Physics

December, 2009

Letter From the Chair

Dear Friends of the Department:

Our faculty members have once again distinguished themselves with their accomplishments this year. Viktor Podolskiy was promoted to Associate Professor and has been granted indefinite tenure. His work has been in the news again – this time on new plasmonic nanorod metamaterials using extraordinarily tiny rods of gold that will have important applications in medical, biological, and chemical sensors. Yun-Shik Lee's book "Principles of Terahertz Science and Technology" was published earlier this year by Springer, and Rubin Landau received the Krell Institute UCES 2008 Award for the publication of his book "A Survey of Computational Physics: Introductory Computational Science." Dedra Demaree was awarded an Innovation Grant from the Center for Teaching and Learning. Yun-Shik Lee, David McIntyre, Ethan Minot, Oksana Ostroverkhova, Viktor Podolskiy, and Janet Tate were successful in receiving funding for their research from the ONR/ONAMI initiative. Corinne Manogue and Tom Giebultowicz are on sabbatical leave this year, pursuing research projects. Chris Coffin and I were honored to be finalists in the College of Science Awards nominations this year – Chris for undergraduate teaching and I for advising.

All this comes amidst great change at Oregon State University during the last year or planned for next year. Our main concern is, of course, related to the economic situation in the State of Oregon, which has resulted in a large cut to the OSU budget. The University is reorganizing its basic structure, and looking very closely at every aspect of its operations. We in Physics are working hard to prepare ourselves for the next few years, when the budget impacts will be the strongest. These are uncertain times, but I am glad to say that our faculty members are pragmatic lot; they are looking forward to what we still can and should do!

The University has decided to close a number of low enrollment programs. This affects our department very strongly, since we will no longer have BS degrees in Engineering Physics and Computational Physics or an MS degree in Applied Physics. Even though these are excellent programs, offered at minimal additional costs, the university-wide move to eliminate small enrollment programs has gone forward. We already have made plans to strengthen and update two of our related options for the BS degree, in computational physics and applied physics, and to make them more visible. We will do this quickly in order to compensate for the loss of students that we will see due to the closure of these programs.

Other changes in our Department are personnel related. Bill Warren has retired, and we will truly miss his contributions to the program. He has been an extremely valuable member of our faculty. His very practical views derived from his unique background in industry have helped us many times in making hard decisions. Our accountant, Verna Paullin-Babcock, has been moved to the new centralized Arts and Sciences Business Center. Office manager Paula Rhodaback is now managing a combined Physics/SMED/Chemistry office from Gilbert Hall, and Renee Freeman is working for Physics and Paula Dungjen for Science and Math Education out of Weniger 301. Even with all the turmoil of people learning new jobs, the transition has been relatively smooth on our level, thanks to the great efforts of our office staff.

In our previous letter we mentioned the development of a new class room, made possible with generous donations from Mr. and Mrs. Greg Serrurier and from Dr. Joan Suit. The renovation is now almost complete and we plan to start using this "SCALE-UP" room for our interactive instructional activities on a test basis in Winter and on a regular basis in Spring. We have also modernized our graduate courses by developing new modules in the specialty areas focusing on current topics in materials science and optics. These modules replace the previous more traditional courses we had in these fields. Our paradigm project remains highly visible, and as a result Prof. Steven Pollock from the University of Colorado at Boulder is visiting us to help with the assessment. His visit gives us great opportunities for discussions and allows us to incorporate outside opinions into the program.

With so many changes one really wonders: what are the things that remained the same? It is very clear that we are still strongly dedicated to ground breaking research and excellent teaching. Both of these aspects of our enterprise involve students at all levels, because that is why we are here. We are still heavily collaborating with other departments on campus. Our research ranges from the study of organic semiconductors and carbon nano-tubes to how students learn in our physics environment. We have been in graduate classes discussing advanced physics topics, but also in summer (continued to page 4)

INSIDE:

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Degrees Awarded

From Fall 2008 to Summer 2009, the Physics department awarded 15 B.S. degrees in Physics or Engineering Physics; and 1 Ph.D. degree in Physics (2 Ph.D and 2 M.S. degrees in Fall 2008 were reported in last year's newsletter).

Justin Elser, Ph.D. (Physics) to a post-doc in computational biology Botany and Plant Pathology at OSU

Troy Ansell, B.S. (Physics) working in Salem
Abel Condrea, B.S. (Physics)
Evan DeBlander, B.S. (Engineering Physics, honors) to grad school in atmospheric science at OSU
Daniel Harada, B.S. (Physics) to graduate school at OSU
Ramsi Hawkins, B.S. (Physics)
Christopher Holmes Parker, B.S. (Physics, honors)
Jonathan Hunt, B.S. (Physics)
Patrick Jacks, B.S. (Engineering Physics)
Jeffrey Macklem, B.S. (Physics) working in Saramento
Scott Marler, B.S. (Physics) serving in the U.S. Navy as a nuclear engineer
Vincent Nguyen, B.S. (Engineering Physics)
Bryan O'Halloran, B.S. (Engineering Physics) to graduate school in engineering
Michael Paul, B.S. (Physics) to graduate school at OSU
Colin Podelnyk, B.S. (Physics) to the Navy Nuclear Engineering School
Alexander Smoot, B.S. (Engineering Physics) to grad school in atmospheric science at OSU

Incoming Graduate Students

Welcome to the incoming class of 2009. Our 11 new students come from both coasts of the US, and from abroad. They are hard at work taking classes, teaching, doing research, and participating in outreach activities.

Student Awards

The annual graduate awards in the department went to **Andriy Zakutayev** (Physics Graduate Research Award) and **Zlatko Dimcovic** (Physics Outstanding Teaching Assistant Award). Our grad students are an essential part of the research and teaching missions of the department, and it's a pleasure to acknowledge them each year.

Our graduate students have garnered several travel award this year to take them to conferences far and wide. **Nick Kuhta** received a Student Travel Grant Award from the APS Division of Laser Science to attend and present a paper at CLEO/QELS in Baltimore. **Andriy Zakutayev** received a conference scholarship and an NSF travel grant to enable him to present a paper at the Canada-America-Mexico Graduate Students Physics Conference in Acapulco, Mexico in October. CAM 2009 is a joint meeting of the Canadian (CAP), American (APS) and Mexican (SMF) Physical Societies.

Oregon Lottery Scholarships, awarded by the Graduate School, went to **Whitney Shepherd** and **Andriy Zakutayev** this year. It reflects well on the department that TWO of our students received awards in one year!

On the undergraduate front, **Howard Hui** received the OSU Waldo Cummings Outstanding Student Award, and **Jeffrey Holmes** won a URISC award to work with Prof. Bill Hetherington on the radio telescope project.

Quantum Control of Quasi-Atoms in Semiconductors

Yun-Shik Lee
Yun-Shik joined the OSU faculty in 2001. He was awarded an NSF CAREER award in 2005 and a Humboldt Research Fellowship in 2007. His research focuses on coherent control of quantum solid state systems using strong terahertz pulses.

Terahertz (THz) radiation is electromagnetic radiation whose frequency lies between the microwave and infrared regions of the spectrum. Recent advances in THz science and technology have brought about exciting new opportunities for a broad range of applications ranging from atomic and molecular dynamics to medical and security imaging and noninvasive package inspection. I authored a book, "*Principles of Terahertz Science and Technology*" (Springer, 2009), to survey the main topics and fundamental issues.

My group is at the front of the newly emerging field of nonlinear THz spectroscopy. In particular, we are interested in using THz radiation to probe and control quasi-atoms called excitons that exist in semiconductors. When light strikes a semiconductor, the photon excites a negatively-charged electron from the valence to the conduction band, simultaneously creating a positively-charged hole in the valence band. The attractive Coulomb interaction between the charged particles leads to the formation of a hydrogen-like entity called an exciton. The exciton does not exist outside of the semiconductor, so we call it a quasiparticle. Excitons behave in many respects just like hydrogen atoms, with similar transitions between energy levels that can be probed by spectroscopy. But exciton spectroscopy must be performed with THz radiation and not optical radiation because the energy scale in excitons ranges from 1~100 meV, about 1000 times smaller than the energy scale of hydrogen. This is because the effective reduced mass of the electron-hole pair in excitons is much smaller than the reduced mass of the electron and proton in hydrogen, and because excitons exist within a medium (the semiconductor) with a large dielectric constant. So while hydrogen atoms are explored using ultra violet and optical photons, the energy differences between levels in excitons correspond exactly to THz photon energies! This shown schematically in **Fig. 1**, where an optical photon creates the exciton in the first place, and THz radiation causes transitions between energy levels within the exciton.

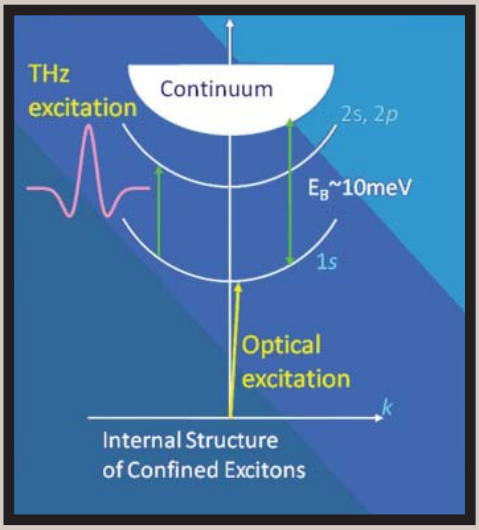

Fig. 1

Coherent control of excitons by THz pulses is a powerful method to manipulate the quantum wave packets of the quasiparticles. Recently, we have explored the uncharted regime of exciton dynamics: quantum coherent transients of internal exciton transitions in semiconductor quantum wells (QWs) driven by ultrafast THz pulses. In a paper recently published in Physical Review Letters, we reported that the strong and short THz pulses produce remarkably strong nonlinear optical effects in semiconductor QWs due to the strong interactions of the THz fields with exciton wave packets.

In the experiment, we employed a THz-pump and optical-probe technique to investigate time-resolved nonlinear optical effects induced by intense, ultrafast THz pulses. The most distinctive feature of this approach is that we can observe the internal exciton transitions with the temporal resolution of 100 femtoseconds (10-13 sec) limited only by the femtosecond laser pulse duration. Indeed, we have observed intriguing coherent quantum effects of internal exciton transitions as shown in **Fig. 2** (on page 4). An analysis based on microscopic many-body theory revealed that the experimental observation demonstrates extreme nonlinear optics, in which the THz field is so strong and short that population inversion between the exciton states can be obtained within a few cycles of THz radiation. In the most recent study, we demonstrated that exciton wavepackets are coherently manipulated by strong few-cycle THz pulses.

The nonlinear THz spectroscopy techniques we have developed are relevant to a wide range of research areas. The coherent control of low-energy excitations in condensed matter is a crucial initial step towards quantum information processing in a compact solid-state device. Enhanced knowledge of THz carrier dynamics and nonlinear optical effects will also be applicable to developing ultra-high speed optoelectronic devices such as

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Quantum Control of Quasi-Atoms in Semiconductors

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optical modulators, switches, and frequency converters. Our research projects have attracted national and international collaborations with world renowned researchers such as Stephan Koch in University of Marburg, Germany, Hyatt Gibbs at University of Arizona, and Dae-Sik Kim at Seoul National University. Our work on the nonlinear THz spectroscopy of condensed matter has been supported by the Defense Advanced Research Projects Agency, the National Science Foundation, and the Office of Naval Research/ONAMI.

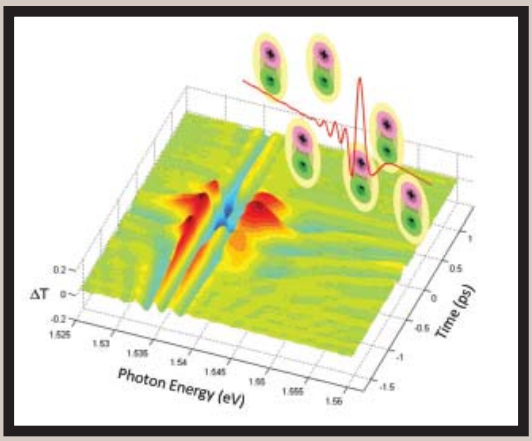

Fig. 2

Letter From the Chair

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workshops for K-8 teachers who are preparing to get a physics certification. No matter what the level we teach at, our faculty members remain dedicated to providing the best possible learning experience, and it remains exceptionally satisfying to see the light bulbs go on when students start to understand the topic.

Also remaining the same was our Yunker lecture, which was once again a great success, and our new lecture hall in Weniger 151 was full. The speaker was Paul McEuen, a world expert on the science and technology of nanostructures, who spoke on "Small is All: Nano, Bio, and the Future of Technology." If you are interested, you can view the video of his presentation on the web at http://oregonstate.edu/media/txknb

As always, the department welcomes your news, feedback, and support. If you're in town, please come and visit with us to see all the new activities that we're glad to describe in this year's letter.

With very best wishes,

Henri Jansen
Chair of the Physics Department

Physics

1908-2008: A Century of Physics at Oregon State University

Kenneth S. Krane
Ken is Professor Emeritus of Physics. His research is in experimental nuclear physics and he is involved in undergraduate physics education in many capacities, including that of textbook author. He served as department chair from 1984 – 1998

The teaching of physics (then known as "natural philosophy") began in Corvallis College as early as 1866 under Reverend Joseph Emery, who held the post of Professor of Mathematics and Natural Science (as well as being in charge of the "Young Gentlemen's Boarding House" and serving as Acting President in 1872). In 1872 Corvallis College became the State Agricultural College, and a School of Physics was established, comprised of the Departments of Chemistry, Biology, and Natural Philosophy. Its leader was Benjamin L. Arnold, A. M., who was at various times Professor of Physics, Professor of Moral Philosophy, Professor of English, Professor of Languages, and director of the Agricultural Experiment Station (and who would later become president of the college from 1872 to 1892). During the 1890's, only introductory physics courses were offered, at various times through the Department of Chemistry, Physics, Geology, and Mineralogy, the Department of Physics, History, Latin, and Music, and the Department of Mechanics, Physics, and Mechanical Engineering. The physics instructor for much of this time and through 1908 was Grant Covell, M. E., who was Professor of Mechanical Engineering. The introductory physics courses supported degree programs in engineering, commerce, pharmacy, forestry, and agriculture.

The formation of an independent physics department began in 1908 with the hiring of Dr. Willibald Weniger as Assistant Professor of Physics. Weniger was originally from Milwaukee, Wisconsin, and received B.A., M.S., and Ph.D. degrees from the University of Wisconsin. He was hired by OAC immediately upon completing his Ph.D. dissertation on infrared absorption spectra. At that time, he was the only Ph.D. on the faculty of the college. He left OAC in 1914 to work at the research laboratories of General Electric and returned in 1920 to resume the post as head of the Physics Department. He served as head of Physics until 1949, and after retiring in 1951 he spent 4 years as head of Physics and Electrical Engineering at the University of Alaska. He returned to Corvallis in 1955 and died in 1959.

During Weniger's absence from 1914 to 1920, Dr. William Anderson (Ph.D., University of Wisconsin, 1906) was appointed as head of the Physics Department. Through this period, the offices and laboratories of the Department of Physics were housed in Apperson (now Kearney) Hall. The department still offered only introductory courses in support of various undergraduate major programs. In addition to Weniger or Anderson, the department employed usually two additional instructors.

Starting in 1920, the department faculty consisted of Professors Weniger and Anderson along with 6 instructors, including the first woman hired by the department, Mrs. Charlotte Taylor (A.B., Vassar), who was in charge of teaching Household Physics in support of the Home Economics degree program. The number of courses had grown slightly, but almost all were introductory courses for students in various other majors. Several courses in photography were added in the 1920's because the department owned a great deal of photographic equipment that supported the laboratories for these courses, the Physics Department ran the College's Photo Service for many years, and physics staff and students did the photo processing for the institution.

Also added in the 1920's were courses in telegraphy, which gradually morphed into courses in radio communication. The Physics Department started the campus radio station KOAC, which was operated by the department until 1932 when the State of Oregon (through the Board of Higher Education) assumed responsibility for the station. Graduate thesis credits were first offered in the 1920's, although no curriculum of graduate physics courses was available.

In 1928, the Physics Department moved to new facilities in what is now known as Covell Hall (then known as the Physics Building), with KOAC occupying most of the 3rd floor. By 1930 the Physics Department had grown to a faculty of 12 (3 professors, 9 instructors) within the School of Basic Arts and Sciences, which offered no undergraduate majors and awarded no degrees (but undergraduate degrees in some areas such as chemistry and zoology could be earned through the School of Agriculture).

The early 1930's brought great changes to the College and the

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1908-2008: A Century of Physics at Oregon State University (continued from page 5)

Department. The State System of Higher Education consolidated its course offerings, and as a result the undergraduate and graduate degree programs in all of the sciences were offered only at Oregon State. These included the B.A./B.S., M.S. and Ph.D. in physics. A full range of undergraduate and graduate courses was offered to support the physics degree programs, and from that time the catalog listings for physics began to resemble the present-day listings. Course offerings in physics went from 70 credit hours to 232 credit hours. Unfortunately the widespread economic depression resulted in severe hardships for the campuses, and the physics instructional staff was reduced from 12 to 7.

In 1936 (at which time Oregon State Agricultural College became Oregon State College) the first 2 students enrolled in the graduate program and served as instructors for the introductory courses. The number doubled the following year, and the first doctoral degrees in physics were awarded in 1939-1940.

The years of World War II (1940-1945) saw many of the faculty applying their scientific expertise in support of the war effort. Professors James Brady, Harold Vineyard, and Ed Yunker spent the war years doing radar research and development at MIT and Harvard. Professor David Nicodemus, who would join the department in 1950, participated as a graduate student in the atomic bomb development at Los Alamos.

In the late 1940's, the department began a research and instructional program in meteorology, which would eventually evolve into the Department of Atmospheric Sciences. In 1949, Ed Yunker assumed the post of department head following the mandatory retirement of Willibald Weniger, who had served as chair since 1920.

By 1950, the physics faculty comprised 9 professors and 12 instructors. Work was begun on the construction of a 37-inch cyclotron under the leadership of Professor James Brady, who had worked with cyclotron pioneer Ernest Lawrence at the University of California. The cyclotron became operational in 1954 and ran until 1966 when funds were received from the Atomic Energy Commission for an upgrade. The cyclotron continued to operate until the early 1970's. The main magnet from the cyclotron is now serving as a bending magnet for the TRIUMF accelerator in Vancouver, BC.

By the early 1960's, when Oregon State College became Oregon State University, the department had grown to 12 professors, 3 instructors, and 40 graduate assistants. In 1959, the department began its move into the new Physics-Chemistry Building, soon renamed Weniger Hall. After the completion of the second stage of the building, the official dedication was held in 1962. Among the speakers at the ceremony were Nobel chemist Willard Libby, Nobel physicist Ed McMillan, and Homer Newell, NASA Director of Space Sciences. At the dedication, the building was described as "one of the largest and best equipped science research and teaching centers in the U.S."

The first undergraduate degree in Engineering Physics was awarded in 1962 through a cooperative program between the Physics Department and the College of Engineering. In the late 1960's, the photography courses were given for the last time. Meteorology courses formerly given by Physics were transferred to the new Department of Atmospheric Sciences, along with the faculty whose specialty was in that area.

In 1972, the faculty of the Physics Department decided that it would be more efficient if the department's research were focused with roughly equal effort in 3 areas: atomic and optical physics, condensed matter physics, and nuclear physics. This policy was used in the ensuing decades to guide faculty hiring. As a result of retirements and resignations, 5 new faculty were hired between 1973 and 1976, and 7 faculty hires were made between 1986 and 1991. These faculty brought a new energy to the department's teaching and research programs and established an enviable record of external grant support. As a result, graduate enrollments swelled to 80 students by 1991, and from the mid-1980's to mid-1990's, the department awarded on the average nearly 25 undergraduate degrees per year, placing it consistently among the top 5% of U.S. universities.

In 1981, the Yunker Lecture Fund was established as a result of a generous gift from Mrs. Gertrude Yunker, who wished to establish a lecture series in honor of her husband, former department chair Ed Yunker. Thanks to the generosity of the Yunkers and members of their family, the first Yunker Physics

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Lecture was held in 1985, and the annual lecture program continues to be a highlight of the department's activities, enabling us to host visitors who have offered stimulating talks on topics ranging from time travel to space-based weapons and from the structure of the universe to the structure of fundamental particles. Although Ed and Gertrude Yunker passed away in 1990, their generosity lives on through this lecture series that they endowed.

As a result of declining undergraduate enrollments beginning in the mid-1990's, the department began a careful examination of its degree programs, which resulted in the launch of the Paradigms project in 1997. This project involved a wholesale reconfiguring of the physics courses of the junior and senior years. Once the program was established, enrollments of physics majors (which had fallen to about 10 per year from 1995-1999) rose to around 20 per year in the following decade. These successes brought OSU attention as one of the 20 model U.S. programs surveyed by the National Task Force on Undergraduate Physics. An outgrowth of the Paradigms program was the establishment of a research program in physics education. During this same period, the department established a new undergraduate major in Computational Physics and awarded the first degree in 2003.

Following a series of retirements, 7 new assistant professors joined the department between 2001 and 2008. These newly hired faculty are injecting a level of enthusiasm that is reflected in new directions for research. The character of research in physics has changed in recent decades, from individual scientists working largely in isolation to large collaborative projects involving dozens of researchers from many different fields of science and engineering. The development and study of new types of materials and the exploitation of structures on the nanoscale have opened new vistas for research, to which the OSU Physics Department is poised to make significant contributions as it enters its second century.

The Society of Physics Students

The Society of Physics Students had a great year last year! The Monday study hall and Discovery Days were both successful events, and will be carried on this year by the club. Each term we had movie nights and game nights, which will be returning this year. **Matt Cibula** is now the president, **Jeff Holmes** is the vice president, **Mike Nielson** is the treasurer, and **David Williams** is the secretary. We participated in the Fall Discovery Days community outreach event in October this year, and we have been adding to the organization's events with our Texas Hold 'Em poker night on September 16th, which was a giant success.

Our new-look webpage is http://oregonstate.edu/physics/sps/. We're glad to welcome new members, so come stop by in Weniger 383 anytime and see what we're up to!

Discovering the Scientist Within

On November 7th, about 20 middle school girls imploded soda cans, rode on a vacuum-cleaner hovercraft, and shrank balloons in liquid nitrogen. These and several other activities were set up in one of the introductory physics labs to let girls have hands-on "phun with physics". Judging by the noise level in the room and the smiles on the parents' faces, the girls were thoroughly engaged in learning about science. Part of a larger science and engineering day called "Discovering the Scientist Within", the physics tour was organized by Janet Tate, Dedra Demaree and Jim Ketter, with enthusiastic help from grads Faye Barras, Jennifer Roth, Jess Gallagher, Christopher Reidy, and undergrads Alison Gicking, and Sean Caudle. In the accompanying photo, one of the middle schoolers is fascinated by a resonating steel plate.

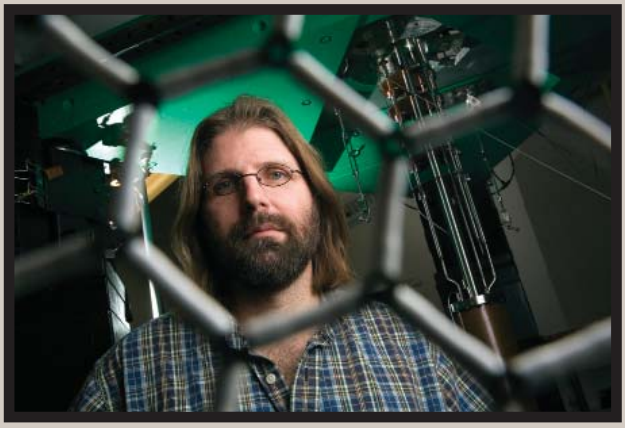
The 2009 Yunker Lecture: Small is All, Nano Bio and the Future of Technology

Ethan Minot
Ethan joined OSU in 2006 after a post-doc at the Kavli Nanoscience Institute in Delft. He was previously a graduate student at Cornell working under the direction of Paul McEuen, the 2009 Yunker lecturer.

Paul McEuen of Cornell University delivered the 2009 Yunker lecture. The premise of his talk was that new nanotechnologies, today in their infancy, will mature and change society in the same way that the miniaturization of electronics changed the world over the last 50 years. Physicists will continue to play an important role in these new technologies, just as they did with transistors and many other revolutionary inventions. Paul likes to phrase it this way: "Kids play to learn, then they grow up and do serious stuff. Scientists play to learn; we are the kids of society."

The biology of life is an incredible nanotechnology in its own right and scientists have a long way to go before they can engineer anything so sophisticated. In a recent breakthrough, researchers figured out how to code sequences of DNA so that they fold into "smiley faces". Paul views this result as a baby step on our way to making biology an engineering discipline.

Predicting the future isn't straightforward, so Paul recently organized the "Kavli Futures Symposium" to gather together renowned scientists such as Steven Chu and Freeman Dyson to talk about the convergence of nanoscience and biology. After a week of discussion, this group of 17 scientists proposed the following scenario: "Fifty years from now, synthetic biology will be as pervasive and transformative as is electronics today. And as with that technology, the applications and impacts are impossible to predict in the field's nascent stages. Nevertheless, the decisions we make now will have enormous impact on the shape of this future." Paul suggested that we will engineer organisms that turn sunlight into fuel, and create the drugs we need to cure disease. Today's genetically engineered crops are nothing compared with what is to come. Our kids might type out DNA sequences on a computer, and then bring their codes to life by squirting the DNA sequence into protocells. After presenting this scenario, Paul discussed how synthetic biology could potentially be regulated "because it is coming, whether you like it or not."



Nanoscience also promises to play a role in generating energy, and Paul gave us his perspective on this issue. Society's demand for energy is enormous. While our bodies run on only 100 W (1 light bulb), the energy consumption in the US is equivalent to each person running 100 light bulbs. The sun is an obvious place to get this energy, since we receive an average of 200 W/m^2. It would be very expensive for the US to harvest all its energy using silicon solar technology - about $300,000 per person. Therefore, the search for a game-changing low-cost/high-efficiency photovoltaic device is a hot research topic, and many scientists are passionate about this goal. In Paul's own lab he is investigating the performance of solar cells made from carbon nanotubes. The topic of energy sparked a chord with the audience, generating a whole spectrum of energy-related questions.

This is the first year that the Yunker lecture was video taped and posted on the web. You can find a link to the video on the Physics Department website Seminars and events/Past Yunker lectures.

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Bill Warren Retires

Bill Warren retired in June 2009 after more than 18 years on the OSU Physics faculty. Bill joined the department in January 1991 after taking early retirement from Bell Labs where he had a distinguished career in research.

At OSU, Bill set up a lab to investigate the electronic behavior of many different solid state systems as revealed through their hyperfine interactions with nuclei. His nuclear magnetic resonance (NMR) and nuclear quadrupole (NQR) experiments provided insights into the atomic-scale dynamics of charge carriers, and they trained a generation of students in techniques that have led them to highly successful careers. Bill supervised 8 Ph.D & 7 M.S. students as well as a number of undergraduates. With Scott Fuller and Ernesta Meintjes, he made the first NMR observations and studies of the electronic structure of impurity nuclei in Si under "realistic" conditions (room temperature and above); with Mark Shroyer, the first observations of a "photo-T_1" effect, i.e. the enhancement of nuclear spin relaxation by interaction with optically bistable impurities; and with Francesca Monte and Tyson Olheiser, the first NMR/NQR studies of delafossite-structure transparent conductors and atomic-scale dynamics of the holes that carry the current. Bill co-authored more than 100 refereed publications during his career, including a book "Fluid Metals" with F. Hensel.

Bill enjoyed the intellectual stimulation of teaching across the physics curriculum to students at a variety of levels. This was, he notes, very different from his highly specialized, research-intensive previous life in an industrial laboratory. The students enjoyed Bill's insights into Physics, his quiet humor in the classroom, and his incredibly well-organized lectures.

Bill contributed to all aspects of departmental life, and in particular, he was for many years the graduate advisor. He began the process of integrating advising, recruiting, admissions, and curriculum development into a coordinated team effort, and students will remember the many hours he devoted to taking an interest in their progress and their aspirations. It was this chance to make a difference in a young person's life that Bill found was one of the most rewarding things about being a professor. Another rewarding aspect, he says, was the chance to work with the excellent physicists who were his colleagues, and the Department's dedication to quality teaching and its concern for students.

In retirement, Bill plans to do more of the things that he has always liked doing, but wished he had more time for: hiking, biking, skiing, practicing the piano, and traveling, especially lots of trips to see his and Nancy's rapidly-growing-up grandchildren.

We in the department will miss Bill's intellect, his willingness to step up and do the things that needed to be done, his wise advice and his contributions to research and teaching. We hope that he'll continue to participate in Departmental activities, not forgetting the venerable Liquid State Seminar, where he was a stalwart for so many years!

And while we're discussing **Emeritus Faculty**, here is news of some of our colleagues (actually, they don't seem to retire!):

Ken Krane remains active in the Physics Department, teaching in the Honors College, conducting research at the University reactor, and pursuing his interests in Physics education.

Rubin Landau continues to conduct research in computational physics, and teaches a course in the Honors College. When he's not at conferences on Computational Physics in all parts of the world, he tries to get in some golf and fishing in LaPine.

Al Stetz teaches a course on "Life, the Universe, and Everything" in the University Honors College and is supervising Jared Stenson's physics PhD thesis.

Allen Wasserman is living in Portland, OR. He is collaborating on the Paradigms project in the Department, and his long-standing interest in Thermodynamics and Statistical Mechanics finally came to fruition when he recently submitted the manuscript of his book to his publisher.

John Gardner is President and CTO of ViewPlus Technologies in Corvallis, the company he founded in 1996. John won one of the inaugural Austin Entrepreneurship Program Entrepreneurs and Innovators Awards at a ceremony held at Reser Stadium in April this year http://engr.oregonstate.edu/austinvids.html

Peter Fontana lives in Florida. Peter donated funds for a travel scholarship for graduate students, and this year Jeff Hazboun, who studied general relativity with Tevian Dray, was the recipient.

Alumni Update

Thanks for contacting us! We're always pleased to hear news of your careers and activities, which serve as inspiration to the current students and are a source of pride to the faculty. Drop an email to individual faculty members or update us via our alumni page at the departmental website. Please keep your address current with the OSU alumni office, so we can mail you a copy of the newsletter.

Undergraduates:

Scott Clark (B.S. Comp Phys. 2008) is surviving the cold in Ithaca, N.Y, where he is a graduate student in Applied Mathematics, which is where the computing program is housed. He's enjoying challenging classes in many aspects of computation.
Kyle Augustson (B.S. 2006) is a graduate student at the University of Colorado at Boulder, studying magnetohydrodynamics in stellar phenomena. His particular interest is proto-neutron star dynamos and equations of state, as well as dynamos in rapidly rotating stellar objects.
Connelly Barnes (B.S. Comp. Physics 2006) is a graduate student in the Princeton Graphics Group in the Computer Science Department at Princeton. He recently published a structural editing algorithm based on the Ising model/Metropolis algorithm he first learned about in Ph466! He presented it at the Siggraph conference in August 2009.
Kirk Bays (B.S. 2004) is a graduate student in Physics at UC Irvine. He works at the Super-Kamiokande experiment studying neutrino physics, and recently advanced to Ph.D. candidacy.
Tim Steckman (B.S. 2004) is living in Salem, and planning to go to graduate school in Physics.
Amato Evan (B.S. 2003) received his PhD in Atmospheric and Oceanic Sciences at UW-Madison in Spring 2009 and is now an Assistant Professor in the Department of Environmental Sciences at the University of Virginia.
Adam Campbell (B.S. 2003) is pursuing a graduate degree in geology at Portland State University, where he is involved in a project modeling glacier response to ice shelf disintegration in the Antarctic Peninsula.
Rachel Bartlett (B.S. 2002) received her Ph.D. in Medical Physics from the University of Wisconsin in May after studying the maternal-fetal exchange of three different compounds using positron emission tomography (PET). She has a post-doctoral position with Memorial Sloan Kettering Cancer Center to study the relationship between tumor proliferation and hypoxia.
Kris Wieland (B.S. 2002) earned a Ph.D. from the University of Washington in St. Louis in 2007 and then took on a post-doc in solar cell technology at the University of Toledo.
Ethan Bernard (B.S. 2000) received his Ph.D. in physics from Cornell and is a post-doc in the group of Prof. Daniel McKinsey at Yale.
David Ohm (B.S. 2000, Ph.D. ECE 2007) for the past several years has been working with a small company in the Denver area doing research and development in the area of signal processing and communications. His OSU physics undergraduate education has been very useful!
Nathan Rodecap (B.S. 2000) is working for the DoD primarily in the field of Systems Engineering and is currently pursuing a Masters degree in SE from the Naval Postgraduate School.

(continued to page 11)

Alumni Update

(continued from page 10)

Matthew Kapus (B.S. 1999) is a lieutenant in the Navy and working for the Director of Submarine Warfare in the Pentagon.

Elliot Koch (B.S. 1999) has a Ph.D. in astrophysics from UCLA and is working as an analyst testing infrared imaging arrays for the next generation space telescope and also as adjunct faculty at a junior college.

Steve Berukoff (B.S. 1999) is working on a Ph.D. in astrophysics from UCLA and expects to graduate this year.

Nate Bezayiff (B.S. 1999) earned a Ph.D. from UCSB and teaches physics at Lone Star College, near Houston, TX. He says it was worth all the hard work he put in as an undergrad.

Kyle Schleuter (B.S. PH & EP 1998) is teaching English at a public high school in South Korea.

Philip Hystad (B.S. 1970) recently retired as a consulting engineer for a software company that he started along with ten other engineers in 1978. Their main business was delivering systems and software solutions to large electric utilities around the world. He now works on various interesting consulting gigs applying software technology to the electric utility industry.

Edward Bernard (B.S. 1966) lives in Medford, OR. His son Ethan (see above) graduated from Cornell with a Ph.D. in Physics in January, 2009.

Robert Hunsucker (B.S. 1954, M.S. 1958) is in the 50th year of a career as a research scientist in ionospheric physics and radio propagation. After receiving a Ph.D. from the Univ. of Colorado in 1969 he was Professor of Physics and Electrical Engineering from University of Alaska until he retired in 1988. He is a senior partner of RP Consultants in Klamath Falls. He was Editor-in-Chief of the international journal, RADIO SCIENCE and co-author of a book, "The high-latitude Ionosphere and its effects on radio propagation".

Graduate Students:

Justin Elser (Ph.D. 2008) is working as a post doc in computational biology in the group of Pankaj Jaiswal at the department of Botany and Plant Pathology at OSU.

Robyn Wangberg (Ph.D. 2008) is an assistant professor in the physics department of Saint Mary's University of Minnesota (Winona Campus). She and Aaron welcomed their son Quinn to the world in September.

Paul Newhouse (Ph.D. 2008, Chem) is a postdoc at the National Renewable Energy Lab in Golden, CO.

Alexander (Sasha) Govaydinov (Ph.D. 2007) is a research associate at the University of Pennsylvania Optics and Imaging group. He works with John Schotland and Vadim Markel on inverse scattering problems and plasmonics. His recent work on plasmonic nanoparticle chains (published in Phys. Rev. B) has been highlighted in Optics and Photonics News.

Josh Mellon (M.S. 2007) works for ViewPlus technologies in Corvallis, and volunteers to teach a section of undergraduate physics in the department (thanks Josh!).

Lisa Eccles Taylor (M.S. 2007) is a research assistant in the Human Spatial Orientation Lab run by Dr. Robert Peterka at the West Campus of OHSU, part of the Biomedical Engineering Division of the university. The research is focused on balance disorders caused by damage to the vestibular system. She designs and runs experiments, manages the lab, and assists with grant applications and renewals. Current projects include setting up a motion capture system and converting all of our software that runs the servo motors to LabVIEW.

James Osborne (M.S. 2004) welcomed son Adrian to the world this year. James is working at Microsoft in Redmond.

Robert Kykyneshi (M.S. 2004, Ph.D. Mat Sci 2008) and Jackie Bangs welcomed daughter Nora to join their son, Oskar. Robert is teaching astronomy at LBCC, and is an affiliate at OSU, working on electronic structure calculations with Doug Keszler.

Bodhi Rogers (Ph.D. 2003) was promoted to associate professor with tenure at Ithaca College. He spent Spring term at OSU team-teaching the Energy and Entropy Paradigms course with David Roundy.

Joe Alyea (2001) is developing software at Amazon.com in Seattle.

Koorosh Zaerpoor (Ph.D. 1998) works at Intel in Hillsboro.

Shannon Mayer (Ph.D. 1997) was elected as Executive Committee Member-At-Large of the Northwest Section of the American Physical Society.

Thank You!

Thank you to all the friends and supporters of the Physics Department who have donated generously to our programs over the past year. We are working on a new format to acknowledge our donors that conforms to the Foundation's guidelines.

There are many components to a successful university physics program that we cannot support with state funds: scholarships and fellowships for graduate and undergraduate students, faculty and student travel to conferences, visiting speakers, and new teaching innovations like space redesign.

Please consider a gift to the Physics Department in your annual list of donations.

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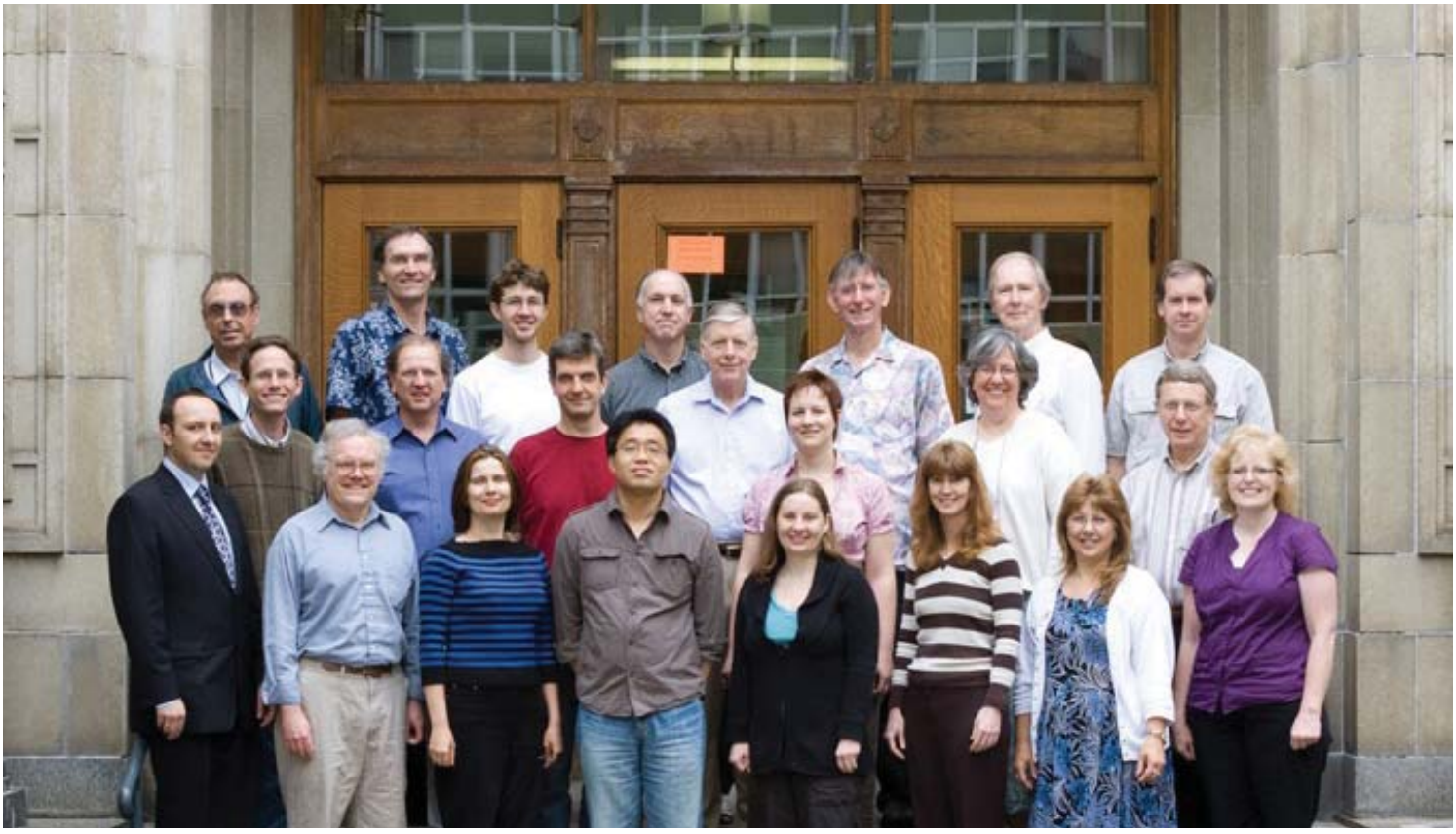

Faculty and Staff of the OSU Physics Department outside Gilbert Hall in June, 2009.