

At the close of summer and the beginning of a new school year, we bring you the second Newsletter from the Physics and Astronomy Department of the University of Nebraska. Again we are pleased at the response from our alumni to last year's Newsletter, whose responses appear later in the Newsletter. Enclosed with this Newsletter is a postcard for you to add what you might think is worthwhile for publication in next year's edition of the Newsletter. We would hope that you would pay particular attention to the list of lost friends and try to help us locate them.

Our plans for the Newsletter are expanding and so we intend over the next few years to include in each Newsletter a summary of one group of members in the department so that you can gain an understanding of the current areas of interest and progress in the department.

Kudos this year go to Professors James Samson, who was selected as a Regents Professor and Professor Edgar Pearlstein, who received what has almost become the annual Teaching Award for the department. We report that Menno Fast, who has been our lecture demonstration manager, has retired. On leave during the year have been Professors Jaswal, Rudd and Sartori.

The results of President Roskens' trip to China has resulted in a cooperative venture with the Chinese for the department. Professor Sellmyer currently has J. G. Zhao and Z. D. Chen of the Institute of Physics, Chinese Academy of Science, Beijing in research in solid state physics.

As mentioned above and in honor of Professor Samson's selection as a Regents Professor we have decided to highlight the Atomic Physics Section in this Newsletter.

FROM PROFESSOR BURROW:

LOW ENERGY ELECTRON SCATTERING FROM ATOMS AND MOLECULES

Our group studies the scattering of low energy electrons (0 to 20 eV typically) from a variety of systems ranging from atomic hydrogen to large organic molecules. Our primary emphasis is on locating and characterizing temporary negative ion states in these systems. At certain discrete energies, the incoming electron may temporarily occupy one of the normally unfilled orbitals of the molecule forming a negative ion.

The lifetimes of these ions are very short, say 10^{-12} to 10^{-15} seconds. Nevertheless their existence is of considerable importance technologically. In molecules for example, there is a high probability that when the electron departs, the molecule will be in a vibrationally excited state. Such processes are central to the operation of certain types of lasers.

We are extending our studies to atoms and molecules which are more difficult to produce in the gas phase. Alan Johnston, for this thesis work, is generating beams of metal atoms such as Zn, Cd, Hg, and the alkali metals to cross with his electron beam. He has studied the formation of temporary negative ion states and is now looking at the cross sections for exciting the atoms by electron impact. Kenneth Stricklett has constructed an infra-red laser which he will use to pump molecules into excited vibrational levels. This will permit us to collide electrons with molecules in selected states, and to study the role of internal energy in the processes of interest.

At present our work is supported by grants from the Engineering Division and the Quantum Chemistry Program of the National Science Foundation. In the past, grants have also been held from the Petroleum Research Fund and Research Corporation.

FROM PROFESSOR JAECKS:

The Atomic Collision Program of Rudd, Jaecks, and Burns received a research grant renewal from the National Science Foundation, starting April 1, 1981. This renewal will receive a projected increase of \$120,000 over the next three years. Work continues in a variety of ion-atom/molecule and electron-atom collisions with an emphasis on studying detailed angular correlations of photons and electrons emitted as a result of the atomic excitation process. Such measurements provide the best tests for theories, and in some instances, have provided clues for new theoretical models. At present 8 students and post-doctoral research associates are involved in these experiments.

FROM PROFESSOR MACEK:

Theoretical atomic physics: One of the most prevalent ion-atom reactions, electron capture, represented by the scheme



has proven to be most difficult to formulate theoretically. At high energies the reaction proceeds by the Thomas double collision mechanism where the captured electron undergoes two collisions: one with P^+ and one with the target T^+ . This mechanism was proposed over forty years ago, but no definitive experimental evidence for it has been found.

Some time ago the University of Nebraska Atomic Physics Group discovered the reaction, electron capture to continuum states, represented by the scheme



Reaction (2) differs from (1) in that the electron associated with P^+ eventually moves off to become a free electron. We have shown how a study of this free electron spectra provides clear evidence for contributions analogous to the Thomas double collision mechanism.

Specifically the free electron spectra exhibits a discontinuity peculiar to the double collision mechanism. This discontinuity is apparent in several groups of experimental data.

FROM PROFESSOR SAMSON:

Atoms, Molecules, and Vacuum UV Radiation: What happens when photons collide with atoms and molecules? The question is simple but the answers have been a long time in coming. Our research group has been studying, experimentally, what takes place when photons interact with atoms and molecules. In the spectral range of interest (1000 Å down to the soft x-rays) electrons are ejected, molecules dissociate into ionic fragments and multiple ionization can occur. This is the field of photoionization. By studying these individual photoionization processes and obtaining quantitative cross sections a foundation is prepared for theoreticians to construct a model of the interaction process and to provide a better understanding of atomic and molecular structure. Our Laboratory, here in Nebraska, is the leader in this field and has produced the highest quality and quantity of photoionization data of any laboratory. Our data is used by theoreticians throughout the world. This type of research has immediate application to the study of atmospheric physics. As the sun's rays bombard a planetary atmosphere photoionization must occur in the upper regions of the atmosphere. It is this process that is responsible for the production of the Earth's ionosphere. In fact, the dissociative ionization process broke up the early Earth's ionosphere of ammonia, methane, carbon dioxide, etc. allowing the free atoms of oxygen, and nitrogen to combine to form molecular oxygen and nitrogen. This research is being supported by NASA, NSF, and the Dept. of Energy.

FROM PROFESSOR STARACE

Anthony F. Starace returned this year from a 9 month sabbatical leave at Freiburg University (West Germany) where he was an Alexander von Humboldt Research Fellow. There he collaborated with both experimental and theoretical atomic physics groups, particularly concerning the polarization of fluorescence radiation resulting from atomic photoionization, and gave numerous in-house seminars. He also lectured at the Universities of Hamburg, Heidelberg, Innsbruck, and Paris, wrote four scientific journal articles, and gave an invited talk at the VIth Vacuum Ultraviolet Radiation Physics Conference at the University of Virginia. Starace also found time to learn German, become expert in wines of the Kaiser stuhl area between the Rhine and Freiburg, and to enjoy cross-country skiing in the Black Forest. Upon returning to Lincoln he has submitted grant proposals to study the photoexcitation process in helium together with his postdoctoral research associate, Don Miller, random phase approximation theories for open-shell atoms with his student Siamak Shahabi, and helium in high magnetic fields with his student Chang-Hwan Park.

WE HEARD FROM THESE ALUMNI:

ANDERSON, Dr. Milo, Department of Physics, Pacific Union College, Angwin, CA 94508

Professor of Physics at Pacific Union College. After completing an MA at UNL in 1955, taught physics at Union College here in Lincoln. Spent five years at the National Bureau of Standards while pursuing graduate study at the University of Colorado at Boulder. Received Ph.D. in electrical engineering in 1971. Since has been teaching at Pacific Union College, Angwin, CA. Is completing his second four-year term as chairman of the Department of Physics and Computer Science.

ANDERSON, Tauba U., 485 Arundel Rd., Goleta, CA 93117

Is Senior Engineer at Delco Electronics, working in radar signal analysis.

ANDERSON, Dr. Terry L., Department of Physics, Walla Walla College, College Place, Wash. 99324

ANSPAUGH, Dr. Bruce, 5010 Lauderdale, La Crescenta, CA 91214.

Is member of Technical Staff at Jet Propulsion Lab.

BAIRD, Dr. Leemon Claude, Jr., 320 E. North Ave., Pittsburgh, PA 15212

Is a Radiological Physicist at Allegheny General Hospital. Living in Pittsburgh with wife Jeanne (U.N. - M.S. in math, 1963) and 4 children. Jeanne is teaching at Robert Morris College.

BEDWELL, Dr. Thomas H., Northern Arizona University, Box 6010, Flagstaff, AZ 86011.

Is Professor of Physics at Northern Arizona University. Now working in Atmospheric Physics; Coordinator of the Atmospheric Sciences; M.S. - U. of Oklahoma, 1975; Engineering Physics (Atmospheric Emphasis); Developing mountain meteorology for this area; also developing Radio Astronomy as part of Intended Astronomy major under Physics Department.

BOYER, Dr. Larry, Naval Research Laboratory, Washington, D.C. 20375

Is Research Physicist at Naval Research Lab.

COOK, Dr. Charles J., 47 Solana Drive, Los Altos, CA 94022

Is employed at Stanford Research Institute.

CROOKS, Dr. Geoffrey B., ISCO, Lincoln, NE 68510

Is Director of Engineering at ISCO. Wants to know of any M.E.'s willing to work for less than 35K?

FLECKENSTEIN, Dr. David C., 1221 Briarfield Dr., Lansing, Michigan 48910

Is Systems Engineer for IBM.

GRUZALSKI, Dr. Greg, Oak Ridge National Laboratory, Solid State Division, Bldg. 2000, Oak Ridge, TN 37830

After leaving NU, spent 2 years working for David Turnbull of Harvard (during which time Anna Marie was born) and then joined the Solid State Division at ORNL (March, 1980). Summer there is the pits!

KOBETICH, Dr. E. J., 214 Drakes Drum Dr., Bryn Mawr, PA 19010

Is Manager of Material Research and Technology Development at Arco Polymers, Inc.

LANDKAMER, Chris, 355 So. Madison Ave. Apt. 206, Pasadena, CA 91101

LANG, Dr. Wayne, Dept. of Physics, University of North Carolina-Asheville, Asheville, NC 28804

Is Director of Computing Center and Professor of Physics. Divides his time between running the Computer Center and teaching undergraduate computer courses. His continuing interest in physics is reflected in the courses he chooses to teach, such courses as Computer Graphics, Microcomputers, and Computational Physics are among his favorites. Phyllis is assistant editor of The Arts Journal and teaches part time at the University. Lives in a house high up on a mountain. Come visit.

LUTTRELL, Ron, 6202 No. 31st Ave., Omaha, Nebraska 68111

Senior Training Officer for Union Pacific Railroad. Has been updating training and is currently writing a new program to put Ind. Programs in (U.P.) stores from Los Angeles to Kansas City. Is still doing teaching of purchasing and store department personnel, which requires traveling.

MAGER, Dr. Dixie, Apt. 10F, University Houses, Madison, Wisconsin 53705.

Obtained M.S. degree from University of Toronto, 1977; Ph.D. degree in 1980 from Dept. of Medical Biophysics, University of Toronto. Started post-doctoral research in Dept. of Genetics, University of Wisconsin-Madison, January 1981.

NIVA, Dr. Gordon D., 1516 River Rd., Corona, CA 91720

Is member of Technical Staff at Rockwell International. After one year on the job he can happily report that industry has not caused him to go far afield from physics. The work is very satisfying, fast paced, and diverse, In short, it hardly caused him to break stride from graduate school.

PINKERTON, Dr. Frederick, General Motors Research Labs, Warren, MI 48090

Is Senior Research Scientist for GM. Received Ph.D. August 1981 from Cornell University.

REIERSON, Dr. James D., 3311 No. George Mason Dr., Arlington, VA 22207

Is Systems Engineer for Mitre Corp. Received Ph.D. in Nuclear Physics from Iowa State in 1969. Spent '73-'75 in Peace Corps teaching at the University of the South Pacific in Suva, Fiji. He is married and has two children.

ROPER, Steven M., 2040 Sahley River Rd. D-11, Charleston, SC 29407

Is Ensign in U.S. Navy, stationed on the U.S.S. James K. Polk (SSBN645) homeported in Charleston, SC. Attended Nuclear Power School in Florida, Prototype in Idaho, Submarine School in Connecticut, and is now qualifying as a Diving Officer aboard a nuclear submarine.

SAUTTER, Dr. Chester A., 1305 So. Elm St., Moorhead, MN 56560

Is Associate Professor of Physics at Concordia College. Is completing his 17th year of undergraduate physics teaching at Concordia. Now also teaching environmental studies. Will be on sabbatical during 1981-82 academic year. Family: wife (Shirley) continues homemaking and is typing Ph.D. thesis for a colleague; Greg, 19; Lorraine, 16; Britta, 13; and Rachel, 11.

SCHULZE, Dr. Paul D., ACU Station Box 8212, Abilene, TX 79699

Is Professor of Physics at Abilene Christian University. Married, daughter 13, son 11. Has had three years in Experimental Solid State Physics: Crystal Growing and Preparation; Thermal Diffuse Scattering of X-Rays; Equipment Design; Theoretical Studies of Charged Point Defects in Ionic Crystals; Computer Programming.

SILL, Dr. R. C., University of Nevada, Reno, NV 89507

Is Professor of Physics at University of Nevada.

SMALLEY, Dr. Larry L., Dept. of Physics, Huntsville, AL 35899

Is Chairman and Professor at Department of Physics, University of Alabama in Huntsville. Youngest daughter, Audrey (19), recently got married. Daco (20) and Larry, Jr. (22) still going to school.

WARING, Dr. Alfred E. (Gene), 812 First St., Milford, NE 68405

Is Math and Physics Instructor of Electronics Dept., Southeast Community College. Published the article "Energy and the Automobile" in October 1980 The Physics Teacher. Currently working on an alcohol fuel project. Remembers the move into Behlen Lab. There are still a few familiar names on the faculty. Wife: Nadine, Daughter: Nancy.

We are still trying to locate the following lost friends:

Dr. Bishan Agrawal	(Ph.D.-74)	Ms. Carol McKinley	(B.S.-64)
Mr. Donald Anderson	(B.S.-54)	Mr. John C. Meyers	(B.S.-75)
Mr. Malvyn P. Bailey	(M.A.-62)	Mr. Edward E. Moreland	(M.A.-54)
Mr. Glenn A. Brindiero	(M.S.-69)	Mr. Maurice L. Mullin	(M.S.-53)
Mr. Wayne R. Chase	(M.S.-66)	Mr. Stuart O. Nelson	(B.S.-52; M.S.-54)
Mr. Duane A. Courter	(M.S.-60)	Mr. Edward B. Niccum	(M.S.-66)
Ms. Jean Davis	(B.S.-54)	Mr. Terry L. Ochsner	(B.S.-72)
Mr. James Eder	(M.S.-66)	Mr. William O'Shaughnessy	(M.S.-70)
Mr. Timothy D. Evans	(B.S.-75)	Mr. Robert L. Phillips	(B.S.-73)
Mr. Charles R. Franz	(M.S.-69)	Dr. Kevin D. Reilly	(M.S.-62)
Mr. William G. Garner	(B.S.-68 or 69)	Mr. Kenneth B. Scow	(M.A.-55)
Mr. Neil Goldman	(M.S.-64)	Mr. Roy Simperman	(M.A.-65)
Mr. Paul Hiltenson	(B.S.-54)	Mr. Gary L. Starkey	(B.S.-63)
Mr. Randy R. Hinze	(B.A.-75)	Mr. Joseph C. St. Lucas	(M.S.-76)
Dr. Bruce W. Jones	(B.S.-69; M.S.-76; Ph.D.-79)	Mr. George L. VanEvery	(B.S.-73)
Mr. Henry J. Lenhoff	(B.A.-72)	Mr. Theodore Wade, Jr.	(M.S.-62)
Miss Fang-Mei Linn	(M.S.-62)	Mr. Kuo Kuang Wang	(B.S.-58)
Mr. Michael T. Marsh	(B.S.-70)	Ms. Anna Welch	(B.S.-62)
Mr. Edward Mathieson	(B.S.-71)	Mr. Ronald E. Whitney	(B.S.-73)
Mr. Robert Matulka	(B.S.-73)		