TTU PHYSICS NEWS

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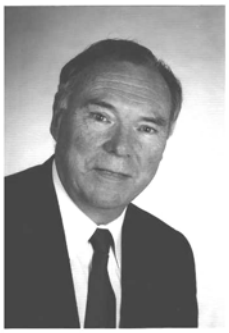
RON E. MILLER IS HONORED WITH THE 2000 DISTINGUISHED ALUMNUS AWARD



At the Spring, 2000 banquet, **Ron E. Miller** received our Distinguished Alumnus Award. Dr. Miller has had a distinguished career in the semiconductor industry. After earning a BS from U.T.-Arlington, and an MS from North Texas State, he received his PhD from TTU in 1971. His advisor was the late Dr. Bill Marshall. He is Senior Director of Advanced Optical Programs at Kla-Tencor.

Dr. Miller's background includes nine years on the faculty at Northwestern State U. There, his research included transport in semi-metals, ultrasonic phenomena, phonons in alums, and properties of oxides. He left academia for industry in 1980, when he joined the Research and Development Lab at Texas Instruments. There, he managed the e-beam direct write device prototyping lab and later managed the optical and e-beam lithography section for the Government Electronic Front End.

In 1985, Dr. Miller joined the Nikon Precision division of Nikon Corp. There, he led the development of lithographic techniques for improved stepper performance. Promoted to Vice President, Technology and Applications in 1988, he led the introduction of scanning technology for Nikon. He moved to Integrated Solutions in 1995, where he was Vice President of Technology and Applications. There, he concentrated on the technology of 193 nm and 157 nm lithography until the purchase of Integrated Solutions by Ultratech Stepper in 1998. At Ultratech Stepper, he was an advocate for the introduction of 157 nm microsteppers into the semiconductor industry.

Dr. Miller took his present position at Kla-Tencor in 2000. He is liaison between Kla-Tencor and Carl Zeiss for the introduction of advanced optical technology into Kla-Tencor's products. He is stationed in Jena, Germany. He holds two patents. One is related to patterning of semiconductor contacts and the other is related to using terpine compounds for cleaning electronic materials and printed circuit boards. He has published papers on numerous subjects in basic research and in semiconductor devices. His recent publications are on the development of DUV patterning.

Ron Miller's outstanding successes are an inspiration to Physics students, indicate that the applications of a Physics education can work well in an industrial setting, and show that he is very deserving of our Distinguished Alumnus Award!

DWAIN K. BUTLER IS THE 2001 PHYSICS DISTINGUISHED ALUMNUS

Dwain K. Butler received our Distinguished Alumnus Award at the Spring, 2001 banquet. Dr. Butler has had a distinguished career in geophysics. He received the physics BS from TTU in 1968. He earned the MS from the U. of Maryland and the geophysics PhD from Texas A&M. He is Senior Research Geophysicist at the Geotechnical and Structures Lab of the US Army Engineer Research & Development Center (ERDC) in Vicksburg, MS, where he has been since 1973. He is a US Army Corps of Engineers designated National Technical Expert on Environmental Geology.

Dr. Butler has many broad areas of expertise in geophysics and geology. These include environmental and solid earth geophysics, engineering geology, dynamic material properties, process modeling, projectile penetration, rock mechanics, soil and rock testing, site investigation and characterization, karst geology, cavity detection, microgravimetry, electromagnetics, shallow seismic methods, seismic risk, liquefaction assessment, ground water resources and modeling, seepage assessment, unexploded ordinance detection, and archaeological geophysics.

As an Adjunct Professor in the Dept. of Civil Engineering at Mississippi State and in the Dept. of Geophysics at Texas A&M, Dr. Butler teaches courses in applied earth geophysics, sits on MS and PhD committees, and serves on consulting review committees. He is a registered Professional Geologist in Arkansas and North Carolina.

Dr. Butler is Past-President of the Near-Surface Geophysics Section of the Society of Exploration Geophysicists (SEG) and Past-President of the American Institute of Professional Geologists. He has served on National Research Council Committees for "Progress in Rock Mechanics" and "Characterization of the Shallow Subsurface". He has also served as Associate Editor of *Geophysics*. His memberships include the SEG, the American Geophysical Union, the International Society of Rock Mechanics, the Assoc. of Engineering Geologists, the European Assoc. of Geoscientists and Engineers, the European Assoc. of Exploration Geophysicists, the Environmental and Engineering Geophysical Society, the American Society of Civil Engineers, and the American Institute of Archaeology.

Dr. Butler's professional honors include a 1984 Outstanding Technical Presentation Award from the National Symposium on Reclamation of Minelands, a 1985 Herbert Vogel Award from the Corps of Engineers, the 1991 Distinguished Alumnus Award of the Dept. of Geophysics at Texas A&M, the 1991 Commander's Award from the Corps of Engineers, and the 2001 R&D Award from ERDC. He holds one patent, for "Noninvasive Mass Determinations of Stockpiled Materials".

Dr. Butler's outstanding success in geophysics should be an inspiration to Physics students and is an indication of the diverse career options open to someone with a Physics education. His national reputation in this area makes him truly deserving of our Distinguished Alumnus Award!

REMARKS FROM THE CHAIR

Many good things have happened in the Department of Physics since the last newsletter! Our faculty and students have continued to strive for the betterment of the department and have made many achievements in teaching, research, and service.

The Society of Physics Students (SPS) has added some excitement to the TTU home football games. Ray Thomas, a physics major and SPS President, designed and constructed a tee shirt cannon. This is a gas gun operated with compressed carbon dioxide donated by Coca-Cola. They shoot tee shirts into the stands during the game. Some shirts have a projectile motion diagram. When they tried to sell shirts at a pre-game party, one man said he wouldn't buy one because he couldn't explain it!

Computer and web assisted instruction have become important, especially in the introductory classes. For the last three years, the students have been downloading their homework from a website and uploading their answers. They find out immediately if they did it correctly. If they get a wrong answer, they get another chance at a correct one, but for reduced credit. Based on student performance, both on a national exam, called the Force Concept Inventory, and on exams prepared by the instructors, this seems to improve learning.

The departmental external research funding level continues to increase and the research facilities continue to improve. The largest on-campus lab is the Nano Tech Center, which is associated with the Maddox Laboratory for Semiconductor Materials. Drs. Shubhra Gangopadhyay and Mark Holtz are the primary Physics faculty who work there, in collaboration with Joint EE and Physics faculty member Dr. Henryk Temkin, as well as with other Engineering faculty. The High Energy (Particle) Physics group, Drs. Richard Wigmans, Vaia Papadimitriou, and Nural Akchurin, use, by far, the largest labs, doing their work at the large accelerators at CERN (Geneva, Switzerland) and Fermi Lab (Batavia, IL). Dr. Roger Lichti also does experiments at off-campus labs. He performs muon spin rotation studies of semiconductors at accelerators in Canada and England.

Dr. Tom Gibson connects large numbers of PC's together so that they will do his calculations concerning what happens when a positron goes slowly by something, like an atom. He now has 16 PC's in parallel. Dr. Wally Glab has so many dye lasers in his lab that I think that if the beams from were combined, the light would be white! Drs. Kelvin Cheng and Juyang Huang have nicely equipped biophysics labs, where they try to unravel the mystery of protein structure in living cells. Dr. Charley Myles is calculating some of the things that happen in semiconductors at high electric fields. Sandia National Lab does experiments and he explains the results. Dr. Roland Menzel is pushing the limits of our knowledge about how molecules fluoresce, as well as running his annual workshop to teach police how to find fingerprints with laser fluorescence. The Pulsed Power Lab, where I do my research, is now the Center for Pulsed Power & Power Electronics. I call it "P-cubed-E"!

Dr. Beth Ann Thacker has received NSF funding to study the way physics is taught and to improve the way non-science majors learn physics. Dr. David Lamp works with K-12 teachers in the regional public schools. They think he is great, because he shows them ways to excite their students. He also teaches special classes for teachers and prospective teachers. Dr. Walter Borst is the Secretary-Treasurer of the Texas Section of the American Physical Society and he is also the Chair of the Regional Science and Engineering Fair. He has conducted this fair for years and it is always a big success.

Three faculty members were awarded Faculty Development Leaves (sabbaticals) this year. It is unusual for one department to obtain three at once. Dr. Vaia Papadimitriou is at Fermi Lab working on the CDF experiment. Dr. Stefan Estreicher has been in Germany, France, England, and Austria working with collaborators on semiconductor theory. Dr. Arfin Lodhi went to Malaysia where he has collaborators doing nuclear physics.

Dr. Estreicher received an international honor this year when he received the Bessel Prize. This prestigious new award, which includes a monetary prize, is given for excellence in science by the German-based Humboldt Foundation. Only five of these were awarded in the world!

All of these activities continue to enhance the local, regional, national, and international reputations of the TTU Department of Physics and make me proud to be the Chairman!

Please check out our web page at http://www.phys.ttu.edu/ for more details on all of our activities!

B.J. MARSHALL ENDOWMENT SOLICITS CONTRIBUTIONS

A Billy Jack Marshall Memorial Scholarship Endowment has been established. Jack Randorff, 1997 Distinguished Alumnus, is heading the fund-raising effort. In his words, "Every former student whose life was touched in some way by Dr. Marshall will surely want to contribute." It takes at least $5,000 to establish a permanent endowed scholarship. **Please send your tax deductible donations to Department of Physics, Texas Tech University, Box 41051, Lubbock, TX 79409-1051. Make checks payable to the Physics Dept. Write "B.J. Marshall Endowment" on the memo line.**

OUR NEWEST FACULTY MEMBER

In the Fall of 2000, the department welcomed our newest tenure track faculty member, **Nural Akchurin**, who joined us as an Associate Professor. He has brought with him considerable expertise and experience in his research area of experimental particle (high energy) physics. Among his research interests are the origin of spontaneous symmetry breaking in the electroweak sector of the Standard Model, Higgs bosons, supersymmetric particles, new gauge bosons, and technicolor states. He is also heavily involved in particle detector R&D. This includes quartz forward and hadronic calorimetry design, construction, and testing at the CMS experiment at the Large Hadron Collider at CERN, in Geneva, Switzerland.

Dr. Akchurin is a native of Turkey. After receiving his Diploma from Robert College Lycee, in Istanbul in 1978, he came to the US. He received the physics BA from Vassar College in 1982, the physics MS from Lehigh University in 1985, and the PhD in particle physics from the University of Iowa in 1990. He stayed at Iowa after his PhD and held various positions there, including Research Investigator (1990-1992), Assistant Research Scientist (1992-1998), and Research Scientist (1998-2000).

Dr. Akchurin's expertise and interests nicely complement those of the other two faculty members in particle physics, Associate Professor Vaia Papadimitriou and Bucy Professor Richard Wigmans. Along with Research Professor Alan Sill, plus several post-docs and students, this group maintains TTU's nationally prominent role in this area.

STEFAN ESTREICHER RECEIVES HONORS

In February, 2000, the TTU Board of Regents named **Stefan K. Estreicher** a **Paul Whitfield Horn Professor**. This honor, which gives the recipient a title change, plus an endowed salary supplement, is named after TTU's first President. It is the highest honor that TTU may bestow upon a faculty member! The title of Horn Professor is granted to faculty of "***outstanding national and/or international distinction in research.***" Dr. Estreicher is only the second Horn Professor in the Department of Physics.

Dr. Estreicher was selected for this honor because of his outstanding research in theoretical (computational) materials physics. This work involves the first principles calculations of the properties of defects in semiconductors. He received his PhD from the University of Zurich, Switzerland, in 1982. He has been at TTU since 1986 and has held the Professor rank since 1996. He became a Fellow of the American Physical Society in 1997. Please see http://jupiter.phys.ttu.edu/stefanke/ for more details on Dr. Estreicher's research.

In April, 2001, Dr. Estreicher's strong international reputation was confirmed when was selected as a recipient of the prestigious **Friedrich Wilhelm Bessel Research Award.** This award, named for the German scientist, F.W. Bessel, was established in 2001. It is administered by the Alexander von Humboldt Foundation, a German foundation for the promotion of international research. ***Only five scientists worldwide were chosen for this award in 2001!***

The Bessel Award Program objective is to attract top researchers to engage in cooperative efforts with researchers in Germany. Recipients carry out projects in Germany in cooperation with colleagues there. Bessel Award recipients also receive a significant monetary prize. Dr. Estreicher spent most of the Fall, 2001 in Germany on a TTU Faculty Development Leave. There, he carried out the type of cooperative research for which the Bessel award was designed. For more details, see the Bessel and Humboldt web pages at http://www.humboldt-foundation.de/en/programme/preise/bessel.htm and http://www.avh.de/en/index.htm.

TWO DEPARTMENT FACULTY RECEIVE 2001 TTU HONORS

At the Spring, 2001 Faculty Honors Convocation, two Department of Physics Faculty were recognized with university-wide honors. Congratulations to them both for these well-deserved awards!

Associate Professor **David Lamp** received the TTU President's Excellence in Teaching Award. This award, which consists of a medallion and a monetary prize, is given yearly to the faculty who are rated, by both peer and student evaluations, as being the outstanding, all around teachers. There is only one such award given each year for each of the eight TTU colleges. Dr. Lamp was the 2001 recipient from the College of Arts & Sciences.

Associate Professor **Vaia Papadimitriou** was awarded the TTU Outstanding Researcher Award. This award consists of a certificate and a check. It is awarded annually to the faculty member in each college who is judged by peers and outside experts to be the best researcher. Dr. Papadimitriou was the 2001 recipient from the College of Arts & Sciences.

TWO DEPARTMENT FACULTY TO CHAIR GORDON CONFERENCES IN 2002

The Gordon Research Conferences provide an international forum for the presentation and discussion of frontier research in the biological, chemical, and physical sciences and technologies. Each Gordon Conference has a recurring theme and strives to be the overall best meeting in its field. They provide an open application process for attendance by active scientists, technologists and educators from academia, government and industry. (For more information see http://www.grc.uri.edu/.)

It is prestigious to be an invited Gordon Conference speaker. However, those who are asked to Chair and organize one of these conferences are scientists with truly outstanding reputations. In 2002, two TTU faculty will chair such conferences!

Assistant Professor **Beth Ann Thacker** will Chair the Gordon Conference on "Physics Research and Education: Quantum Mechanics," June 9-14, 2002 at Mount Holyoke College, South Hadley, MA. The goal of this conference is to bring together researchers, physics education researchers and quantum mechanics instructors to promote innovation in teaching undergraduate quantum mechanics. The conference will include sessions and discussions about content that should be taught, development of curricula based on research on students' understanding of quantum mechanics, and the results of current research that can be used to increase students' understanding of quantum mechanics concepts at the undergraduate level.

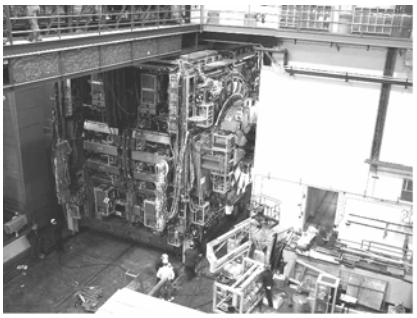
Horn Professor **Stefan K. Estreicher** will Chair the Gordon Conference on "Point and Line Defects in Semiconductors," July 7-12, 2002 at Colby-Sawyer College, New London, NH. At this conference, sessions on Defects in Silicon, Dislocations, Interface Defects, Nanostructures, Zinc Oxide, Muon Spin Resonance, Spins and Qbits, II-V Nitrides, Isotopes as Point Defects, Gap Issues in (In)GaAsN, Defects in SiC, and Defects in Diamond are planned. Professor **Roger Lichti** will give an invited presentation in the Muon Spin Resonance session and Maddox Professor of EE and Joint Professor of Physics **Henryk Temkin** will give an invited talk in the (In)GaAsN session.

MARLON SCULLY NAMED TO NATIONAL ACADEMY OF SCIENCES

Marlan O. Scully, Distinguished Professor of Physics at Texas A&M and TTU Adjunct Professor of Physics, was elected to the National Academy of Sciences (NAS) during the organization's 2001 meeting. He was elected to this honor in recognition of his outstanding contributions to theoretical quantum optics. Dr. Scully received the PhD in physics from Yale in 1966. He has been an Adjunct Professor at TTU for more than 10 years.

The NAS, a private, non-profit, society of distinguished scholars engaged in research, is dedicated to the furtherance of science and technology and to their use for the general welfare. Its mandate requires it to advise the Federal government on scientific matters. Members of the NAS are elected in recognition of their distinguished and continuing achievements in research; election to the Academy is one of the highest honors that can be accorded to a scientist. The Academy consists of 1900 members and 300 foreign associates, of whom 170 are Nobel Laureates. Further details may be found at http://www.nationalacademies.org/. It is clear that TTU is fortunate to have Dr. Scully as an Adjunct faculty member!

PARTICLE PHYSICS GROUP NEWS



The TTU particle physics group is actively involved in the 400+ person collaboration known as the CDF experiment at Fermi National Accelerator Lab in Batavia, IL. Pictured at left is the central portion of the CDF detector moving in January, 2001 from the Assembly Hall where it was built, to the Collision Hall where it collects data. CDF stands for "Collider Detector at Fermilab". Fermilab is home to the world's most powerful particle accelerator, the Tevatron. The Tevatron accelerates protons and antiprotons close to the speed of light, and collides them head-on inside the CDF detector, which is used to study the collision products. By doing this, researchers try to reconstruct what happened in the collision and to figure out the nature of the forces that govern the world around us.

The CDF experiment started taking data again in October, 2001, for first time since February, 1996. In the intervening years, the accelerator and the CDF detector underwent major upgrades. The enhancement provided by these upgrades will move the experiments into a regime of precision hadron collider physics. This capability will allow experimenters to find the answers to several important questions in high energy physics. It also has the potential for revealing interesting new physics.

TTU has been a participating institution in the CDF experiment since 1994. The faculty members in the group are Associate Professors **Vaia Papadimitriou** and **Nural Akchurin**, Bucy Professor **Richard Wigmans**, and Research Professor **Alan Sill.** There are also several post-doctoral researchers and students. In the past few years, several TTU students have worked on projects at Fermilab in the summers, and sometimes throughout the year. In 2001, graduate students **Olga (DuBois) Lobban** and **Koushik Biswas** and undergraduate **Kenneth Carrell** worked with the CDF detector.

For more details on particle physics at TTU, please see http://www.phys.ttu.edu/research/hep_welcome.html.

BIOPHYSICS GROUP NEWS

Professor **Kelvin Cheng** and Associate Professor **Juyang Huang**, our two biophysics faculty, are investigating diffusion properties of sterols in binary and ternary lipid mixtures using a multitude of techniques. These include fluorescence microscopy, time-resolved photoluminescence and steady state single photon counting.

Richard L. Cardenas successfully defended his PhD dissertation in biophysics in August 2001. His dissertation is on the creation and development of an innovative calibration procedure and data visualization of a new generation of gel dosimetry for direct verifications of advanced 3-dimensional conformal radiation cancer therapy. The work summarized a three-year collaborative effort between our biophysics group and the Radiation Oncology Department at the University of California at San Francisco. Graduate student **Brian Cannon** is continuing his PhD research work in the area of spectroscopic characterizations of nanoscopic domains in lipid bilayers and their modulation of ion channels.

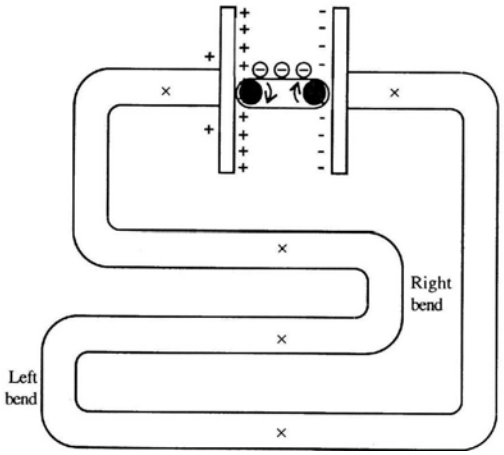
Dr. Cheng recently received a new, three-year, Robert A. Welch Foundation Grant to support his work in exploring the physics and biological relevance of superlattice domains in lipid membranes, and a research contract (as co-PI) from Advanced DNA Technologies Inc. to develop an ultra-sensitive device for detection of single DNA molecules.

For more details, see on biophysics at TTU, please see http://www.phys.ttu.edu/research/bp_welcome.html .

PHYSICS EDUCATION RESEARCH NEWS

Assistant Professor **Beth Ann Thacker,** our physics education researcher, has started, and has obtained funding for, several projects since she arrived at TTU in 1999. She is continuing research on 1) whether or not students understand the development of microscopic processes and the connection between models of microscopic processes and macroscopic observations, 2) student understanding of concepts in quantum mechanics, 3) the form of students' mental models in the context of students' understanding of the development of microscopic processes and 4) the skills and understanding developed by students in a graduate level engineering course. Dr. Thacker often stresses to colleagues in the department that there is a big difference between "***Physics Education Research***" and traditional "Physics Education". Just looking at the research topics she is pursuing, as listed here, ought to convince the reader of this fact!

Other funded work by Dr. Thacker is on curriculum development for the introductory algebra/trigonometry-based physics course. A new two-semester course is being developed that is taught in a laboratory-based environment where students learn concepts based on experimentation. Work is also being done on a theme issue of the *American Journal of Physics* for which Dr. Thacker will serve as a guest Editor. This issue will focus on the content, curriculum development and instructional methods in the undergraduate course on quantum mechanics.

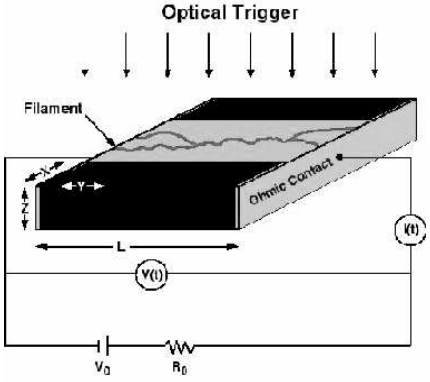


For the readers' education and amusement, what follows is an example of the type of questions which Dr. Thacker's research attempts to answer: Can students who are taught with an emphasis on models of microscopic processes and on understanding the connection between these models and the observations of macroscopic quantities better solve problems like the one given here? Consider the diagram shown (from Electric and Magnetic Interactions by R. Chabay and B. Sherwood, J. Wiley, Inc., 1995). Why is the electric field of the battery different at different points marked with ×'s, but the current is constant throughout the circuit, based on macroscopic measurements? Between the left and right bends, there is a part of the wire where the electric field due to the battery is in the opposite direction to the flow of positive current. How do you account for this? For further information contact Dr. Thacker at the department address, by phone at (806) 742-2996, or email at batcam@spudhammer.phys.ttu.edu. Also, see http://www.phys.ttu.edu/research/ed_welcome.html for more details.

In addition to biophysics research, Professor **Kelvin Cheng** also has an interest in Physics Education research. Collaborating with Assistant Professor **Beth Ann Thacker** and Harvard researcher Dr. Catherine Crouch, he has completed a two-year study assessing the impact of interactive, online homework on students' understanding of physics concepts in large lecture introductory physics courses. This work will be published soon. In addition, he will give an invited talk in the Assessment of the Web session at the American Association of Physics Teachers meeting in Philadelphia in January, 2002. He received a grant from the TTU Teaching Learning and Technology Center to support his interest in using internet technology, especially interactive online homework and the web-based course tool (WebCT), to improve physics teaching.

MATERIALS PHYSICS THEORY NEWS

Professor **Charley Myles** and his group have for several years been working on simulations of photoconductive semiconductor switches (PCSS's) at high electric fields. Such switches have been developed for high power switching applications. Most PCSS's are made from semi-insulating GaAs. Ohmic contacts are made on a semiconductor, which is put into a circuit. When the material is illuminated by above-the-bandgap light, current flows (the switch closes). At low fields, the switch is in a linear, low current, high voltage state. Turning off the light causes the current to cease (the switch opens). Above a critical field (~ 20 kV/cm for GaAs), the switch can go into a low voltage, high current "on" state, in which the current remains on for 100's of nanoseconds after the light is off. This high gain, nonlinear state is called "lock-on", because a switch in this state is "locked-on" to a relatively low voltage, corresponding to a field of ~ 5 kV/cm for GaAs. This effect is accompanied by current filaments, visible in the infrared (see figure).



In collaboration with Sandia National Labs, which partially funds this research, the Myles group (including 1998 PhD graduate **Samsoo Kang** and PhD student **Ken Kambour**) has been using Collective Impact Ionization Theory to study such switches. The main idea is that, at high charge carrier densities, as in the current filaments, carrier-carrier interactions enhance the impact ionization probability, allowing a "local breakdown" at fields much lower than the bulk breakdown field. Recently, they have used this theory to study steady state properties of current filaments. Presently, they are using Ensemble Monte Carlo along with this theory to investigate the conditions for initiation of lock-on. This research has recently received new funding from the AFOSR MURI Program.

In addition to their ground state diamond structure, silicon, germanium, and tin can form metastable, expanded volume, crystalline solids, called "clathrates." As in diamond, in the clathrates, all Group IV atoms are tetrahedrally coordinated and covalently-bonded with their neighbors. In contrast to diamond, the clathrate lattices are open frameworks containing 20, 24, & 28-atom "cages". These can contain loosely bound impurities ("guests"). Because of their weak bonding, the guests have minimal effects on the electronic properties. However, they produce low frequency vibrational modes which can strongly affect the vibrational properties. Some guest-containing clathrates are excellent candidates for thermoelectric applications.

In collaboration with Arizona State U., Dr. Myles and his group have been performing calculations of the electronic and vibrational properties of some tin-based clathrates. These use a first principles, density functional method. In addition, they have recently performed empirical potential-based molecular dynamics simulations of the thermal conductivity of guest-free and guest-containing germanium-based clathrates. The results compare favorably with experiment.

Horn Professor **Stefan Estreicher** has for many years worked on the first-principles theory of defects in semiconductors. "Defects" include native defects (vacancies, self-interstitials), impurities, and complexes. Defects determine to a large extent the electrical and optical properties of semiconductors. The type and concentration of charge carriers are controlled by dopants and their lifetimes are determined by defects. The diffusion of many impurities is affected by the presence of specific native defects. Understanding the physics and chemistry of defects in a covalent solid is not just important from a technological perspective but is also a formidable challenge to experimentalists and theorists.

Dr. Estreicher's research is in the calculation of properties of a wide range of defects, mostly in crystalline silicon. The calculations by his group mainly involve the use of first principles, density-functional theory in periodic supercells containing from 64 to 216 host atoms. These results are sometimes complemented with ab-initio Hartree-Fock calculations. In addition, dynamic properties are obtained from molecular-dynamics simulations. At a given time, the total energy allows the calculation of classical forces on each nucleus, and Newton's 2nd Law is used to compute the velocity and position of each nucleus at a short time (~ 1 femtosecond) later. Each nucleus is moved to its new position and assigned its new velocity, and the calculation begins again. This allows the calculation of vibrational modes and sometimes of diffusion and/or defect interactions.

SOUTH PLAINS SCIENCE FAIR SHOWCASES TALENTED PUBLIC SCHOOL STUDENTS

Since 1995, Professor **Walter L. Borst** has served as advisory board Chair for the South Plains Regional Science and Engineering Fair. This is sponsored by TTU and takes place every year in March on-campus. About 400 students from regional elementary, junior high, and high schools compete with their science projects for prizes and awards. The two top winners from the junior and senior divisions go to the International Science Fair. The details of the Fair are administered by dedicated public school teachers. Dr. Borst primarily solicits financial contributions to the Fair from various sources on- and off-campus and assists in arranging the TTU facilities. For more details, please see http://www.phys.ttu.edu/scifair/.

CENTER FOR FORENSIC STUDIES AIDS IN CRIMINAL INVESTIGATIONS

The TTU Center for Forensic Studies, under the direction of Horn Professor **E. Roland Menzel**, has for many years been involved in devising techniques for the detection of latent fingerprints on items of evidence in criminal investigations. These techniques have now been adopted in most major crime laboratories world-wide. Currently, Lubbock is involved in extradition proceedings for a person residing in Mexico, who 15 years ago murdered a woman in Lubbock. The evidence was developed by the Center for Forensic Studies at that time.

Many articles of evidence unfortunately display intense background fluorescence that overwhelms the fingerprint luminescence. To remedy this, the Center has devised time-resolved imaging instrumentation and is in the process of refining chemistries designed to produce fingerprint luminescences of lifetimes longer than those of typical obnoxious backgrounds, in order to permit the time-resolved imaging. As a spin-off, the Center has recently also become involved in the medical biotechnology arena, particularly time-resolved photon counting for DNA analyses. These analyses have implications in health care, environmental matters, veterinary medicine, agriculture, etc. The work includes activities in DNA luminescent labeling and instrument development. There are forensics implications here as well.

The Center is a partner in a multi-million dollar effort to establish a Forensic Sciences Institute at TTU/TTUHSC. If this is successful, we shall have a broad-based forensic science degree program at TTU before long.

For more details, please see http://www.phys.ttu.edu/~menzel/.

ROGER LICHTI LEADS INTERNATIONAL μSR COLLABORATION

For many years, Professor **Roger L. Lichti** has served as one of the primary spokesmen for an international collaboration which is using muon spin rotation (**μSR**) to study the properties of semiconductors. These experiments require muon beams, which are, of course, only obtainable at large particle accelerators. Doing such experiments therefore requires travel to such accelerators, such as TRIUMF in Canada and the Rutherford Appleton Lab in England.

The main idea of **μSR** is to use the spin of the positive muon as a probe of local magnetic fields, thus giving structural, bonding, and electronic information about the material. It is similar to nuclear magnetic resonance (NMR), except that the spin being used is that of the short-lived muon, rather than that of the nucleus of a material atomic constituent. Since the muon is positively charged, it can be viewed as a "light isotope" of the hydrogen nucleus or proton. Thus, it can (briefly) bond in the material and it also acts in many other ways like a hydrogen impurity. If present in a semiconductor, hydrogen is almost always there in large concentrations, so determining the properties of isolated hydrogen in semiconductors by other techniques is almost impossible. Since it measures the properties of isolated muons as they interact with the material, the **μSR** method thus gives researchers a means to determine the properties and behavior of isolated "hydrogen" in a material.

The international **μSR** collaboration consists of many researchers at several institutions world-wide. Each year, they publish many articles in excellent peer reviewed journals and give many invited and contributed conference papers. There also have been invited chapters in books and review articles about the **μSR** technique. One of Dr. Lichti's roles as a spokesman for the collaboration is to take the lead in writing the papers, in planning the experiments, and in writing formal proposals to accelerators for beamtime grants. This team uses 50 or more days of beamtime, worth more than $1M, annually! Dr. Lichti also maintains NSF and Robert A. Welch Foundation funding for this research, which supports his on-campus effort and helps to support graduate students. Clearly, his prominence in the international **μSR** community brings prestige to the Department!

COMPUTATIONAL PHYSICS NEWS

In the cool semi-darkness of Room 29 in the Science Building, the lights on a new low-cost, high-performance computer blink rhythmically as scientific calculations are performed at a rate exceeding 2,000 million floating-point operations per second. This computer, which costs less than $13,000, consists of 16 commodity, off-the-shelf PC-class systems hooked together in parallel with a fast ethernet switch and a free operating system. This type of computer is known as a Beowulf cluster and is the system of choice at many of the national labs where high-performance capability is crucial.

Our Beowulf system (see photo) was purchased by Associate Professor **Tom Gibson**'s Robert A. Welch grant and was constructed by our computer systems administrator (and department alumnus; BS, 1992) **Lee Burnside**. It is being used primarily to compute interaction potentials for positron-molecule collisions by PhD student **Pat Nichols** as part of his dissertation research. In the future, this system will also be used by Associate Professor **Juyang Huang** to perform Monte Carlo simulations in biophysics. It is also used for training graduate students as part of our computational physics course. For more information, see the research interests link at http://www.phys.ttu.edu/~ritlg/ .

ATOMIC, MOLECULAR, OPTICAL (AMO) PHYSICS NEWS

A study of antimatter-matter collisions is being conducted by Associate Professor **Tom Gibson**'s theoretical AMO group. They have developed the Distributed Positron Model (DPM) to compute the interaction of a positron when it is near an atom or molecule of ordinary matter. For larger, nonlinear molecules, e.g. SF_6, CF_4, and CCl_4, this requires that a full Self-Consistent Field calculation for the n+1-particle system be carried out. Such calculations would take far too long on conventional, single-processor workstations, which is why Gibson's group has pioneered the use of parallel techniques for this problem.

Pat Nichols (Dr. Gibson's PhD student) has written a suite of parallel quantum chemistry codes, PATMOL, to implement the DPM scheme on our Beowulf cluster (see above article). This breakthrough has resulted in a fruitful collaboration with Dr. R. Lucchese at Texas A&M, who has used the Gibson group's potentials to compute scattering cross sections in good agreement with experiment. It is not yet clear how large a molecular target will be practical with this scheme. Dr. Gibson is thinking about trying C_{60}! See the research interests link at http://www.phys.ttu.edu/~ritlg/ for additional information.

Recent work in experimental AMO and chemical physics in Associate Professor **Wally Glab**'s lab ("The Glab Lab") has concentrated in several areas: spectroscopy and excited state dynamics of highly excited (Rydberg) states of prototypical small molecules, such as H_2O and H_2; the effects of strong electric fields on these states; and spectroscopic studies of laser-vaporized atoms. This work utilizes multiple pulsed, tunable dye lasers whose frequencies have been upconverted into the ultraviolet and vacuum ultraviolet regions of the spectrum. It also uses molecular beam techniques, and resonance ionization of the systems under study. These experiments shed light on the exchange of energy between electronic, vibrational, and rotational motions in highly excited molecules. They also make possible highly accurate determinations of important physical and chemical quantities such as atomic and molecular ionization energies.

RESEARCH AT THE TTU NANOTECHNOLOGY CENTER

The TTU Nanotechnology ("Nano Tech") Center was started in the Fall of 1999. The Center co-Directors are Professor of Physics **Shubhra Gangopadhyay** and Maddox and Horn Professor of EE and Joint Professor of Physics **Henryk Temkin**. Also active in the Center research and other activities are Associate Professor of Physics **Mark Holtz** and Assistant Professor of EE (and Physics alumnus; MS, 1993; PhD, 1996) **Tim Dallas**. The Center is now a dynamic, multidisciplinary research and education environment. A number of diverse faculty and student participants who represent many departments participate. From a core group of Physics and EE faculty, the Center has expanded to include participants from ME, ChE, Computer Science, Biology, Chemistry, and Medicine. This has fostered collaborative proposals that break new ground. The Center's primary goal is to develop materials, processes, and techniques for designing, fabricating and utilizing miniaturized sensors and analysis systems. These microsystems are currently a "hot" research area and they will bring about new paradigms in medical diagnosis, in chemical and biological species characterization (which is particularly relevant, due to the bio-terrorism threat), and in other areas. Cutting-edge research on materials for the microelectronics industry is also being carried out at the Center.

Recently, several proposals were submitted to NSF, the Army, SEMATECH, Semiconductor Research Corporation, Actel Corporation, and Texas Instruments under the Center banner. Many of these were funded. The total Center funding for 2000-2003 is more than **$3.2 M!** Most of these programs were highly competitive. As an example, NSF's "XYZ on a Chip" program received 270 pre-proposals of which 60 were selected for proposal submission. The Center was the recipient of one of the 10 awards! There are now 11 PhD and 4 MS students plus 4 undergraduate students and 4 post-doctoral researchers supported by Center-generated funds.

In addition to research, the Center is establishing multidisciplinary educational programs for training students to work in these new areas. In 2000, for the first time, a class on the subject of Microsystems was team taught by faculty members from different departments. Future curriculum development will be supported by an education and research grant from NSF.

Since the last newsletter, numerous refereed publications, and invited and contributed conference talks have come from the faculty and students involved in this research. This materials physics emphasis is clearly also strongly integrated into the Department of Physics educational mission and programs; for example, it is central to our Applied Physics MS Program option in semiconductor materials physics, which includes internships in the semiconductor industry. In the past five years, 16 PhD's and 14 MS's have been awarded in which the students have done thesis or dissertation work in semiconductor physics.

For more details, please see http://129.118.19.6/ee/index.html.

RETIRED FACULTY NEWS

Kamal Das Gupta has lived for a couple of years at 7901 Electra Drive, Los Angeles, CA 90046, phone (213) 851-7820.

Young Kim and his wife live at 8106 Elgin, Lubbock, TX 79423, phone (806) 745-7384.

Ray Mires continues with his accident consulting business. In 2000, Dr. Mires received the Engineering Sciences Founder's Award from the American Academy of Forensic Sciences. His home address and phone are 3201 58th St., Lubbock, TX 79423, (806) 796-2274. His business address and phone are 2301 Broadway, Lubbock, TX 79401, (806) 762-8679.

Henry Thomas and his wife still spend portions of the year travelling. When in Lubbock, they can be reached at 2110 55th Street, Lubbock, TX 79412, (806) 747-1595.

DEPARTMENT EFFORTS CONTINUE TO IMPACT PUBLIC EDUCATION

From the Spring of 2000 through the Summer of 2001, over 1500 children of all ages have seen a performance of the department's "Physics Circus." Crowd pleasers such as the "bed-o-nails", "Tesla's revenge", and the exploding grain elevator demonstrate important principles and help to dispel the rumor that science is boring. The circus is performed primarily by Associate Professors **Tom Gibson, Wally Glab,** and **David Lamp**, with invaluable support from laboratory technician **Sarah Stubbs**, and the occasional participation of Society of Physics Students members.

On the more serious side of science education, Physics 1400, Fundamentals of Physics, first taught in Fall, 1998, continues to attract elementary education majors. These students are taught simple physics and taught how to teach it to children. As part of the course requirements, they go to a primary school and participate in teaching it to a class. This course continues to receive rave reviews. This course is successful because of the personal contacts between Physics faculty, Education faculty, and a team of Primary teachers. This course was designed using two grants from the Texas Education Agency.

We also hold summer workshops for elementary and middle school teachers. They learn about voltage, current, resistance, and power. They also learn to devise inquiry-based lab exercises for students. These workshops are funded by the Texas Education Agency. We are also continuing with our series of Saturday morning workshops for children in grades 1, 2, and 3. Each monthly workshop focuses on a different topic. Workshops on Sound and Music, Balance and Motion, Sink and Float, and Electricity and Magnetism, have been held. Approximately 100 children (many accompanied by parents) attend each. A Physics Circus is performed, followed with hands on labs. Howard Hughes Medical Institute provides some funding for these. For more details, please see http://www.phys.ttu.edu/~tlcdl/ .

INTERNSHIP OPTION FOR APPLIED PHYSICS MS CONTINUES SUCCESS

Our Applied Physics MS option (MSi Program), which includes semiconductor industry internships, continues to be very successful. It is now in its 6th year. Students have been sponsored for internships by Intel (Albuquerque), Motorola (Austin), Cypress (Austin), Texas Instruments (Houston, Dallas), Advanced Micro Devices (Austin), and Applied Materials (Austin). A boost to our efforts to launch this program was our NSF grant ($478,000, 1997-2001). Most of this grant went to paying on-campus stipends, with the companies supporting the students while they were on internship. This grant, plus TTU matching funds, was also used to purchase equipment to enhance our lab training capabilities. Beginning in 2000, students have been supported for the entire two years of the program (on-campus and in industry) by either Texas Instruments or Applied Materials. This program has benefited tremendously from our cooperation in materials physics research with the EE Department and from the existence of their Program in Semiconductor Product Engineering, a complementary program to ours.

Degree programs with industrial internships are common in engineering. However, for physics departments, such programs such are rare. A primary objective and a major contribution of this program has thus been to produce and develop a national prototype **"Professional MS"** degree program for physics. Similar programs could perhaps be developed in other physics subareas, provided that there is a "critical mass" of faculty with expertise which meshes with the needs of regional industry. The arena for our program is the microelectronics industry, which is strong in the Southwest. We have clearly produced such a program, and we continue to improve it. We have made numerous presentations aimed at assisting other institutions to begin their own internship-based physics program. However, ***we are still the only PHYSICS program which is in operation!*** **We believe that this is a significant achievement!** This program has also achieved considerable national recognition. For example, it was ranked as a "Category I Professional MS Degree" in the American Institute of Physics (AIP) Report entitled "Mastering Physics for Non-Academic Careers" by S. Norton, P. Hammer, and R. Czujko (2001). See http://www.aip.org. It is also featured on an Alfred Sloan Foundation web site devoted to Science MS Programs (http://www.ScienceMasters.com), as well as on the web sites of the APS (http://www.aps.org/jobs/cpdl/resources.html) and the AIP (http://www.aip.org/professionalmasters/profmshigh.htm).

Our program contributes to human resource development because we place students in the microelectronics industry at a very high level. In the past, physics majors have "seeped" into this industry in a haphazard way, and have made significant contributions. By contrast, we purposely educate and place students in this area. It is our hope that this effort will help industrial recruiters to direct their attention to physics majors as strong recruits. An objective is also to provide the students with a quality education, ***with hands on training***, in an area which promises better job prospects than do traditional areas. Even with the economic downturn, there is a shortage of qualified people for jobs available in the semiconductor industry. Our program fills an industrial need by providing the regional semiconductor industry with qualified people to fill such jobs. Since its inception, more than 25 students have graduated and have been placed in permanent jobs in the semiconductor industry.

Continued success of this program relies on a steady supply of excellent students. We have guaranteed admission agreements for students with a Physics BS (who meet other requirements for admission to our graduate program) from Angelo State, Sam Houston State, and Abilene Christian Universities. We hope to expand this list. It is also vital to this program's success to have "champions" in industry. Program needs are continuing internship positions and instrumentation. Please contact the program co-Directors: **Mark W. Holtz** (email: mark.holtz@ttu.edu) and **Roger L. Lichti** (email: xbrll@ttacs.ttu.edu.). For more information see http://www.phys.ttu.edu/MSi/Nav/MSiHome-Nav.htm .

FACULTY GRANTS AND CONTRACTS REACH RECORD LEVELS

The research being carried out by Department of Physics faculty continues to be of very high quality. One measure of this quality is the number of grants and contracts awarded each year and the dollar amount of these awards. Most faculty have some grant or contract support and maintain it on a continuous basis. Since the last newsletter, 18 faculty members have been awarded 34 grants or contracts totaling more than $2.5M! This is fantastic in these times of tight budgets for granting agencies. Many of these awards are for collaborative projects, both within the department and with colleagues in other departments.

TEXAS SECTION APS PROVIDES INTERACTION WITH TEXAS PHYSICS COMMUNITY

Walter L. Borst, Professor of Physics, is serving as the secretary-treasurer of the Texas Section of the American Physical Society (TSAPS). His work includes handling the Section financial affairs and assisting with the March and October meetings each year. The meetings are held jointly with the Texas Section of the American Association of Physics Teachers (TSAAPT), and Zone 13, Society of Physics Students. TSAPS takes the lead in organizing the October meeting, and TSAAPT the March meeting. The main financial activity of the TSAPS is the student awards program, in which about $3,000 are given to 15-20 students for travel grants and prizes for the best student papers. TSAPS has about 1200 members and is attempting to increase its membership to support physics in the region, including neighboring states.

Therefore, Dr. Borst asks the following question of all readers: ***Are you a member of the TSAPS?*** If so, great! If not, we encourage you to join (whether or not you live in Texas!) It costs you ***NOTHING*** (!!!) to join, yet each membership brings the TSAPS $4 annually to use in support of its programs. Please e-mail: membership@aps.org, with your name and request to join the TSAPS. If you are not sure if you are a member, please check your directory listing on the Web at http://www.aps.org/memb/enter-directory.html. Additional information can be obtained at: http://www.aps.org/TSAPS/.

NEWS OF FORMER FACULTY

Vijendra Agarwal is Assistant Provost at The College of Staten Island of the City University of New York. Address: 2800 Victory Boulevard, Staten Island, NY 10314. Phone: (718) 982 2464. Email: agarwal@postbox.csi.cuny.edu .

IN MEMORIAM

Bill Dean Stubbs passed away in April, 2000. Dean worked for many years as a shop technician and machinist, first for various research groups and then for the department. Dean came to TTU in 1986. He was an excellent machinist and optics technician. He was the husband of lab technician Sarah Stubbs. He also was a very nice person and a friend to many.

G. Wilse Robinson, Robert A. Welch Professor of Chemistry, a Joint Professor of Physics, and an internationally known chemical physicist, died after a short illness in September, 2000. Through innovative experiments and insightful theory, over a 50 year period, Wilse and co-workers brought fundamental understanding to some of the most important problems in molecular structure, electronic energy relaxation in molecules, crystal spectroscopy, reaction dynamics in liquids, and the structure and properties of liquid water. Wilse came to TTU in 1976 and had been a Joint Professor of Physics for about 15 years. In the latter role, he had research collaborations with Physics faculty and guided Physics MS and PhD students. He was a brilliant scientist, an interesting conversationalist, and a good friend to many of us.

Will N. Portnoy, Professor of Electrical Engineering and Joint Professor of Physics, died in September, 2001 after a long illness. Will's research was in semiconductor device physics, for which he was nationally known. He was a Fellow of the APS and of the IEEE. He had received numerous professional and educational awards in his career. He had been at TTU since 1967 and had retired in 2000. He had been a Joint Professor of Physics for about 15 years. During that time, he collaborated with Physics faculty and guided Physics graduate students in their MS or PhD research. Our BS in Engineering Physics Alumni will perhaps remember him best as the long-time co-Director of that program. He was a good friend to many of us.

Preston F. Gott, Professor Emeritus of Physics and former TTU Director of Observatories, died in January, 2002. Preston joined the department in 1948 and taught physics and astronomy for 41 years, retiring in 1989. Recently, he had lived in Odessa, TX, with his second wife, Dr. Orene Pedicord, M.D. He was instrumental in developing the two astronomy observatories at TTU. Several years ago, in his honor, the TTU Board of Regents named the off-campus observatory The Preston F. Gott Skyview Observatory. Until recently, he was listed as Senior Scientist at the Jet Propulsion Laboratory in Pasadena, CA, where he worked many summers on the Moon and Mars lander projects. He also worked several summers at the White Sands Proving Ground in New Mexico. He was a generous donor to the Dept. of Physics and to TTU. He endowed the Gott Gold Tooth Scholarship Award in Physics and also endowed a scholarship in the Women's Studies Program, in memory of his first wife, long time TTU Economics Professor Edna Gott. He was a true gentleman and a friend to all who knew him.

SPS NEWS

The TTU chapter of the Society of Physics Students (SPS) sponsors and participates in a number of annual activities. These include the Departmental Banquet, the Egg Drop and Edible Car Contests, presentations at TSAPS meetings, and helping with outreach efforts such as the Physics Circus. The TTU SPS has won two Outstanding Chapter Awards from the National SPS in the past 10 years! The SPS officers this year are Ray Thomas (President), Abel Diaz (Vice President), Brahama Seth (Treasurer), and Bill Boyett (Secretary). The SPS Faculty Sponsor is Dr. Juyang Huang.

SPS THANKS ALUMNI FOR DONATIONS

The Society of Physics Students expresses their sincere thanks to the following alumni and friends who made donations to them within the past year: Alfred Smith, Bill Covington, Bob Dunlap, Bruce Pickelsimer, Douglas Stevens, Dwain Butler, Harry Bearman, Jeffrey P. Wilde, W. P. West, Harold and Gwen Ballew, and Lynn and Martha Alice Boatner.

SPS BANQUET AND DEPARTMENT SCHOLARSHIPS

Each spring, the department and the Society of Physics Students (SPS) sponsor a scholarship and awards banquet. The banquet speaker is often the Distinguished Alumnus for that year. This was the case at the banquets in April, 2000 and April, 2001, at which the featured speakers were the 2000 and 2001 Distinguished Alumni Ron Miller and Dwain K. Butler.

Our departmental scholarship endowment is one of the largest at TTU. Awarding such scholarships to new students often makes a difference in their decision on whether to come to TTU and awarding them to continuing students helps tremendously with the retention of majors. At the 2000 banquet, 16 students received departmental scholarships totaling more than $13,000. In 2001, these numbers were 15 students and $14,000! (Excluding awards of the Graduate Bucy Scholarships in Applied Physics, awarded at a different time.) We thank the donors for their strong support of the department! Congratulations to all scholarship recipients for their outstanding academic achievements! The scholarships with criteria for their award follows. If you would like to donate to one of these endowments or to start a new endowment, please contact the department.

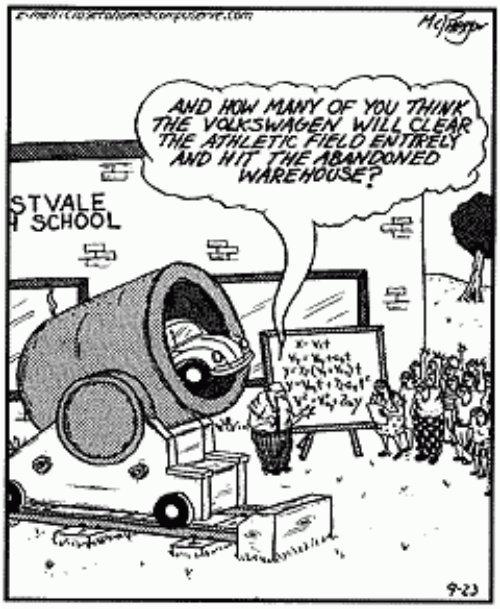
The **Bucy Graduate Scholarships** are for new or continuing graduate students in applied physics who have high academic potential. The **Bucy Undergraduate Scholarships** are for students who have demonstrated high academic performance and who have potential for future contributions to physics. Both Bucy Scholarships are gifts from Distinguished Alumnus J. Fred Bucy and his wife. The **Schmidt Scholarships** are for new or continuing undergraduates who have a 3.0 physics GPA or a good high school record. They were established by the Schmidt family in memory of former department Chair Dr. C.C. Schmidt and his wife Alma K Schmidt. The **Mann Scholarship** recipients must be entering freshmen and have outstanding high school records. They were established by Mrs. Glen A. Mann in memory of her husband, who was a department faculty member. The **Thomas Scholarships** are for new or continuing students with good academic records and high potential for the study of physics. They are a gift from Dr. and Mrs. Henry C. Thomas. Prof. Emeritus Thomas was Chair of the department for many years. The **Gold Tooth Scholarships** are for students with an interest in astronomy. Their purpose is to encourage young scholars and to strengthen motivation for astronomy. They are a gift from Prof. Emeritus Preston F. Gott. The **Day Scholarships** are for students with a 3.0 GPA in physics and overall. They were established by Mrs. J.W. Day in memory of her husband, who was a department faculty member. The **Sterne Scholarships** are for students with a 2.5 or greater GPA who are interested in astronomy or physics. They were established by Mrs. Kenneth Sterne in memory of her husband, who was a friend of the department. The **Howe Fellowships** are for outstanding graduate students. They were established by Dr. A. Isabelle Howe and her sons in memory of her husband, Dr. David A. Howe, who was a faculty member. The **Seibt Scholarships** are awarded to outstanding graduate students with promise in experimental physics. They were established by Mrs. Tamara (Seibt) McNally and friends in memory of Dr. Peter J. Seibt, an alumnus and a staff member. The **Gangopadhyay Scholarships** are for physics or engineering physics freshmen with outstanding high school records. The first Gangopadhyay awards were made in 2001. They were established by Prof. Shubhra Gangopadhyay and her husband, Keshab.

EDIBLE CAR COMPETITION, SPRING, 2001

The race may belong to the swift, but in the annual edible car competition, style, originality, and edibility, count for a lot as well! Cars are judged for esthetics as well as for distance traveled from the end of a ramp. This year, having the race outdoors in the Free Speech Area by the University Center seemed to draw more of a crowd than in the past. This event was covered by the press, including the local Fox affiliated TV station, the local newspaper, *The Avalanche Journal*, and the student newspaper, *The University Daily*. For some interesting pictures from this event, the reader is invited to check out the web page http://www.phys.ttu.edu/sps/ediblecar_s01.html .

EGG DROP COMPETITION, SPRING, 2001

The idea is simple---build a minimum volume "vehicle" that keeps the egg intact for increasing drop heights. The egg must be fresh from the carton and not altered chemically, frozen, or boiled. Diverse and wonderful contraptions were constructed in secret by the contestants. They were then put to the test by a panel of impartial judges. For some pictures from this event, the reader is invited to check out the web page http://www.phys.ttu.edu/sps/eggdrop_s01.html .



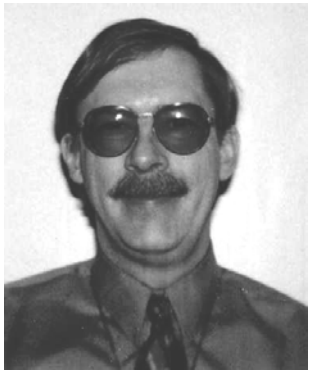
Thanks to the innovative labs of teacher Herb Krenley, physics quickly became Westvale High's most popular course.

"Good morning, and welcome to The Wonders of Physics."

ALUMNI NEWS

Please write to the department if you have news to be included in the next edition.

Bill Ford Has Successful Career In The Aerospace/Defense Industry



Since completing his PhD in theoretical semiconductor physics, under the direction of Professor Charley Myles, Dr. William C. (Bill) Ford (PhD, 1986) has had a very successful career in the aerospace industry. Dr. Ford is an Analyst for XonTech, Huntsville, AL. He is responsible for performing modeling and analysis for the National Missile Defense Program on the Sensor Simulation Test Bed (SSTB). He is also responsible for modeling the Ground Based Interceptor (GBI) and the Space Based Infrared Satellite (SBIRS) network. He developed both the three-degree-of-freedom GBI flight simulation and the satellite model used in the SSTB.

Dr. Ford has more than 15 years of industrial experience. Before taking his present job in 1998, he worked (1997-98) as a Senior Engineer for CAS, Inc., as a Senior Project Engineer (1996-97) for Boeing/McDonnell Corp., and as a Senior Project Engineer (1986-96) for McDonnell Douglas Corp.. His expertise includes modeling and simulation of sensor systems (infrared, radar, and electro-optical), three-degree-of-freedom flight simulation, operations analysis, survivability and vulnerability analysis, systems engineering, risk management, device physics, orbital mechanics, UNIX administration, and object oriented programming. Some of his accomplishments include creating and integrating Weapon System and SBIRS models into XonTech's SSTB, acting as Program Manager for the Harpoon/SLAM Survivability Assessment Program, improving McDonnell Douglas's proprietary radar and force-on-force engagement simulations, acting as Security Advisor to the Harpoon/SLAM Program, and authoring McDonnell Douglas's Risk Management Process.

At the Editor's request, Dr. Ford wrote the following, about how he has used his physics education in his industrial career:

"While updating my company biography, it dawned on me how many different areas I've worked in over the last 15 years. Immediately after receiving my PhD from TTU, I went to work for McDonnell-Douglas in St. Louis, as a device physicist testing and modeling the performance of infrared detectors. The work was close to my dissertation area of semiconductor physics. I learned that working in industry can be quite volatile, as that program was canceled a few years later. I transferred within the company, and became an operations analyst for the Harpoon antishipping cruise missile program. This meant that I needed to acquire skill in the modeling and simulation of radar, surface to air missile, and weapon system performance; analyzing foreign weapons systems; force-on-force simulations; and survivability and vulnerability analysis. I was expected to get up to speed and make significant contributions ***IMMEDIATELY! This has been true for all of my jobs!*** I took continuing ed courses in radar and vulnerability analysis. These, plus on-the-job training and study helped me to be successful in this job.

After the Soviet Union collapsed, the Harpoon program was reduced, so I switched jobs again. My next job was performing Programmatic Risk Management. Again, I took a continuing education course and had some on-the-job mentoring. I worked on the Tomahawk program as part of the Integration Agent contract. As a part of this job, I wrote the corporation's best practice guide for risk management, which is still in use today.

The Boeing took over McDonnell-Douglas at about this time and I had an opportunity to transfer to the development program of the F/A-18E/F Super Hornet aircraft. My assignment was performing Design to Cost, Life Cycle Cost, and Cost As an Independent Variable analyses. This involved doing studies for new aircraft design on everything from avionics and weapons to landing gear and wing construction to alternative maintenance concepts and logistics over the aircraft life cycle. For this job, I had only on-the-job training. As the program moved toward production, the work slackened, so I moved to another defense contractor, CAS, Inc., where I was systems administrator of a computer network and was involved in the validation and verification of a suite of infrared missile simulations.

Then, I took my current job, which involves modeling and simulation work on the National Missile Defense Program at XonTech, Inc., in Huntsville, AL. I am responsible for modeling all aspects of the Ground Based Interceptor and the SBIRS network. I do flight and orbital dynamics and guidance system and sensor modeling. I had the opportunity to take a continuing education course in guidance and control theory, but have had to learn the rest through self-study.

When I was a student, I never imagined that I'd wind up doing such a broad variety of jobs! I suppose that I am a "Jack of all trades," but, hopefully, I'm a master of a few**! I credit my Physics education at TTU with helping me to be able to "hit the ground running" with each new assignment**. In addition to technical and scientific knowledge, the publication and presentation of research results and the writing of a dissertation provided me with valuable experience in technical writing and public speaking. These are the most numerous products of my work. I would like to say 'Thanks' to my Professors at TTU for their dedication and excellent teaching and advising. **I would also like to encourage current students to get all they can from their courses and research. What you learn will stand you in good stead in the job market, whatever you wind up doing**." (Dr. Ford's contact info: 218 Beaver Run Drive, Madison, AL 35758. Phone: (256) 971-9871. Email: Bill_Ford@XonTech.com.)

Jun Shen Contributes to Switching Technology

Alumnus Jun Shen (MS, 1984) is a Professor of Electrical Engineering at Arizona State University (ASU) in Tempe, AZ. After leaving TTU, he received a physics PhD at the University of Notre Dame and then worked for Motorola Corporation for several years before taking his present position.

Dr. Shen and his research group at ASU have recently developed the first latching microelectromagnetic relay switch. Relay switches are everywhere, from computers to satellites, but until now, they have needed a constant source of power to remain in a given position. The switches developed by Dr. Shen's group are cantilevered, so that they can either stay up (off) or down (on) without power. Coils embedded underneath the cantilever pass a current pulse through an interaction mechanism to put the switch up or down and need no power afterward. A positive current pulse turns the switch on and a negative pulse turns it off. "Power consumption is money," Dr. Shen says, adding "less power means longer battery life, among other things." The latching relays have little resistance, which makes the switches attractive for radio frequency use, because resistance equals loss of signal. Cell phones using the Shen group's switches, for instance, will get better reception, operate longer without charging, and because they offer higher signal isolation, the sound will be clearer. The switches will also work well in outer space. Present semiconductor switches are subject to damage by the constant high radiation in the space environment. Dr. Shen's latching microelectromagnetic relays are made of metal, which makes them less susceptible to radiation effects.

Another type of switch, also invented by Dr. Shen and co-workers at ASU, has the potential to impact the internet. Fiber optics have increased telephone line capacity enormously, but there is a major "bottleneck" problem that has been exacerbated by the explosion of internet use. When a long distance call is made, it may be routed through several intermediate cities, depending on what the phone company's computer decides is the quickest route to complete the call. This is where the bottleneck comes in. Optical signals work well for straight line communication, but when a change of direction of the signal is desired, because electrical signals are easier to guide, it is more efficient to convert the optical signal to an electrical signal, make the directional change, and then convert it to an optical signal again. An optical relay switch developed by Dr. Shen has a strong potential to change this situation. These switches use mirrors to change the optical signal direction, eliminating the bottleneck caused by the optical-electrical-optical conversion.

Presently, Dr. Shen is exploring the commercialization of these inventions through a startup company called MICROLAB. They have raised $5.5M in venture capital funding for the company and plan to introduce products within a year. They also already have several projects to explore different applications for the devices. Dr. Shen's hope is that these switches will prove successful enough to "fund a lifetime of research and exploration" in this area. (Dr. Shen's contact info: Dept. of EE, ASU, Tempe, AZ 85287. Email: jshen@asu.edu).

Lynn A. Boatner Receives New Honors

Department alumnus **Lynn A. Boatner** (BS, 1960; MS, 1961), Section Head for Ceramics and Interfaces at Oak Ridge National Laboratory and leader their Novel Materials Group, was featured in the last Newsletter and his numerous scientific achievements and honors were outlined there. Since that time, he has received two new honors for his work in materials science, ceramics, and metallurgy. In September, 2001, Dr. Boatner was appointed by the American Institute of Physics to the prestigious position of membership on the Editorial Board of the journal Applied Physics Reviews. In November, 2001, he was awarded the 2001 Jessie W. Beams Award for excellence in research by the Southeastern Section of the American Physical Society. His outstanding career accomplishments make continue to make the Department of Physics very proud of one of our most distinguished Alumni! (Dr. Boatner's contact info: Solid State Div., MS-6056, ORNL, PO Box 2008, Bldg. 3150, Oak Ridge, TN 37831. Phone; (423) 574-5492. Email: lb4@ornl.gov).

Ginger Kerrick, On Vacation From NASA, Visits The Department

What do you do if you get bored living at Star City in Russia, after training astronauts, cosmonauts, giving tours to Tom Hanks (yes, ***that*** Tom Hanks!) and reminding eccentric, but wealthy guys like Dennis Tito that meals aren't catered, you actually have to go to the mess hall? Well, if you're department alumna (BS, 1991; MS, 1993) Ginger Kerrick, you come home to Houston, buy a motorcycle, and take off on a tour of Texas! (See picture at left). Ms. Kerrick was featured in the last Newsletter for her work at NASA in the Astronaut training program for the International Space Station. Ms. Kerrick's contact info: (256) 961-6814, Fax: (256) 961-6807, email: ginger.kerrick1@jsc.nasa.gov.

We Hear That

Terry Adams (MS, 1990; PhD, 1994) is a permanent member of the scientific staff in the Computing, Communication, and Networking division at Los Alamos National Laboratory. Email: tadams@physics.angelo.edu.

Elise (Boerwinkle) Adamson (BS, 1985; MS, 1988; PhD, 1993) is on the faculty at Wayland Baptist U. Address: Dept. of Math, Wayland Baptist U., Plainview, TX 79072. Phone: (806) 296-5521.

Gerald P. Alldredge (BS, 1958; MS. 1960) works for TRW, Inc. Home address: 5600 Gibson Blvd. SE, #445, Albuquerque, NM 78108. Email: gerald.alldredge@trw.com.

Mike Baker (MS, 1999) is a Design Engineer at Cypress Semiconductor in Austin. Address: 1706 Creek Bend Circle, Round Rock, TX 78681. Phone: (512) 425-5256. Email: mbp@cypress.com.

Harry Bearman (BS, 1980) is a Software Engineer at PDX, Inc., in Ft. Worth. Home address; 3812 Fenton, Ft. Worth, TX 76133. Phone (817) 294-8330. Business address: 101 Jim Wright Freeway, Ft. Worth, TX, 76108. Email: bbearman@bigfoot.com.

Richard L. Cardenas (PhD, 2001) is now an Assistant Professor of Physics at St. Mary's U. Address: Dept. of Physics, St. Mary's U., Box 69, One Camino Santa Maria, San Antonio, TX 78228. Phone: (210) 431-2234. Email: rcardenas@stmarytx.edu. Web page: http://ats.stmarytx.edu/~physics/Cardenas.html .

Bill Covington (MS, 1975; PhD, 1978) is Associate Vice President for Research at Southwest Texas State U. Address: 601 University Drive, San Marcos, TX 78666. Phone: (512) 245-2314. Email: bc18@swt.edu.

Tim Dallas (MS, 1993; PhD, 1996) is an Assistant Professor of Electrical Engineering at TTU. Address: EE Dept., MS 3102, TTU, Lubbock, TX 79409. Phone: (806) 742-4753. Email: tim.dallas@coe.ttu.edu.

Sylvester Ekpenuma (PhD, 1990) is a Chair of the Dept. of Physics at Claflin U. Address: 400 Magnolia Street, Orangeburg, SC 29115. Email: ekpenuma@claf1.claflin.edu .

Yvonne Emil (MS, 1999) works at Los Alamos National Lab doing Radiological Engineering work. Address: 1900 Verbena Dr. NE Rio Rancho, NM 87124. Phone: (505) 994-8116.

Byeongchul Ha (MS, 1997) is a PhD student in the Department of Physics at U.T.-Arlington. Email: bxh3179ha@netscape.net.

I-Yuan Jan (MS, 1983) is President of the JJMAX Corporation. Address: 2F, 46 Lane 346, Kwang-Fu S. Road, Taipei, 106 Taiwan, Republic of China.

Samsoo Kang (PhD, 1998) is a design engineer at California Micro Devices in San Jose, CA. Phone: (408) 934-3164. Fax:(408) 263-7846. Email: SamK@calmicro.com .

Zhuoxing (Joe) Luo (MS, 1990; PhD, 1994) works for Intel Corp. Address: 22555 Kinst Court, Cupertino, CA 95014. Email: joe.luo@intel.com.

Greg Osterman (MS, 1990) has been assigned to work on the Tropospheric Emission Spectrometer project at JPL and he, along with wife Lina, recently announced the birth of their daughter Elayna Osterman on July 26, 2001. All are doing well.

Young K. Park (PhD, 1994) is a staff member in the Semiconductor Materials Laboratory of Korea Institute of Science and Technology. Address: PO Box 131, Cheongryang, Seoul, 130-650, Korea. Email: ykpark@kistmail.kist.re.kr**.**

Toni Sauncy (BS, Math, 1992; MS, 1995 & PhD, 1998, Physics) is Assistant Professor of Physics at Angelo State U. Address: Dept. of Physics, Angelo State U., 2601 West Avenue N, San Angelo, TX. Email: Toni.Sauncy@angelo.edu.

Al Smith (MS, 1966; PhD, 1970) is still a Professor at Harvard Medical School. Address: 84 Trumbull Road East Falmouth, MA 02536. Email: ASMITH3@PARTNERS.ORG.

Doug Young (MS, 1996; PhD, 1998) is an Assistant Professor of Physics at Mercer U. Address: Physics Dept., Mercer U., 1400 Coleman Ave., Macon, GA 31207. Phone: (912) 301-2704. Email: young_dt@mercer.edu.

Jianbai Zhu (MS, 1999) is working at Texas Instruments-Dallas. Address: 2421 Cimmaron Dr. Plano, TX 75025. Phone: (972) 480-3197. Email: jbzh@ti.com.

Dorothy Zoledziowska (MS, 1990), works as an environmental scientist for the EPA. Address: 516 Ludlow Station Road Asbury, NJ 08802. Email: Zoledziowska.Dorothy@epamail.epa.gov.

NOMINATIONS ARE INVITED FOR DISTINGUISHED ALUMNUS AWARD

Nominations are invited for the Department of Physics Distinguished Alumnus Award. This award is given to alumni who have achieved outstanding career success. Any graduate from any of the degree programs administered by the Department of Physics is eligible. A goal is to make one award each academic year. Usually, the recipient is presented with this award at the spring departmental banquet. Previous recipients, the years in which they received this award, their TTU degree(s) and their graduation years are J. Fred Bucy (1986; BS, 1952), Herbert E. Welch (1988; PhD, 1965), Lynn A. Boatner (1989; BS, 1960; MS, 1961), Gilbert L. Varnell (1989; BS, 1963; MS, 1966; PhD, 1968), Bobby D. Dunlap (1990; BS, 1959), B. Tom Waak (1992; MS, 1971; PhD, 1972), Robert B. Palmer (1993; BS, 1962; MS, 1965), Billy C. Covington (1994; MS, 1975; PhD, 1978), Jack E. Randorff (1997; MS, 1967; PhD, 1970), C. Rinn Cleavelin (1998; MS, 1969; PhD, 1973), Alfred R. Smith (1999; MS, 1966; PhD, 1970), Ron Miller (2000; PhD, 1971), and Dwain K. Butler (2001; BS, 1968). Please send nominations for this award to Lynn Hatfield, Chair, Department of Physics.

ADDRESSES, NUMBERS, & WORLD WIDE WEB FOR TTU PHYSICS

Our mailing address is Department of Physics, Texas Tech University, Box 41051, Lubbock, TX 79409-1051. Our phone and FAX are (806) 742-3767 and (806) 742-1182. Most faculty and staff have email addresses. The email for Chair Lynn Hatfield is Lynn.Hatfield@ttu.edu . That for Administrative Secretary Sandra Hester is Sandra.Hester@ttu.edu. Most faculty and staff email addresses are in the format Firstname.Lastname@ttu.edu . Our homepage is http://www.phys.ttu.edu . Faculty email addresses can also be found there. Look for the Web Edition of this newsletter, which will be posted soon! The TTU homepage is http://www.texastech.edu .

Department of Physics Photo, Fall, 2000

WHAT IS NEW WITH YOU?

Where are you and what are you doing? We want to know what is new with you, personally and professionally. Any information you send will be circulated in the department and inserted into the next Newsletter, unless you request otherwise. If you have news of other alumni, please let us know. Please print or type your information. Include your postal label in your reply, so that we can change our records if necessary. Please mail it to **Attention: Charley Myles, Alumni Chair,** at the above address or email him at Charley.Myles@ttu.edu . Thanks for keeping in touch!

Name: _____

Year of Graduation & Degree(s) Earned: _____

Mailing Address: Please check if new ( )

_____

Job Title (if appropriate):_____

Business Address: _____

Telephone: _____
Home **Work**

Email: _____

Please sign one of the following
The Dept. of Physics may publish in its Newsletter any or all the above information, as well as the comments below, or this information may otherwise be distributed to other alumni

_____

(If you prefer that some, but not all information be published, please let us know also!)

I prefer that this information not be made public at this time

_____

Enclosed is my tax deductible donation of _____.

This donation is designated for

New B.J. Marshall Endowment	_____
Scholarships (please designate which one)	_____
Observatory Equipment	_____
Advanced Lab Equipment	_____
Cost of Education Account	_____
Other (please specify)	_____

The Cost of Education Account is a discretionary fund to pay for items for which we are not allowed to use State funds.

Please check if you are interested in starting an endowment _____. Someone will contact you with details.

Nomination for Department of Physics Distinguished Alumnus Award. Please include a brief statement of the reasons your nominee deserves this award. Use reverse side or attach extra sheets as necessary.

News, Comments, and Input: (Use reverse side or attach extra sheets as necessary)

Do You Know Where They Are?

We have several alumni that we are no longer able to reach. If you know a current address of any of the following, please send the address to Sandra Hester (sandra.hester@ttu.edu) or Gwen McGill (gwen.mcgill@ttu.edu). If you prefer, you can mail the information to Texas Tech University, Department of Physics, Attn: Sandra Hester, Box 41051, Lubbock, TX 79409-1051.

Al-Ayoubi, Isam S.
Bailon, Leoncio H.
Bebak, Eric Dennis
Bradley, David Aaron
Carter, Harris G.
Castano, David Charles
Chen, Sun-Yung
Chu, Edmond Y.
Coleman, Phillip D.
Dawdy, Morgan R.
Demifturk, Tayfun
El-Ghossain, Maher
Guan, Yuhua
Hamilton, Jing Fang Hao
Hao, Jing Fang
Helms, William
Hooker, Julian Andrew
Jan, I-Yuan
Jester, Karyn Marie
Jordan, Kevin
Khan, Shamim Akhter
Kidwell, Gary Robert
Koo, Yeon D.
Kumar, Shanti
Kwon, Kihong
Ladue, Jami
Lancina, David Glenn
Lawrence, Richard
Li, Weigang
Lin, Fey
Lin, Tao
Lin, Tsai-Ku
Mathunjwa, Mduduzi
McCormick, Gerald
Mekkaoui, Ismail Alaoui
Meyers, Calvin
Norton, Amy
Palsule, Chintamani P.
Park, Young
Pleil, Matthias
Quesenberry, Paul
Sankaran, Mythiliiyer
Seon, Moonsuk
Shen, Jin Miao
Smith, Robert B.
Sudduth, Mark R.
Turmel, William A.
Vereide, Abraham M.
Wilson, James Nolan
Wu, Fang-Ming
Wu, Xue Mei
Yoon, Sang-Il
Young, Brian Anthony
Zhang, Xin

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