Ron Q. - Maud Hammond Fleng Fellowship

Dexin Wang - Presidential Fellowship

Wen-Jia Zhang - Homer C. Rhoden, Fund

Avery Fellowship

1992-93 Scholarships

Steven J. Buda - Joel Stehling Fund Scholarship

Conrad D. Engel - Henry H. Marvin Memorial Scholarship

Jeroen R. Dallati - U. S. Harris, Fellowship

Eric S. Green - U. S. Harris, Scholarship

Clifford D. Milles - Joel Stehling Fund Scholarship

Brent A. Peterson - Henry H. Marvin Memorial Scholarship

Randy R. Porter - Physics & Astronomy Alumni Scholarship

Matthew E. Ramsdell - John, E. Almy Scholarship

Samuel P. Szumkin - Henry H. Marvin Memorial Scholarship

Donald C. Stafford - U. S. Harris, Scholarship

1989 Sigma Xi Support of Research Award

Patricia J. Christo

1993 Distinguished Teaching Assistant Awards

Kayvan Aftosoun - Brian E. Jones

1983 Alumni Achievement Award of the College of Arts and Sciences Alumni Association

M. Eugene Rudd

1993 College of Arts and Sciences Distinguished Teaching Award

Starlam S. Dawsal

1993 Recognition Award for Contributions to Students

Clifford L. Bette - Evelyn T. Patterson

Robert G. Fuller - Norman Simon, Donald J. Taylor

1999 Outstanding Teaching and Instructional Creativity Award

Robert G. Fuller

Robert A. Millikan Medal of the American Association of Physics Teachers

Robert G. Fuller

1992-93 Society of Physics Students Officers

Eric Green, President - Mary Krasovec, Vice President

Joan DeButts, Secretary - Michael Anderson, Treasurer
Faculty Professional Activities

In addition to service on Departmental, College and University-wide committees, in 1993-4 a number of the faculty are active in local, national and international professional activities, as follows:

Clifford L. Bettis Lincoln Children's Museum Science Committee; Physics Instructional Resource Association.
Paul D. Burrow Geoscee Electronics Conference Executive Committee.
William R. Campbell Rocky Mountain Consortium for High Energy Physics, Steering Committee.
Stephen Ducharme NSF/SSRI Review Panel.
Robert G. Fuller AAPT Associate; "Ask the Medium" column (Author), AAPT Instructional Materials Center (Editor), AAPT Publications Committee; Physics Academic Software Steering Committee; Science Supplement of Nebraska statewide Systematic Initiative (Co-Principal Investigator).
Timothy J. Gay Symposium on Two-Center Effects in Ion-Atom Collisions, Lincoln, NE (Chair).
John R. Hardy Army Ballistics Research Lab, Aberdeen, MD (Consultant); U.S. Naval Research Laboratory (Consultant).
Duane H. Jaecks Edgerton Museum Project, Plainsman Museum, Aurora, NE (Consultant); 8th International Symposium on Polarization and Correlation in Electronic and Atomic Collisions (July 1994), Vancouver, BC, Organizing Committee; IUCR-CAC General Committee; National Academy of Sciences, NSF Graduate Fellowship Committee (Chairman); NSF Instructional Equipment Program Evaluation Committee.

Kam-Ching Leung AAS Christian Research Grants Committee (Chairman); Chinese Astronomy Astrophysics (Pergamon Press) Editorial Board; Shanghai Observatory, Academia Sinica, China (Distinguished Professor); United Nations Working Group, Astronautical Facility in the Pacific.
Sy-Hwang Liu Applied Physics Communications (Editor); James A. B. Samson Advanced Light Source, Berkeley, CA, Atomic Physics Beamline Committee; Argonne National Laboratory, Atomic Physics Review Committee; Optical Society of America, X-Ray and Ultraviolet Techniques Committee.
Gregory R. Snow NSF Teacher Preparation and Enhancement Program Review Panel; ScienceTech Museum, Aurora, IL, Exhibit Development Committee.
Anthony F. Sturace APS Committee on Investments; APS Division of AMO Physics, Nominating Committee (Chairman); Institute for Theoretical Atomic and Molecular Physics, Harvard-Smithsonian Center for Astrophysics (Advisory Board); Physical Review A (Editorial Board).

* * * * *

1993-94 Visiting Staff Members

Visiting Professors this year are Sam Cipolla (Ph.D. 1996, Purdue) and George Hadijanian (Ph.D. 1979, Manitoba, Canada).
Visiting Associate Professors are C. Martin Gaskell (Ph.D. 1981, California-Santa Cruz) from the University of Oklahoma; Jang Han-jeong (Ph.D. 1993, Yeoui, China); and Seo Youn Jeong (Ph.D. 1993, Korea U.).
Visiting Assistant Professors this year are physics education researcher Charles E. Lang (Ph.D. 1975, Kansas State); Charles B. Robbins (Ph.D. 1969, Illinois); and experimental condensed matter physicist Chunxing Zha (M.S. 1988, Shanghai U. of Science and Technology).
Research Assistant Professors this year are theoretical atomic physicist Cheng Pan (Ph.D. 1998, Virginia), working with Professor Stare; and experimental condensed matter physicist Zhengsheng Shan (Ph.D. 1990, Nebraska), working with Professor Sellmyer.
In our Department's Postdoctoral Research Associates this year are experimental high energy physicist Giuseppe Balluchi (Ph.D. 1998, Rochester), working with Professor Stare; experimental condensed matter physicists Jian Chen (Ph.D. 1993, Texas-Austin) and Yuan Long He (Ph.D. 1993, Rensselaer Polytechnic), both working with Professor Sellmyer; experimental atomic physicists Jeffrey N. Cother (Ph.D. 1992, W. Ontario) and Zhong-xiang He (Ph.D. 1990, Hawaii), both working with Professor Samson; condensed matter physicist David N. McBay (Ph.D. 1993, Rhode Island), working with Professor Dowben, theoretical atomic physicist Qiao-jing Wang (Ph.D. 1991, Louisiana State), working with Professor Stare; and experimental atomic physicist Orhan Yener (Ph.D. 1996, Nebraska), working with Professor Jaecks.
Research Associates this year are Dongjin Byun (M.S. 1993, Syracuse), Seong-Don Kwang (M.S. 1991, Syracuse), all working with Professor Dowben; Christopher T. Moore (M.S. 1992, Nebraska) and Laurin Gutekuck (M.A. 1986, Nebraska), both working with Professor Fuller.
Research Assistant this year is Thomas M. Abelson (B.A. 1973, Rev., Dominie Calabrese (Ph.D. 1993, Nebraska), and Brad Jacobsen (M.A. 1993, California), all working with Professor Fuller.

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1992 Fall Semester Colloquia

September 9: Professor Robert G. Fuller, University of Nebraska–Lincoln
"Hypermedia and the Knowing of Physics: Standing Upon the Shoulders of Giants"

September 10: Professor Patricia A. Thiel, Iowa State University
"Thin Film Structure at Low Deposition Temperatures"

September 24: Professor Laird A. Thompson, University of Illinois
"Adaptive Optics: A Revolution in Ground-Based Astronomy" 

October 1: Professor Robin Shakeshaft, University of Southern California
"Multiphoton Ionization of Atoms"

October 22: Dr. Eric F. Roedl, Intellometrics, Hopkins, MN
"Don't Blame the SLAM: Scanning Laser Acoustic Microscopy"

October 29: The Jerry E. Huckman Lecture: Professor Arnold B. Arons, University of Washington
"Understanding vs Coverage—Resisting the Undertow"

November 9: Murray Gell-Mann, Robert Millikan Professor of Theoretical Physics, California Institute of Technology
"Simplicity, Complexity, and Complex Adaptive Systems"

November 12: Professor J. Brian Mitchell, University of Western Ontario
"New Experiments on H$_2$ Recombination"

November 19: Professor Chris H. Greene, JILA and University of Colorado
"Novel Physics of Doubly-Excited Atoms"

December 10: Professor Craig J. Eckhardt, University of Nebraska–Lincoln
"Crystal Engineering in Two Dimensions: A Calculative and Experimental Excursion into Flatland"

1993 Spring Semester Colloquia

January 21: Professor Mark W. Meisel, University of Florida
"One-Dimensional, Integer-Spin Antiferromagnets: To Order or Not to Order?"

January 26: Dr. Francisco Laudea, AT&T Bell Labs
"X-Ray Studies of Crystal Surfaces During Vapor-Phase Growth"

February 2: Dr. Daniel L. Abraham, University of Nijmegen, The Netherlands
"Nonmagnetism in the 1990s"

February 4: Professor Peter Dowben, Syracuse University
"Are the Surfaces of Metals Metallic?"

February 9: Professor Jon M. Slaughter, University of Arizona
"Theory of Exchange Coupling in Magnetic Multilayers"

February 16: Professor Timothy Gay, University of Missouri-Rolla
"Testing Physical Theories With Polarized Electrons: From Relativistic Atomic Collisions to the Standard Model"

February 28: Professor C. Martin Gaskell, University of Nebraska–Lincoln
"Quasars—Into the Black Hole"

April 8: Professor E. Dan Dabbert, University of Minnesota
"Ubiquitous Non-Exponential Decay—Disorder, Interaction, or What?"

April 15: Professor Robert N. Compton, Oak Ridge National Laboratory and University of Tennessee
"Negative Ions"

April 26: Professor Daniel M. Kaplan, Northern Illinois University
"High-Rate Heavy-Quark Experiments at Fermilab"

April 30: Professor Gregory R. Bauer, University of Michigan
"The Production of 'Direct Photons' From CERN Experiment UA6, Fermilab Experiment D0, and the SSC"

May 6: Professor Vladimir Finkel, Russian Academy of Sciences
"Ferroelectric Polymers"
New Research Grants and Contracts

During the period 1 November 1992–31 October 1993 the following new and renewal grants and contracts were received by our faculty:

<table>
<thead>
<tr>
<th>Principal Investigator</th>
<th>Title (Brief of Funds)</th>
<th>Amount ($ Thousands)</th>
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<tbody>
<tr>
<td>Burrow</td>
<td>Electronic Scattering Studies of Temporary Crystals</td>
<td>60.6</td>
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<tr>
<td>Burrow</td>
<td>Scanning Tunneling Microscope for Advanced Materials</td>
<td>14.5</td>
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<tr>
<td>Campbell</td>
<td>Rocky Mountain High Energy Physics Research Laboratory (NSF)</td>
<td>49.5</td>
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<td>Dowben</td>
<td>Beam Carcill, Beam Properties and Beam Device Performance by Photo-Assisted Chemical Vapor Deposition (BET)</td>
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<td>Ducharme</td>
<td>Real Time Space Structures Degradation Monitor Using Stigmagrams (KCI)</td>
<td>72.8</td>
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<tr>
<td>Ducharme</td>
<td>Experimental Preparation of Photoreactive Polymers (NSF)</td>
<td>100.0</td>
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<tr>
<td>Ducharme</td>
<td>Helping High School Students Explore Modern Scientific Research Through the Eyes of Their Teachers (BC)</td>
<td>14.0</td>
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<tr>
<td>Ducharme</td>
<td>Real Time Space Structures Degradation Using a Small Modulation (WC)</td>
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<td>Duquette</td>
<td>Laser Photomultiplier Studies of Excited Atomic States (NSF)</td>
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<td>Fabricant</td>
<td>Atomic Processes Involving Negative Ions (NSF)</td>
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<td>Faller</td>
<td>Bragg, Bicycles and Triflare: Thematic Physical Science Lessons (NSF)</td>
<td>41.5</td>
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<td>Faller</td>
<td>Physics Teacher's Guide to the World of Physics (NSF)</td>
<td>48.5</td>
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<td>Using New Technologies to Teach Physics (NSF)</td>
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<td>Transforming Physics Laboratories Using New Technology (NSF)</td>
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<td>Faller</td>
<td>Undergraduate Education Initiative (NSF)</td>
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<td>Teaching Physics Using Interactive Digitized Video (NSF)</td>
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<td>Instructional Enhancement Award (KZLZLY)</td>
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<td>Gaskell</td>
<td>CDC Photometry of Supernova and Boyert (NSF)</td>
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<td>Gaskell</td>
<td>Undergraduate Teaching Observatory Telescope (NSF)</td>
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<tr>
<td>J.A. Hardy</td>
<td>Studies of Ionic Molecular Solids (ARO)</td>
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<tr>
<td>J. A. Hardy</td>
<td>Active Formation in High Altitude (NSF)</td>
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<td>Theoretical Studies of Complex Ionic Solids (EPSCOR)</td>
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<td>J.R. Hardy</td>
<td>Interfacial Studies on Two Fluid Mixing (GO &amp; IDA)</td>
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<td>J.R. Hardy</td>
<td>Microscopic Properties of Ionic Molecular Solids: Theory and Experiment (ARO)</td>
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<td>Jostock</td>
<td>Correlation Studies of Three Motive, Coussinibinding Interactions (NSF)</td>
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Jawad: Electronic and Magnetic Properties of Quasi-crystalline and Anomalous Alloys (NSF) | 15.0
Kata: Theory of Biological Effectiveness (DOE) | 49.0
Kata: Theoretical Investigation of the Radiation Hazards from Cosmic Rays within Space Vehicles (NSF) | 30.0
Liu: Neuromechanics of the Brain (NSF) | 22.8
Rudd: Initiation Processes in Atomic Collisions (NSF) | 96.2
Samson: Interaction of Radiation with Planetary Gases (NASA) | 85.5
Samson: Photoionization Studies of Atoms (NSF) | 85.0
Samson: Ultraviolet and X-ray Bombardment of Planetary Atmospheres (NASA) | 85.0
Samson: A Rare Gas Optics-Free Absolute Photom for Energy Analyzers (UCSD) | 57.0
Schmidt: Survey of Poorly Studied Variable Stars (NSF) | 54.5
Selby: Magnetism and Magnetic Properties of Actinically-Structured Materials (NSF) | 50.9
Selby: Fundamental Studies of Magnetic Rare Earth-Transition Metal Alloys (DOE) | 75.0
Selby: Development of New Perpendicular-Magnet Materials for Magnetic-Field Applications (NSF) | 124.2
Selby: Ultra High Density Recording: Magnetic Disk Component (NSF) | 80.8
Selby: Ultra High Density Recording: Optical Recording Component (NSF) | 48.9
Selby: Surface Studies of Metal Film Resistors (DARPA) | 6.0
Selby: Materials Research on Nano-structured and Complex Systems (EPSCOR) | 100.0
Simon: A Test of New Reductive Qualities and Their Incorporation into Improved Cathode Polishing Models (NASA) | 109.5
Starr: Dynamics of Photon-Atom Interactions (NSF) | 56.0
Starr: Dynamics of Collision Processes (DOE) | 72.0
Starr: Conference on Two-Dimensional Effects in Ion-Atom Collisions (EPSCOR) | 5.0
Weymouth: Magnetic Survey: L & M Lower Portage Camp Site (NSF) | 7.0
Weymouth: St. Catherines Island Survey (NSF) | 5.0
Weymouth: Kenoach Island Survey (NSERC) | 1.0
Weymouth: Port Ellis Magnetic Survey (NSF) | 1.4
Weymouth: North Carolina Survey (NSF) | 3.5
Weymouth: Magnetic Survey of Umpqua & Grant National Historic Site, Missouri (NSF) | 4.4
Weymouth: Magnetic Survey of the Coquial Valley National Recreation Area, Ohio (NSF) | 1.0

TOTAL $4,191.0