KANSAS STATE UNIVERSITY

DEPARTMENT OF PHYSICS

2007 Department Newsletter

Editor's Corner

As I write to you we are experiencing one of the mildest winters in many years, no snow and no hard freezes and it is the end of December.

K-State continues to excel in teaching and scholarships, being placed 7th in the nation in the numbers of scholars (Rhodes, Marshall, Truman, Goldwater, and Udall). K-State ranks first nationally among all 500 state universities in Truman and Goldwater and fifth in Udall scholarship competition since each foundation began awarding scholarships.

The recently constructed building to house KSU's Biosecurity Research Institute was named Pat Roberts Hall to honor the US senator who recognized before September 11th that terrorist action poses significant risk to the U.S. With the senator's help, and support from the state of Kansas, the Biosecurity Research Institute has begun operation. The institute is state-of-the-art and one of a kind in the world today.

K-State has renamed its Military Science Building in honor of an alum, General Richard B. Myers, who has served in the position of chairman of the Joint Chiefs of Staff, the nation's highest ranking military officer. The Kansas Board of Regents has approved the renaming of the building to General Richard B. Myers Hall. A dedication ceremony, featuring Myers, was held on November 9th 2006. General Myers joined the Air Force in 1965 through the Air Force ROTC program at K-State, where he also earned a bachelor's degree in mechanical engineering.

President George W. Bush, the United States' 43rd President, delivered the Landon Lecture on January 23, 2006 to about 9,000 K-State students, faculty, staff, patrons, military members and special guests. President Bush was the third sitting president, after Richard Nixon (1970) and Ronald Reagan (1982), to give a Landon lecture.

K-State played Rutgers in the inaugural Texas Bowl on December 28 at Reliant Stadium in Houston, Texas. For the first 30 minutes they were even, but then Rutgers pulled ahead for a win in front of a total of 52,210 fans.

Department Head Corner

Dean Zollman is in Germany on sabbatical leave and I am working as the interim head for the 2006-2007 academic year. This gives me a unique opportunity to write to our friends and alumni about our past year's accomplishments and our vision for the future. At the same time I take this opportunity to thank our strongly supportive friends and alumni who continue to support our efforts in many ways — financially, spreading the word about our programs, and recommending that students consider K-State Physics for their education.

Highlights of Our Achievements

Research Funding

Our research funding from extramural funds continues to increase and is presently at a level of about $7.8 million. The lion's share of the funding for the department comes from sources different from state appropriations. This becomes clear if one compares our standing among peer institutions in terms of (a) Federal funding only and (b) all funding sources. For example, we stand 3rd in the Big 12 behind Texas and Colorado in Federal funding while we drop to fifth in the Big 12 (also behind Texas A&M and Nebraska) in terms of total funding. A clear message is that other similar institutions (such as Nebraska and Texas A&M) have invested and are continuing to invest significant state/university funds in physics.

New Teaching Initiatives — Studio Optics

Professor Chris Sorensen is leading a group of five faculty to apply the interactive Studio concept to the first semester of our Optics curriculum at the junior/senior level. This appears to be the first attempt to use interactive studio concepts at this upper level. A series of such interactive optics courses would take students from the traditional optics of mirrors and lenses to working with research level high power lasers. By the time they complete the sequence students are in a position to work in fields such as communications and development of medical applications or continue research in graduate school. An NSF grant with Sorensen as PI and generous gifts from Bill and Joan Porter have provided funds for developing the optics courses and remodel the optics studio space, respectively.

Faculty and Student Awards

Our students and faculty continue to bring accolades to themselves and to our department.

Undergraduate physics major Eli Parke has won the prestigious Goldwater scholarship for 2006-2007. I am happy to report that in the last fifteen years, six other physics majors (Beverly Loseke, Brett Esry, Craig Caylor, Jonathan Winkler, Aaron Wech, and Jonathan Whitmer) and one physics minor (David Thompson) have won the Goldwater scholarship.

Graduate student Howard Camp has won an ETD award for his exemplary electronic PhD thesis.

Professor Lew Cocke is the 2006 recipient of the American Physical Society's Davisson-Germer Prize in Atomic or Surface Physics. The award recognizes Lew's *"sustained record of novel experimental developments and new insights into interactions of ion and photon beams with atoms and molecules." While this award is awarded by the APS, scientists from all parts of the world are eligible. The* Davisson-Germer Prize is the highest international award given specifically for work in atomic physics (see article in last year's newsletter when this award was first announced).

Congratulations to Professor Brett Esry and Adjunct Professor Theo Zouros, who have just been elected as Fellows of the American Physical Society.

Professor Chris Sorensen has won the Schenk Teaching award for excellence in teaching physics majors.

Students Graduating

Recent graduates with a BS degree in physics are Ben Gramkow, Mindy Gratny, Eli Jaggard, Jon Kalodimos, Mat Leonard, Jacob Thomas, and Philip Zemler. Most of them are continuing their education in graduate school.

Recent PhD recipients are Edgar Corpuz, Lili Cui, Altaf Karim, Faisal Mehmood, Neeraj Nepal, and Mudessar Shah. They are split between holding post-doctoral research positions and teaching positions.

Congratulations to all of them!

New Members of the Department

Russ Reynolds is now the new machine shop supervisor. He has significant experience as a machinist and thus is immediately contributing to developing and building instruments for both teaching and research. Recently Russ helped restore a 67 year old telescope. Lisa Zecha is our new main office secretary. Lisa is doing a terrific job. The new research staff includes nine post-doctoral research associates and five visiting scholars.

We now have seven new freshman physics majors and 20 new graduate students — the largest graduate student class that any of us can remember. As usual the incoming graduate students come to KSU with very diverse backgrounds. Seven of the students completed undergraduate work in the US while the remaining are from Asia and Europe. This year, five of the new graduate students are women.

Plans for New Faculty Hire

The department has chosen two majors areas of focus for immediate hire — experimental Atomic-Molecular-Optical (AMO) ultrafast laser science and experimental nano-bio science. In AMO physics, our goal is to hire a leading experimentalist in ultrafast laser-atom interactions. We hope that this new hire will help the J. R. Macdonald Laboratory (JRML) in the Physics department to achieve its goal of becoming a leading center in ultrafast AMO physics.

The upper administration at Kansas State is very supportive of this hire and has offered to help us with generous start up funds. Recently, JRML had its three-year review by the sponsoring US Department of Energy. The idea of such a hire was unanimously and enthusiastically applauded by both the review panel and the attending representatives of the sponsoring Department of Energy.

The department plans to hire an experimental physicist whose research interest overlaps with both nanoscience and bioscience. Such a scientist might engage in current exciting areas of research at the interface between nano- and biosciences such as the construction of smart and active nanoparticles, nanostructures, and nanodevices. Potential applications include building a new world of adaptive materials that mimic Nature's ability to control its environment and in various aspects of bio-security and cancer research. The possible physics hire in nano/bio science has a lot of potential in building bridges between physics and many bio-related departments (such as Biology, Biochemistry, Veterinary Medicine, Terry Johnson Center for Basic Cancer Research, etc). This hire will be timely given that the department has successfully done the groundwork with our nanoscience projects (for example, NSF is funding a Nanoscience Interdisciplinary Research Team (NIRT) grant with Chris Sorensen in Physics as the principal investigator; see this news release on this NIRT award: http://www.mediarelations.k-state.edu/Web/News/NewsReleases/nsfgrant91406.html) and now we believe that the time is ripe for us to move into the interface between nanoscience and bioscience. We expect that research in these areas will benefit from the expected higher level of state bioscience funding opportunities.

We Need Your Help

As you can see from this summary of the year's activities, we continue to focus on our teaching and research missions.Our faculty and students are doing very well. Our success has always depended on your help. State financial support for higher education continues to drop in Kansas and throughout the country. KSU, as with most other state universities, has no choice but to significantly increase tuition. At the same time the number of physics students seems to be growing. Thus, we need to provide more scholarships and increase the scholarship amounts. We can do so only with your continued support. All of our faculty and students are very grateful for all of the generous support that our alumni have given in the past. We hope that you will continue to think of us and support us in the future.

Recent Gifts from Porter's Improve Teaching & Research

Bill and Joan Porter have provided two generous gifts of $100,000 each to the Department. These gifts are being used to improve teaching and research activities. A major fraction of the first gift will be used to remodel space for the new sequence of optics courses. The development of the courses is supported by the National Science Foundation but NSF does not provide funds to bring space up-to-date.

Bill graduated from Adams State College in Colorado. He then came to Manhattan where he earned a master's in physics here. His master's thesis, "Infrared spectroscopy applied to the study of the autoxidation of di-iso-butyl ketone" was completed in 1952. In 1967, after working at the National Bureau of Standards, General Electric, and Textron Corporation, he continued his education at MIT.

Bill is the founder of e-trade and the International Securities Exchange. Joan is the founder and director of Stillheart, a retreat center in Northern California.

Recently at KSU Bill was the first Ernest Fox Nichols lecturer, was a Distinguished Lecturer for the College of Business Administration and was the speaker for the 2004 College of Arts & Sciences Spring Commencement. (See photo.)

Reception for Chet Peterson in Physics Department

In 2006 Chester Peterson Jr., Lindsborg, Kan., made a commitment to the Kansas State University Foundation Changing Lives Campaign to establish the '**Peterson Public Lecture Series in Physics'**. The fund will be used for appropriate expenses associated with publicizing and presenting an annual public lecture series on a continuing basis concerning cosmology or quantum mechanics. The lectures will be held on the main campus of Kansas State University, with an alternate lecture site once every three years at the University of Kansas.

Each university's physics department and the KSU Center for the Understanding of Origins will help select speakers and facilitate the lecture series.

On Dec. 14th, faculty, staff and students from physics met with Chet Peterson to hear about his interest in physics and science in general.

A Kansas native, Peterson earned a bachelor's degree in agriculture, a bachelor's degree in journalism, and a master's degree in quantitative genetics from K-State. While in college he was a member of Phi Kappa Phi and Gamma Sigma Delta honor societies, Alpha Gamma Rho fraternity, Sigma Delta Chi professional fraternity, the dairy cattle judging team winning the international contest, and was a senior leader, editor of the award-winning Ag Student magazine and a student government representative.

Peterson is a member of the Presidents Club, a KSU Foundation leadership organization for friends and alumni of K-State. A career writer-photographer-editor, he's had an estimated four million words published, including ten books.

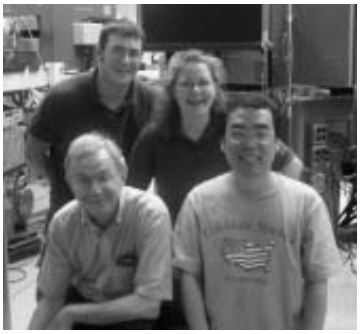
Dean Zollman, Tim Bolton, Chet Peterson, Bharat Ratra and Dean Stephen White.

"Cosmology and quantum mechanics are intriguing, exciting fields that are of interest to an increasing number of people, both laymen and in the scientific community," Peterson commented. "My hope is that these remarkable lectures will, in addition to informing us all, also serve as a catalyst to interest potential students in the fascinating world of modern physics."

"Mr. Peterson's generous gift provides our department and the Center for the Understanding of Origins with an opportunity to increase our efforts to inform the public about important scientific issues and discoveries," said Dean Zollman, head of the K-State physics department. "Because of this lecture series we will be able to bring outstanding cosmologists and quantum scientists to campus and provide all interested people on the campus, in the community and across Kansas with the opportunity to interact with them."

Information taken from News Releases, K-State — May 2006

K-State Physics Once Again Hosts Reu Program



This year, the Kansas State physics department was awarded a three-year grant to host a Research Experience for Undergraduates (REU) site. This summer, an outstanding group of 10 undergraduates participated in this exciting program, some from as far away as New York and Virginia. They upgraded the ultrafast lasers in the JRM lab, studied the hydrophobic properties of Prof. Sorensen's patented aerosol gels, and even turned the satellite dish donated by former department head Jim Legg into a radio telescope! They heard the inspired lectures of Dr. Larry Weaver on scientific topics of their choosing and discussed the ethics of scientific inquiry under the direction of ethicist Dr. Bruce Glymour. They also found time for social events, including a picnic and volleyball game below the Tuttle Creek Damn, an ice cream social with the Biology REU students, and a canoe trip down the Blue river! To see a list of the students, their mentors, and their final presentations, click here http://www.phys.ksu.edu/reu/2006-reu.html.

Professor Larry Weaver, who has directed the program over many previous years, and Asst. Prof. Kristan Corwin direct the program and oversee the grant. Applications will be available at the web site, http://www.phys.ksu.edu/reu/ or from Jane Peterson (janie@phys.ksu.edu). All eligible undergraduates are encouraged to apply.

Physics Department Creates Updated Website

The physics department website has been updated and will be online in January of 2007. When you have time, go to this site and take a look at the wonderful pictures of Kansas as well as the pictures and descriptions of teaching and research in the department of physics. There is also a section for alumni and friends of the department of physics to help keep you informed in this area and for you to provide us with information on your career path and help us stay in touch.

The faculty committee involved in this update were Brett Esry, Kristan Corwin, Glenn Horton-Smith, Sanjay Rebello, and Chii-Dong Lin who chaired this effort. The major work in putting these changes on-line was done by Kim Coy with significant help from Jane Peterson and Vince Needham.

Hewlett-Packard Grant Supports New Tecnology for Teaching

Thanks to the efforts of Associate Professor Sanjay Rebello the Department has received a technology grant from Hewlett-Packard which is valued at more than $120,000. This package includes two wireless HP Tablet PCs, two HP digital projectors, two HP printers and two HP digital cameras for faculty use, 40 additional HP Tablet PCs for student use, and a cash stipend of $10,500. In addition, the grant includes travel expenses for one participant to attend the Worldwide HP Technology for Teaching Higher Education Conference in February 2007.

The grant will help the physics department expand the use of its "K-State InClass" project, according to Rebello. The project is currently used in two courses — Concepts of Physics and Contemporary Physics — and involves around 200 students.

"Developed and implemented in 2005, 'K-State InClass' is Web-based interaction software that affords students and instructors a wide range of communication options," Rebello said. "Using the HP Tablet PCs, which are personal digital assistants, instructors can communicate digitally with students to determine if they are comprehending the subject matter."

Rebello said the HP technology provides for greater interaction and active learning by students. It also gives instructors the opportunity to collect and respond to real-time feedback about the lecture from students and adapt their teaching to the students' needs in real-time, whenever needed.

"Through the Leadership Grant, HP offers additional equipment and training so that the excellent work already demonstrated by these educators can be expanded," said Bess Stephens, vice president, philanthropy and education, HP. "We are delighted to make these reinvestment grants so that even more educators and students can benefit from innovative applications of technology to improve teaching and learning."

The HP Technology for Teaching program is designed to improve student achievement through the innovative use of technology in the classroom. Since 2004, HP has contributed more than $36 million in HP Technology for Teaching grants to 650 schools worldwide. The overall program is targeted to both K-12 and two- and four-year colleges and universities.

More information about HP's Technology for Teaching program and the 2006 HP Technology for Teaching Leadership grant recipients is available at http://www.hp.com/go/hpteach

Content provided by KSU Media Relations.

Physics Department Restores 67-Year Old Telescope

The Department of Physics might have one of the newest old pieces of equipment on campus.

First built in 1939, the 10-foot Perkin Elmer/Moffet telescope was once the pride and joy of Willard Hall, but when the department got a new telescope in the mid-1970s, the old one was disassembled and squirreled away.

For 30 years it sat, in pieces and dust-covered, in the forgotten department's depths.

"It was on its way downhill, basically," Russell Reynolds, physics machine shop supervisor, said. "It was set aside for the new telescope and left."

But the 67-year-old telescope recently has been reborn, and, thanks to Reynolds, again is exploring the cosmos.

"When I became involved with this instrument, it was torn into pieces and strewn all over," Reynolds said. "I was the one to bring in because I knew every component. I knew what all the components are and where they went."

Working in the physics shop, Reynolds said he has been making optical equipment for 27 years and used his experience to restore the telescope.

Despite a healthy amount of neglect, the scope itself was in generally good condition. The optics had corroded due to condensation and contact with the brass in the tubing, and several layers of paints had to be sloughed off.

In addition, a movable tripod was built to hold the telescope and the equatorial mount, the mechanism that, once aligned with the North Star, allows the telescope to be adjusted to compensate for the earth's rotation.

Working on the glass and tubing of a precision observatory-grade telescope requires more care and effort than Windex, sandpaper and nails. Reynolds said he has spent about 200 hours of restoration time to bring the scope back to full operation.

The results of the operation have caught a few eyes in the physics department, and although the future of the telescope isn't certain, Reynolds said it is going to be a part of the physics department in one form or another.

"That's really going to be up to the professors. Now that they've seen it in its restored condition, they want to keep hold of it for now," he said.

Spit and polish on K-State's old telescope is just one of the changes the physics department hopes to make. At the top of the wish list is a new observatory for both the new and old telescopes.

"We used to have an observatory on top of Cardwell Hall," said Bharat Ratra, professor of physics and adviser of the Astronomy Club. "It hasn't been maintained in quite a while."

Problems with the Cardwell observatory sprout from the growth of K-State and Manhattan in recent decades. Along with more people and more businesses come more lighting and more light pollution, which makes pinpointing faint objects in the night sky almost impossible.

"We're trying to find a place, somewhere in the Konza (Prairie Research Center), maybe, to build an observatory," Ratra said. "We're basically blinded on campus."

Ratra said grants and other proposals have begun for funds to construct the new observatory, which could cost anywhere from $100,000 to $200,000.

Kansas observatories, due to their relative isolation, often are well-suited to capture astronomical events. Ratra said many pictures from the most recent visit of Halley's Comet in 1986 were taken in western Kansas.

When it comes to building the observatory, Ratra said much of the work might be done by faculty to trim costs, and ultimately, their work is at least easier than current efforts to restore the Hubble Orbital Telescope.

"They have to go out there and do all their work in space," Ratra said. "We have it much simpler down here."

Reprinted from the K-State Collegian, 12/8/06

NSF Grant Supports Creation of Modern Optics Course

The National Science Foundation has awarded the Department a grant of almost $100,000 to create a set of optics courses for undergraduate science and engineering students. This project is being directed by Chris Sorensen and Zenghu Chang with additional efforts by Brett DePaola, Bruce Law and Sanjay Rebello. It will create interactive studio instruction for the first semester of a junior / senior level, three-semester optics course. It adapts and implements hands-on, interactive, peer-instruction methods developed successfully by others and aspects of Paradigms in Physics developed at Oregon State University. Application of interactive studio instruction to an upper level physics course is novel. An important aspect of the optics studio is a mini-exploration / mini-lecture / mini-lab combination for instruction. This involves a very brief acquaintance (mini-exploration) followed by a short lecture (mini-lecture) over some aspect of optics. This is followed by a similarly short period of experimentation with optical equipment (mini-lab) that illustrates and amplifies the mini-lecture. Students work on the mini-lab in groups of four, which encourages peer instruction while the lecturer visits the student groups to provide direct, interactive instruction. Many of the mini-labs are related to homework problems which helps to combine conceptual and problem solving skills. A few mini-exploration / mini-lecture / mini-lab combinations with associated problems are performed each two-hour studio period.

The NSF Grant will support the creation of the studio instruction and acquisition of equipment. A gift from Bill and Joan Porter is providing funding for creating space appropriate for this type of instruction.

Sorensen Elected VP of AAAR

University Distinguished Professor Chris Sorensen has been elected to be Vice-President of the American Association for Aerosol Research (AAAR). Chris will become President of AAAR next year.

AAAR is a nonprofit professional organization for scientists and engineers who wish to promote and communicate technical advances in the field of aerosol research.

Committed to the development of aerosol science and its application to important societal issues, AAAR offers an international forum for education, communication, and networking among leading aerosol researchers.

Alumni News

Jim Chelikowsky, who graduated with a B. Sc. from K-State in 1970, recently visited K-State and updated us on his career. He is currently Professor and Director of the Center for Computational Materials and Institute for the Theory of Advanced Materials in Information Technology at the University of Texas, Austin. Jim has been doing *ab initio* calculations to understand the electronic, optical, mechanical, surface and interface properties of bulk materials and nanostructured semiconductors, ceramics and metals. He now has an extensive publication record. He has received the *David Turnbull Lectureship Award* from the Materials Research Society (2001), and the *David Adler Lectureship Award* from the American Physical Society (2006) and we congratulate him on his outstanding contributions in these areas.

Stephen A. Dyer was recognized April 25 with the Distinguished Service Award from the Instrumentation and Measurement Society of the Institute of Electrical and Electronics Engineers. accepted the award during a ceremony at the annual IEEE Instrumentation and Measurement Technology conference in Sorrento, Italy. Steve received his BS in Physics from KSU in 1973 and is now a professor of electrical and computer engineering here at KSU. You can read more at: http://www.mediarelations.k-state.edu/WEB/News/NewsReleases/dyer51106.html.

Art Hobson, who received his PhD from our Department in 1964, is the 2006 recipient of the Robert A. Millikan Medal from the American Association of Physics. "This award recognizes teachers who have made notable and creative contributions to the teaching of physics." (http://www.aapt.org/Grants/millikan.cfm) Art is a professor emeritus of physics at the University of Arkansas. For more information, see http://dailyheadlines.uark.edu/8059.htm

George J. Simonis visited K-State and talked about his work on photonics and terahertz properties of materials. He graduated from K-State in 1973 receiving a Ph.D. under the direction of Charles Hathaway. He is currently at the Army Research Laboratory and is Chief, Microphotonics Branch.

Jackie Spears was named Director of the KSU Center for Science Education in August of 2006. Jackie is an alumna of the physics department and an Associate Professor in the Department of Secondary Education at KSU.

Telefund a Success

Our telefund this year was very successful. Our undergraduates got almost $12,000 in pledges for physics scholarships. This scholarship money will be invaluable in supporting our students during their undergraduate education. We thank students, Asma Al-Rawi, Zack Warren, Aaron Pung, Jason Tackett, Ben Gramkow, Mindy Gratny, Melissa Perez, Chelsi Kovala, and Professor Larry Weaver for their efforts. Jason deserves special thanks for organizing everything.

Physics Alumni & Friends Website Update

Dear Alumni & Friends,

As part of the upgrade of our web pages, we plan to expand the Physics Alumni and Friends section.

We want this section to accomplish two things:

· Enable you to reconnect with former classmates and friends,

· Help our present students understand what careers paths have been followed by our alumni.

To get this database started, we request that you send us information about your career since you left KSU.

Please write a short summary about your career path in the general form

- Your name
- e-mail address
- Years at KSU
- Your career experience from graduation until now.
- Any other information you want to share.

Please note that this information will be published on the web. If you do not want your e-mail address to appear on our web site, please do not include it after your name. If you do not want your e-mail address published we will not give it to anyone without your explicit permission. Please send this information to: alumsurvey@phys.ksu.edu. We are looking forward to hearing from you.

Dean Zollman

Prof Bunny Clark, K-State Alumna, Retires

Professor Bunny Clark recently retired as Ohio State University Distinguished Professor. Bunny had a long and distinguished career in physics and early on got her B.Sc. at K-State. Bunny, along with husband Tom, moved to Handford where her theoretical calculations were classified and therefore could not be published in publicly available journals. She was one of the first to push for adopting a relativistic approach to nuclear physics calculations and was eventually proven to be correct in this approach. She was elected a Fellow of the American Physical Society in 1984 for her major impact on the field of nuclear physics, and more recently was elected a Fellow of the American Association for the Advancement of Science (1996).

During her long career, Bunny was active and very effective on issues related to the education of women and under-represented minorities, and the advancement of women and under-represented minorities in physics. This was reflected in the many positions she filled in the American Physical Society including past Chairs of the Division of Nuclear Physic and Committee on the Status of Women in Physics.

For more information on Bunny Clark's life and career see the following pdf file:

http://positron3.aps.org/educ/cswp/gazette/loader.cfm?url=/commonspot/security/getfile.cfm&PageID=71782

High Energy Physics News

On the research front, K-State's D-Zero experiment (see http://www-d0.fnal.gov/) at Fermilab passed the two inverse femtobarn mark in integrated luminosity. D-Zero made the first observation this year of the production of a single top quark via the weak nuclear force (as opposed to pair production of top-anti-top via the strong nuclear force, and yes, we throw around terms like "anti-top", all the time…).

Yurii Maravin, with post-doc Dima Bandurin and graduate student Alexei Ferapontov have finished a series of beautiful measurements of properties of collisions involving high energy photons detected with the D-Zero detector. Graduate students Mansoora Shamim and Mahsana Ahsan are making great progress in completing their theses with Tim Bolton. Post-doc Kristian Harder completed a crucial measurement of the absolute luminosity of the experiment. The "layer zero upgrade," outfitted with several components built in Manhattan in collaboration with KSU Electronics Design Lab engineer Russell Taylor, was installed in early spring and performs beautifully. Post-doc Dima Onoprienko wrote major sections of the crucial control software for this new project.

In one more year, Fermilab will cede its title of world's highest energy accelerator to the Large Hadron Collider (LHC) located at the European particle physics lab CERN in Geneva, Switzerland. K-State is deeply involved in building one of the experiments to run at the LHC called CMS (see http://cmsinfo.cern.ch/Welcome.html/). As usual we specialize in silicon charged particle detectors, in this case the forward pixel system. Bolton, Taylor, and a terrific crew of K-State EE students have checked out hundreds of specialized circuits for the forward pixels out in the KSU high bay lab. Onoprienko and Bolton have implemented a complex software simulation package that is needed to optimize the use of the detector. Maravin and Bandurin are working with Fermilab colleagues to set up an operations center in Illinois that will allow US physicists to operate the CMS experiment completely by remote control from Illinois, or even desktop computers in Manhattan; and Maravin, Bandurin, and graduate student Keti Kaadze are bringing the group's expertise in photon physics developed at D-Zero to the higher energy machine.

Meanwhile, Glenn Horton-Smith, Noel Stanton, and Bolton are leading KSU's program in neutrino oscillation physics. Post-doc Alfred Tang and graduate students Mark Smith and Jasmine Foster are working with this team on the KAMLAND (see http://www.awa.tohoku.ac.jp/KamLAND/) and Double-Chooz (see http://doublechooz.in2p3.fr/) experiments located in Japan and France, respectively! Mark and Jasmine are also involved with "table-top" projects that will provide important data for the larger experiments. Jasmine is building a liquid scintillator test module that she will expose to a low energy proton beam with the help of our friends in the Macdonald Lab; and Mark is building a specialized detector for rare cosmic ray interactions that will operate in an undergraduate enclosure. You could help Mark out a lot in fact if you happen to know where a nearby room is that sits about 50 feet underground and hopefully has some heat and lights!

While Eckard von Toerne is enjoying a long-term leave in Bonn, Germany supported by his Sofja Kowalskaya Prize, he is still managing to keep his hand in KSU-HEP. He and the resourceful Onoprienko have completed a highly regarded set of studies on charged particle tracking in yet another future accelerator project, this time the International Linear Collider (see http://www.linearcollider.org/cms/), a proposed futuristic complex of 30 kilometer long linear accelerators that will shoot high energy beams of electrons and positrons at each other.

As with other groups in the physics department, we continue to enjoy working with fantastic KSU undergraduates. Our crew this year included our accounting intern Tonya Brocksmith, and undergraduate researchers Wesley Cameron, Dan Wright, Arthur Thompson, Tom Vehlewald, and Ashley Wheeler. We are delighted that Ashley has been named a KSU McNair scholar in part for her work with our group.

We also remain proud of our HEP outreach activities (see http://www.phys.ksu.edu/hep/). Our 22-teacher Quarknet project continues under the able guidance of lead-teacher Laurie Cleavinger of McLouth High School, and with the continuing collaboration of Sanjay Rebello and the KSU PERG. And we continued to take a lead in the scientific literacy project KSU Center for Understanding of Origins (see http://www.phys.ksu.edu/origins/), with program assistant Nidhi Mungali making critical contributions to all facets of Center activities.

I'll close with some more news about people. Kristian Harder has moved on to a permanent position at the Rutherford Appleton Laboratory in the United Kingdom. Research faculty member Tina Khaniashvili (who worked with the HEP group and cosmologist Bharat Ratra), has taken a fellowship at New York University. Our former students remain quite active: Drew Alton has joined fellow KSU physics alumnus Eric Wells on the faculty of Augustana College in Sioux Falls, SD. Jesse Goldman is now on the faculty of the California Polytechnic Institute in San Luis Obispo. Max Goncharov is a post-doc at Texas A&M, and is now hunting for a faculty job. Shih-Wen Yang teaches physics at American River College in Los Rios, CA. Daniel Mihalcea serves on the scientific staff of the Northern Illinois Center for Accelerator and Detector Development. Finally, Patrick Berghaus is studying neutrino interactions at the South Pole (on the aptly named IceCube experiment) with the Inter-University Institute for High Energies in Brussels, Belgium.

Tim Bolton

James R. Macdonald Laboratory News

The J.R.Macdonald Laboratory has now firmly established AMO (Atomic, Molecular and Optical) ultrafast as its theme. We continue to work with the Kansas Light Source (KLS) as our main workhorse, now scheduled essentially 24 hours per day 7 days per week. This laser delivers 25 fs, 800 nm pulses with 3 mJ of energy at one kilohertz. The pulse can be shortened to 6 fs. During the past year, Zenghu Chang's group has been able to stabilize the phase of the "carrier" of the laser relative to the envelope. A second technical development has been the addition of a "Dazzler" to the system by Brett DePaola's group. This device is capable of generating "designer" pulses by slicing out or modifying user-chosen slices of the wavelength range of the pulse. The demand for the laser beam is high, and we are working hard to install a second amplifier which will allow us to double the amount of "beamtime" we have available to users. Projects which involve both the laser beam and the ion beams from the accelerators include the disintegration of molecular ions from the ECR source by Itzik Ben Itzhak's group and the generation of ultrashort pulses of energetic ions through the "Picopulse" project headed by Kevin Carnes. As I write, the KLS room is being expanded to house our improved laser and the Dazzler, as well as to allow room for the installation of a new laser.

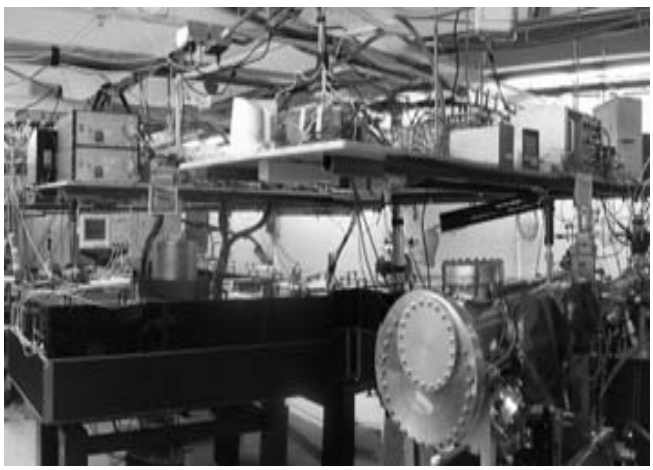
Our three year review was held in November. This time it brought to our laboratory five highly respected members of the AMO community, as well as our program managers from the Chemical Sciences Division of Basic Energy Sciences in the U.S. Department of Energy. The scientific evaluation of the program was very positive.

We have had many changes in personnel in the laboratory. As postdoc, Jarlath McKenna from Queen's University in Belfast has joined Itzik's group in November, replacing Pengqian Wang who left to take an Assistant Professor position at Western Illinois University. Hiroki Mashiko, from Katsumi Midorikawa's group at RIKEN, Japan, has joined Zenghu Chang's group for three years, and Ximao Feng, a new Ph.D. from Western Michigan University, has joined this group as a postdoc. In Chii Dong Lin's group, John RuiHua Xie and Zhangjin Chen have both joined as new postdocs. A.T. Le has been promoted to Assistant Research Professor. Toru Morishita and Hoang Le are visitors for extended periods, while K.Toyota, H.Matsunaga, T.F. Jiang, Y.M. Lee and A. Igarashi were shorter term visitors. Marlene Wickenhauser returned to Vienna Institute of Technology in January 2006 after one year in that group and has earned her Ph.D. degree there. Georgi ("Goga") Veshapidze joined Brett DePaola's group last winter as a postdoc, and Brett's student, Mudessar Shah, completed his Ph.D. defense and has taken a postdoctoral position with Georg Raithel at the University of Michigan. Vladimir Roudnev, a postdoc with Brett Esry, left in June to take a postdoc position at the University of Kentucky. New graduate students (advisor) in the JRM laboratory include Maia Magrakvelidze (Litvinyuk), Hyounguk Jang (DePaola), Nora Johnson (Ben Itzhak), Cheng Jin and Junliang Xu (Lin). Sam Fahrenholtz has joined the group of Ben Itzhak as an undergraduate research assistant.

The labs of Kristan Corwin and Brian Washburn have had a productive year. This year, Brian has converted his empty lab into an ultrafast nonlinear fiber optics laboratory, together with graduate student Jinkang Lim and undergraduate Daniel Nickel. They have constructed and numerically modeled an ultrashort pulsed fiber laser, which they will use for optical frequency combs and potentially for quantum communications. Next door, Kristan's group now includes postdoc Karl Tillman, grad students Rajesh Thapa, Kevin Knabe and Andrew Jones, and undergraduates Aaron Pung and Asma Al-Rawi. Together with Brian, they have created a stable frequency comb from an ultrafast Chromium forsterite laser. Also, they have filed a provisional patent on a new "reflected pump" technique for measuring the spectra of molecules inside novel hollow optical fibers and improved techniques for splicing these fragile hollow fibers to standard optical fibers. They are now poised to combine these techniques to develop a portable optical frequency standard, which are of essential interest to the telecommunications industry.

We have had a long parade of excellent colloquium speakers in AMO this fall semester. These include Gerhard Paulus from Texas A&M, Jianping Zhou from Spectra Physics, Haruka Maeda from the University of Virginia, Bruce Shore (a returning son) from Lawrence Livermore National Laboratory, Chris Greene from the University of Colorado and Chris Monroe from the University of Michigan. Outside speakers at our AMO seminar this semester have included Richard Brédy from CRNS, France, Tom Kirchner from University of Clausthal, Germany, Marcus Schöffler and Mathias Smolarski from the University of Frankfurt, Germany, Shin Watanabe from UEC, Japan, Bruce Shore from LLNL, and Jarlath McKenna, Belfast, Ireland.

Lew Cocke



Kansas Light Source

Activities of the Physics Education Research Group

The The Physics Education Group is continuing research and development on a variety of projects related to understanding better how students learn physics. Our efforts have moved toward investigating how students use the knowledge that they bring to a physics class and how they adapt and transfer knowledge from both other classes and everyday life experiences.

As is the case with any research group some changes in personnel have occurred. Both Lili Cui and Edgar Corpuz completed their PhDs in Physics during the summer of 2006. Lili accepted a lecturer position at University of Maryland – Baltimore County, while Edgar is now an assistant professor at University of Texas - Pan American. Dr. Meera Nagarajarao, a professor of physics from Bangalore University in India, is visiting for the academic year and is working on research and development related to teaching magnetic resonance imaging. Her visit to KSU is supported by an American Physical Society KPR Fellowship and a grant from the Fulbright Commission.

Dr. Zollman has taken a sabbatical this year to conduct research at Ludwig Maximillians University in Munich. In February he will be going to the Institute for Science Education (IPN) in Kiel, to conduct research .At both places he is focusing on creating teaching materials to be used in the US & Germany.

New GRAs in the group include Jackie Haynicz, graduate of Drew University, Fran Mateycik, graduate of RPI, and Dyan Jones, graduate of Miami University.

Dr. Zollman and postdoc Brian Adrian are still busy working on thePathway, project. This effort, which is an expansion of a pilot project funded through the National Science Digital Library, emphasizes support for teachers who are already teaching physics but have less than adequate preparation in physics or the pedagogy of physics. Pathway is a new type of digital library for providing ongoing enhancement and preparation for physics teachers and combines state-of-the-art digital video library technology with contemporary ideas about pedagogy and materials contributed by teachers. Carnegie Mellon University's "synthetic interview" technology provides the foundation for a system that allows physics teachers to ask questions of a virtual mentor and get video responses. The group at Carnegie Mellon is enhancing the software so that users may add media from our collection or others and create their own Synthetic Interviews. The net result will be a cooperative in which teachers contribute, modify and keep up-to-date high quality instructional materials and at the same time have the opportunity to learn from expert physics teachers. For more information or to see how it works see www.physicspathway.org.

As part of the NSF-funded Modern Miracle Medical Machines project, PER graduate students have been conducting research on student mental models using two methodologies. They begin with traditional clinical interviews that help us investigate how students are using their knowledge of physics to understand medical diagnostic tools such as CT scans and positron emission tomography. This part of the effort is based on the transfer of learning research in education and psychology. Using the results of these interviews we then build instructional materials. Students work in small groups of two or three to learn from these materials. As they do we simultaneously learn more about how students think about the topics and what parts of our materials are successful in promoting transfer of learning. Additional research is being conducted on X-rays, lasers and the eye and magnetic resonance imaging. To create successful instructional materials we need to base our development on research in physics teaching and learning. Much of the research that has been done previously will be useful, but we need to do more as well. Thus, we are now conducting some research on students' reasoning and mental models related to some topics in modern physics as it relates specifically to medical imaging.

Dr. Sanjay Rebello has also had a busy year. He was awarded one of 10 Hewlett Packard Technology for Teaching Leadership Grants. This grant provided K-State with Tablet PCs along with other computer software and hardware to be used in the classrooms and labs. The system is currently being used in Physical World I labs with students.

Dr. Rebello and his graduate students are conducting research on Student Modeling of Real-World Devices and Phenomena as part of his CAREER grant. In this research they are investigating students' mental models of real world devices and everyday physical phenomena. These devices have included the bicycle, musical instruments, electrical appliances and phenomena such as friction. Through previous research in our group, we had developed a model to describe how students transfer their learning from one setting to another.

Dr. Rebello is also working with Dr. Sadhana Puntambekar at the University of Wisconsin and Dr. Roland Hubscher at Bentley College on the NSF-funded CoMPASS project. This project investigates the use of hyperlinked concept maps in conjunction with hands-on, design-based activities to help students at the middle school level learn concepts in physics such as simple machines or force and motion. Dr. Rebello's efforts in this project have focused on developing the instructional materials as well as investigating students' conceptual development as they use these materials.

In addition we are beginning work on several new projects that have recently received funding. One of these projects will expand the Pathway project as the first step toward creating a version which will enable individual teachers to create Synthetic Interviews for their students. The research will investigate what types of Pathway style multimedia are most effective in providing foundations for student learning of physics concepts, for encouraging students to reflect on their

Physics Education (cont.)

learning, and for enhancing transfer of knowledge to the learning of physics. As with the previous Pathway projects our primary collaborator is Scott Stevens at Carnegie Mellon University.

A research effort in collaboration with David Jonassen at University of Missouri-Columbia is starting a study of problem solving in introductory physics classes. This work is based on research in psychology which seems to indicate that students learn problem solving techniques better if they compare and contrast problems with different strategies. However, this research has generally focused on problems that are somewhat simpler than a typical physics problem. So, we will build a system that requires students to compare and contrast problems and thereby develop their problem solving abilities. Then, we will investigate whether students' problem solving abilities transfer to problems that they have not seen.

One other project is a collaboration with Dennis and Cynthia Sunal at the University of Alabama and Cheryl Mason at San Diego State . The research effort will investigate how undergraduate science courses that serve pre-service teachers affect their teaching once they are in the elementary school classroom.

If you would like any additional information about any of our research, please go to our website at http://web.phys.ksu.edu/ or send email to kim@phys.ksu.edu.

Graduate Student Howard Camp Wins Award

Howard Camp was named one of three winners of the "Innovative ETD Award" by the Electronic Institutional Document Repository Program. The award letter stated:

> 'Your exemplary work has created a unique model of digital media research that will encourage further endeavors in this area. Your efforts have improved graduate education and raised the standard of scholarship on a global scale. Your work will provide a clear road for others to follow.'

Howard received the award at the ETD 2006 Symposium in Quebec, Canada. This award is supported by Adobe Inc. and through this support he received an award check of $400.00.

Howard's thesis work was done under the direction of Professor Brett DePaola in the MacDonald lab and his thesis was entitled, "Measurements of the Time Evolution of Coherent Excitation."

Undergraduate Fulbright Fellow to Study in Japan

Next year, David Thompson, a senior with a minor in physics, will be a Fulbright Fellow in Japan at Tohoku University in Sendai, where he will be using the opportunity provided by the Fulbright to improve his Japanese language proficiency, focusing on business and technical settings. David conducted undergraduate research under the supervision of Tim Bolton, professor of physics. His project was a simulation program to help measure neutrino oscillation. He is majoring in electrical engineering with an emphasis in biomedical engineering and minors in physics and Japanese. Later in his career, he hopes to use these skills to facilitate increased academic and commercial cooperation between American and Japanese universities and companies. After the year in Japan, he plans to attend the University of Michigan to earn a master's and Ph.D. in biomedical engineering, focusing on the area of neural prosthetics. Career plans are to conduct research and teach in a university setting.

David Thompson with Prof. Tim Bolton

A K-State honors list student, he is a 2005 Goldwater Scholar, and received an honorable mention in the National Science Foundation Graduate Research Fellowship Program. A member of the College of Engineering honors program, he also has received the James A. Branson Memorial Scholarship. He came to K-State as a Presidential scholar. He has been active with Powercat Masters Toastmasters, which he served as secretary. This semester he is working with Steve Warren in the electrical engineering department improving the performance of a pulse oximeter unit, and later will be investigating its possible use as a biometric. He is a 2001 graduate of Burlingame High School and Allen County Community College, which he attended concurrently. Thompson is married to Amity I. Smith Thompson and is the son of David W. and Judith B. Thompson, Burlingame. See nire at http://www.mediarelations.k-state.edu/WEB/News/NewsReleases/Fulbright51606.html.

Content provided by KSU Media Relations.

Graduate Physics Student Association Activities

This year the Graduate Physics Student Association has been busy! We made the very popular "KSU PHYSICS" shirts in the spring, and you can find someone wearing one on any given day of the week. We're talking about making another round of shirts, so if you missed out the first time, don't worry.

We've also been active in K-State's Graduate Student Council, trying to increase students' benefits concerning insurance and health care. While this will probably be a long and drawn out process, we have confidence that we can help change things for the better.

We also had a very successful graduate student Pot Luck Dinner at the beginning of the fall, where everyone was encouraged to bring a dish that is popular to their culture. Everyone had a great time, and we would like to thank Amit and Dean for their generosity in allocating funds to help us buy plates, plastic ware, napkins, and soda!

Finally, we finished off the semester's activities with a Departmental Football game (European football, of course!) in November. Everyone who came had a great time, and no one was seriously injured. We had an after party at my house with a keg of Little Apple's Blueberry Wheat, which everyone enjoyed. Although the turn out to this game was good, there were a lot of people who told me they were going to show up and didn't! Because of this, we're going to have a rematch in the spring, so prepare yourself!

Physics Club 2006

During spring break of 2006, the Physics Club organized a trip to Fermi National Accelerator Laboratory and Argonne National Laboratory in northern Illinois. The eight undergraduates who made the trek were given private tours to learn about the science being conducted at these prestigious facilities. At Fermilab, the group toured the inner workings of the Tevatron high-energy particle accelerator and visited with particle physicists about the consequences of their discoveries. The highlight of the Argonne National Laboratory tour was the Advanced Photon Source where X-ray beams are used for applications in the physical, medical, and environmental sciences.

Over the remainder of 2006, the Physics Club hosted several movie and gaming nights in order to foster camaraderie amongst K-State students. Those events were met with increasing success and will be continued into the future. The club also welcomed Dr. Sanjay Rebello as their new faculty advisor and announced Dr. Chris Sorensen as the 2006 recipient of the Schwenk Award for Undergraduate Teaching. This award is given annually to a professor chosen by physics majors whom demonstrates excellent teaching in the department. For the coming year, preparations are underway for the K-State Open House in April where the theme will be "The Physics of Music." This will include demonstrating capacitance with a Theremin and exploring standing waves on drums and electric guitars.

Class of 2006 & What They are Doing Now

Bachelor of Science Degrees

Ben Gramkov - Graduate School, KSU Physics

Mindy Gratny - Physics Education Research, University of Colorado

Sara Jaggard - Graduate School, KSU Physics

Jon Kalodimos - Graduate School (Master's in Business Finance), University of Florida

Mat Leonard - Graduate School, University of California-Berkeley

Jacob Thomas - Graduate Program in Education & Teaching

Philip Zemler

Masters of Science Degrees

Chris Nakamura - Teaching, KSU Physics

Doctorate Degrees

Edgar Corpuz - Associate Professor, Univ. of Texas – Pan American

Lili Cui - Lecturer, Univ. of Maryland –Baltimore College

Altaf Karim - Postdoctoral Fellow, University of Delaware

Faisal Mehmood - Research Associate, Univ. of Wisconsin-Madison

Neeraj Nepal - Research Assistant, Kansas State University

Mudessar Shah - Postdoc, University of Michigan

Physics Department Obituaries

Jim Crawford, Graduate

We learned at the start of 2006 that Jim Crawford, who graduated from the department of physics with a Ph.D. in about 1972, has passed away.

After Jim graduated from KSU he went on to have a long and productive career in teaching and research in physics. In 1972 he joined Southwest Texas State University as an assistant professor of physics. About ten years later he became chairman of the Department of Physics. He was deeply involved with teaching and added coursework in materials physics. In 1997, the American Physical Society recognized the (now named) Texas State program for adding the materials science courses.

In his research Jim used optical diagnostics to study the properties of materials. Recently he spent several summers at the U.S. Naval Research Laboratory in Washington using optical techniques to understand how nuclear fusion might serve as an energy source.

Jim visited KSU about three years ago to give a colloquium. We were very happy to have had the opportunity to have him back here to catch up on what he has been doing and discuss physics with him. More information can be found on Jim in an article at: http://www.statesman.com/news/content/metro/obits/15tsuphysics.html.

Bernice Bartel, Former Librarian

Bernice Bartel passed away in November of 2006 in Olympia, Washington. Bernice was the librarian for the section of the library in Cardwell Hall that housed much of the physics collection. She provided 19 years of service to the university library and the physics department, retiring in 1983. According to an article in the Manhattan Mercury, the highlight of her retirement years was traveling with husband Roy in their Airstream all over the United States and Canada.

Bernice was a native Kansan growing up in Hillsboro and leaves behind a large family including five grandchildren and two great grandchildren.

Your Support Makes a Difference

Your Support Makes a Difference

If you wish to make a donation to one of the physics department scholarship funds, please make your check payable to the scholarship of your choice.

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- A. B. Cardwell
- Clarences S. & Jane Clay
- Basil & Mary Curnutte
- Dean & Edna Dragsdorf
- Louis Ellsworth
- John P. Giese
- Paul G. Hewitt
- Leo E. Hudiburg
- James R. Macdonald
- Ronald D. Parks

You may also make a gift to the Department's general scholarship fund or to one of the following endowments.

- Ernest & Lillian Chapin Professorship
- James Neff Lecture Series
- Chester Peterson Lecture Series

To make your gift, send a check (or visit the link for the Foundation) to either the

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