Nanophotonics

This article was prepared by Associate Professor Eric Stinaff who joined the faculty at Ohio University in September of 2005. Please see the departmental website for more information.

From the latest computers and hard drives to batteries and lighting, technology is getting smaller and more complex. Current computer processors contain features that are only 100 atoms wide and 3 atoms thick and are measured in nanometers, or billionths of a meter. Understanding physical properties and interactions at this scale is the domain of Nanoscience and Nanotechnology. Nanotechnology can be thought of as the ability to build or design materials with atomic, or nearly atomic, precision. This unprecedented level of control has led to incredible new scientific discoveries and technological advances and the potential for revolutionary new materials and devices. It has also led the government in 2000 to create the National Nanotechnology Initiative (www.nano.gov), a concerted effort of 25 Federal agencies to further nanotechnology R&D, underscoring the importance of technological advances in this area.

However, as technology becomes smaller quantum properties become dominant and must be taken into account. This often presents itself as a roadblock to miniaturization where effects such as tunneling can degrade the performance of classical electronics. But these apparent obstacles can also be an untapped resource providing fertile ground for revolutionary new devices and applications. Just as a firm understanding of Electricity and Magnetism helped spur the digital age, our growing knowledge of quantum phenomena will undoubtedly drive a new revolution in technology. In the quantum world of the ultra small, objects behave in extremely strange ways; particles can ‘pass’ through barriers (quantum tunneling), ‘interact’ with each other faster than the speed of light (quantum entanglement), and behave like two things at once (quantum superposition).

Ohio University’s Nanoscale and Quantum Phenomena Institute (NQPI, www.ounqpi.org) is a collection of researchers across 2 colleges and 8 departments who have a broad range of expertise in areas related to nanoscience and nanotechnology. The members of this institute are actively working to further the understanding of quantum phenomena, such as those mentioned above, and to attempt to use them in fundamentally new forms of technology. Through the techniques of optical and laser spectroscopy the Nanophotonics and Spectroscopy Group studies the properties of structures and materials down to the level of individual nanostructures. This includes details of energy levels, carrier interactions, crystal structure, impurities, local environment, and internal fields. Not only do we use light to study our samples but we can also use it to manipulate and control the states within the sample through techniques such as resonant laser excitation and Rabi flopping. What I would like to touch on in this article are two of the most quintessential and bizarre phenomena in quantum mechanics mentioned above, the principle of superposition and the idea of entanglement. Much of the research in our group revolves around understanding and exploiting the subtleties associated with these phenomena.

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Superposition

A very alluring proposal is to harness quantum properties for information processing. Fundamentally, the power of using quantum mechanics for computation lies in the superposition of states. If a physical property of a quantum mechanical system, say the spin of an electron, is associated with the binary computational states 0 and 1, then, like Schrödinger’s cat, until a measurement is made the electron is in a superposition of both 0 and 1. By extending this concept to an array containing n electrons in a coherent superposition, the system would then simultaneously span a space containing all 2^n possible binary combinations! The parallel nature of this quantum mechanical array is at the heart of quantum computation. Theoretically, the linear boolean logic of classical computers would be replaced by the intrinsically parallel nature of a coherent superposition. Such a revolutionary shift in computation is only one of the many possibilities as we begin to engineer the quantum properties of materials. However, properties such as spin are highly susceptible to unwanted interactions with the environment making them extremely difficult to isolate and control. The loss of quantum coherence often occurs on nano- or pico-second timescales and requires extremely precise experimental techniques to measure and manipulate. One of the current projects we are working on involves using quantum dots (QDs) to isolate and manipulate the spins of individual charges.

The type of QDs we typically study are approximately disk shaped clusters of InAs, with heights of 2 to 4 nm and diameters of 10 to 20 nm, embedded in a crystal of a higher band gap material, in this case GaAs. These are grown by collaborators at the Naval Research Laboratory in Washington, DC, using molecular beam epitaxial techniques. As the spatial dimensions of semiconductor structures become comparable to the Bohr radius of the electron or hole, quantum confinement effects start to dominate and the system begins to look very much like the standard particle-in-a-box. This results in the formation of discrete energy levels, the observation of sharp emission lines in luminescence, and the ability to trap individual charges in the QDs.

In a typical InAs QD sample, the ensemble spectra of thousands of dots excited by the laser displays inhomogeneous linewidths on the order of 50 to 100 meV whereas the homogeneous linewidth of a single QD is on the order of a few μeV. Therefore, to investigate the properties of QDs in detail it is necessary to isolate and study single dots at a time. To selectively charge the QDs and control the electric field, the QDs are embedded in a Schottky diode where the top contact has micron-scale apertures allowing for the study of single QDs.

Entanglement

Einstein referred to entanglement, one of the most bizarre consequences of quantum mechanics, as “spukhafte Fernwirkung” or “spooky action at a distance.” Although some form of ‘action at a distance’ is occurring, as proven by Bell’s inequality violations, it turns out that information cannot be conveyed faster than light. Basically, there is no way to send superluminal signals. Though this may be disappointing to the science fiction aficionados, entanglement still has demonstrated technical applications. Ultra-secure communication utilizing Quantum Key Distribution (QKD) is one such example where the doubly charged biexciton (four holes and two electrons) results in an initial state of two known hole spins in separate QDs. This will hopefully provide a launching point for experiments involving coherent manipulation on prepared spins in CQDs, a first step toward quantum information processing.
Through a spontaneous parametric down conversion (SPDC) process, nonlinear crystals such as lithium niobate can generate entangled pairs of photons from a single incoming photon which satisfy the conservation of energy and momentum. Our group is currently working with Battelle Memorial Institute, located in Columbus, Ohio, to study periodically poled lithium niobate waveguides (PPLN-WG) which are excellent sources of entangled photons. By performing experiments such as quantum Bell-State measurements we can quantify the quality of entanglement resulting from such a device. Working with Battelle our group will be investigating new ways to optimize these devices, design new structures for entanglement generation, and use the devices in new experiments to study entanglement and potentially use this property for novel applications.

The quantum world of nanoscience and nanotechnology is often truly strange and unnerving. However, in this strange world vast potential awaits. This article is meant to give a small taste of some of the research being done by the Nanophotonics and Spectroscopy Group to understand and exploit these properties. Revolutionary new discoveries and technologies are waiting to be uncovered and Ohio University and the members of NQPI are strong and active players in these explorations.

Mauricio Garrido (PhD 2010) a former member of the Nanaophotonics and Spectroscopy Group.
Photo credit John Stoops.
A Note from the Chair

David Ingram

Greetings to friends and alumni of the Department of Physics & Astronomy at Ohio University. Our department continues as an environment in which our students thrive and grow in their intellectual development, realize their potential, and advance the frontiers of science. Our alumni are testimony to the past success of our program and an inspiration as we look to the future. I am delighted to share some updates from our department with this newsletter.

There have been many changes to the faculty and staff in the department this past year. With Joe Shields being confirmed as the Vice President for Research & Creative Activity and Dean of the Graduate College, the department recommended me to the Dean as the Chair for the next five years effective July 1, 2012. We have also experienced many staff changes during this year. After the retirement last year of Candy Dishong, Donna Welch joined us as her replacement. However, with the recent departure of Meg Van Patten we are welcoming back Candy Dishong as the new Assistant Department Administrator. Vickie Ball-Seiter has moved on to follow her passion for musical instruments and we have welcomed Candi Spaulding as her replacement. In our workshop, Jeremy Dennison found a position closer to his home and we have been able to replace him with Mike Myers. We now are back with our full complement of staff, including Wayne, who spent some of the year in France and Brazil with his wife and son while she was on sabbatical. While Wayne was travelling, he was still keeping an eye on us through Skype. However, we also brought back Ennice Sweigart to help out. I am relieved to say that all went well and we are starting the new academic year with a full complement of staff.

Our faculty have received several notable recent recognitions: Julie Roche and Eric Stinaff were promoted to Associate Professor with tenure, and Marcus Böttcher was promoted to Professor, recognizing their excellent performance in teaching, research, and service. Daniel Phillips received the College of Arts & Sciences 2011-12 Jeanette G. Grasselli Brown Faculty Teaching Award in the Natural Sciences. The citation is “This award recognizes superior classroom performance, involvement with students beyond the classroom, and involvement in departmental curriculum development and in the spectrum of your department’s course offerings.” Well done Daniel!

For this year we are being joined by Matthias Dietrich and Ken Nollett. This will help us while we find a replacement for Joe Shields and help cover for Sasha Govorov while he takes advantage of an award from the Irish Government, the E.T.S. Walton Visitor Award, to spend a year just on his research. Matthias comes to us from OSU and Ken from Argonne National Lab.

The accelerator ended its 40th year of operation with a major upgrade. The Van de Graaff belt charging system was replaced with a Pelletron charging chain system, http://www.pelletron.com/charging.htm. This was funded by a grant from the National Science Foundation. The terminal voltage is much more stable than with the belt charging system and we look forward to another 40 years of successful operations. Since the accelerator’s installation there have been 58 Ph.D.s produced that have used the accelerator. Carl Brune has recently written a history of the Edwards Accelerator Laboratory, illustrated with many photographs, and it is online at: http://inpp.osu.edu/~oval/history/history.php.

The Board of Trustees approved a six-year capital plan last November which will include major renovations to Clippinger including an addition to the building. This addition will be built in the first phase during the 2015-2016 capital budget biennium. This will allow us to continue operation of the labs during the second phase renovation of the original building during the 2017-2018 biennium.

The support we receive from our friends and alumni remain an invaluable element in helping our department in the pursuit of its mission. We always appreciate visits by our alumni (see separate news stories), as a means to educate our students about possible career paths and to help our department remain connected to a larger community.

A Note from the Editor

Louis E. Wright

Welcome to the 2012 Newsletter which is now presented primarily in electronic format although, at your request, we can provide a printed version. As you can read in this edition of the Newsletter, the Department of Physics and Astronomy is proud of its many successes during the past year and is very proud of the success of our alumni and current students.

According to my records, we now have graduated 303 students with doctoral degrees.

The first was awarded to Richard Castle in experimental nuclear physics in 1963. Richard’s doctoral research was supervised by Roger Finlay. Faculty teaching in the department takes many forms: lecturing and supervising service and major undergraduate courses and laboratories, teaching graduate courses and seminars, doing research and directing research of students at all levels. Among the most demanding, but ultimately extremely rewarding, is the successful direction of doctoral research. Almost all faculty in the department have directed doctoral research, but some have directed many doctoral dissertations over the years. As of now, faculty who have directed more than 10 dissertations at Ohio University include: Roger Finlay (18), Martin Kordesh (17), Steve Grimes (16), Jack Rapaport (14), Sergio Ulloa (14), Louis Wright (13), Ron Cappelletti (12), David Drabold (12), Earle Hunt (12), and David Onley (11). Some on this list are still active and we wish them continued success with their doctoral students.

I want to express my appreciation for all the help I have received from filmmaker and Special Projects Assistant Jean Andrews. Jean provided many of the photos used in the Newsletter and assists in outreach efforts for our department. Please check out our You Tube channel to view the short Open House 2011 mini-movies she recently produced: https://www.youtube.com/user/OhioUPhysics/videos.
Transitions

The death of Herman Kalifon (Avishai Kallai), BS 1971, in Israel on April 26, 2012 was reported by his classmate Conrad Potemra and confirmed by his family. Herman was born in Cleveland, Ohio in 1949 after graduating from Ohio University and studied at Technion for a year. Though Herman studied Physics, he never worked in the field. Most of his working career was in the accounting office, but his real passion was for classical music. He self-taught himself musicology and became an expert music editor, editing and correcting music scores of Beethoven and the Swedish composer Eggert. Though he lived in Israel, he was one of the leaders responsible for the Eggert revival in Sweden in recent years. Herman suffered from Parkinson’s Disease for over 17 years and in the last 2.5 years fought bravely a losing battle with cancer. Earle Hunt remembers Herman Kalifon and his friend Conrad Potemra as being excellent students.

Harold D. Knox, BS 64, PhD, 70, passed away at his home on Saturday July 14, 2012. Harold was born in McArthur, OH, on June 6, 1942, the son of the late George A. and Bertha Calvin Knox. Roger Finlay supervised his doctoral research in experimental nuclear physics. After completing his PhD, Harold worked at Rensselaer Polytechnic Institute and Texas A&M before returning to Ohio University as a Post-doctoral Fellow with Ray Lane in experimental nuclear physics. The experimental nuclear physics program at Ohio University greatly appreciated the many contributions made to the program by Harold. After several years, Harold joined Knolls Atomic Power Laboratory in up-state New York for the remainder of his career. At Knolls, Harold was the co-editor of three editions of the Chart of the Nuclides. We were fortunate that he visited the department as a colloquium speaker on April 22, 2011 to give a very interesting talk on this subject. Harold is survived by his wife Lenna S. and his son Jonathan D. Knox, as well as a sister Janet L. (James T.) Ziegler.

Roger Rolbiecki, MS 1978, died suddenly at home July 21, 2011 at the age of 57. Roger was a passionate hobbyist, a guitar and bicycle enthusiast, and a collector of historical relics. He attended Winona Cotter High School, was a graduate of Winona State University, and obtained a master’s in solid state physics from Ohio University. Born and raised in Winona, Roger loved his town so much that he covered his backyard in Shoreview with trees from his hometown. He touched the lives of people far and wide and will be missed by many.

Physics Major Scholarships

Austin Way, an HTC sophomore in Engineering Physics, won the Ernest F. Hollings Scholarship awarded by the National Oceanic and Atmospheric Administration (NOAA). Austin is minoring in mathematics and chemistry. In addition, due to the generosity of alumni, faculty and friends, our majors have access to a number of scholarships which assist them in achieving their educational goals. We are very grateful to your previous support to these scholarship funds and we would encourage you to be as generous as you can in providing continuing contributions.

Holders of Edwards Scholarships for 2012-2013 include: Andrew Dewald, Taylor Gruesser, Keith Hawkins, Natalie Klco, Derek Miller, Yashashree Jadhav, Samantha Thrush, Austin Wood and Zoe Zeszut.

Holders of the Ewers, Gecsy and Singh Scholarships are Zoe Zeszut, Shido Yoshida and Nigel Wilson, respectively.

Preston Brooks, Henry Cornell, John Stahl, Jeff Voegele, and Austin Way hold Stocker Scholarships while David Spalding and Daniel Patterson hold Shipman Scholarships.

Alan Savage, Jared Ray and Matthew Burket hold Distinguished Professor Scholarships for 2012-2013.

The average GPA of the continuing students is 3.5 and the total scholarship support apart from the Distinguished Professor scholarships which cover tuition is $20,584. The current Chair of the Scholarship Committee is Julie Roche.

Stay Connected with Social Media

Join us on Facebook and check out our department’s YouTube channel!

Department of Physics and Astronomy Facebook
Ohio U Physics YouTube Channel

Donors to the Department

During the past academic year the department received contributions from many alumni, friends and members of the faculty and staff. We are very thankful to all of our donors. Donors between July 1, 2011 and June 30, 2012 are listed below: (We apologize if we have overlooked any contributions made during this period.)

Arnold Aronson
Markus Böttcher
Thomas Boster
John Bowdle
Ido Braslavsky
Carl Brune
Horacio Castillo
Michael Cervenak
Ying-Chien Chang
Gang Chen
Phillip Chute
Bruce Danner
Justin Fink
Thomas Fox
Justin Frantz
George Gans
Alexander Govorov
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Kenneth Hicks
Saw Hla
Peter & Betty
Hoffman-Pinther
Marie Huwe
David Ingram
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Penelope Reighart
Roger Rollins
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Joan Sanford
Scott Savage
Daniel & Donna Sayre
Andreas Schiller
Joseph Shields
Arthur Smith
Eric Stinaff
Folden & Margaret Stumpf
David Tees
Sergio Ulloa
Department News

Joe Shields, former Chair and current Vice President for Research at Ohio University, visited Thomas Jefferson National Accelerator Facility for a tour and to discuss research with faculty and students from Ohio University working on experiments at the lab.

Recognition of Physics Majors

Our majors have achieved many successes during the past year. Below we include some of the more significant achievements:

Honorary Societies
The following students were inducted into the Physics Honorary Society Sigma Pi Sigma (ΣΠΣ): Andrew Dewald, Keith Hawkins, John Kerr, Austin Way, Austin Wood, Yashashree Jadhav, while Sai Dong and Gary Canter were inducted into Phi Beta Kappa (ΦBK).

Undergraduate Research
During the past few years under the leadership of Ken Hicks and David Tees, we have been increasing the number of our majors engaged in summer research with faculty. For the summer of 2012 these include the following undergraduates (listed with their research mentors): Taylor Grueser (Böttcher), Samantha Thrush (Böttcher), Derek Miller (Chen), Paul Adams (Ingram), Jared Ray (Ingram), Austin Way (Kordesch), Natalie Kclo (Kordesch), Helen Cothrel (Prakash), Austin Wood (Roche), Alan Savage (Smith), Shido Yoshida (Stinaff), and Desmon Rogers (Russell).

Research and Creative Fair Winners
Both graduate and undergraduate students in the department are active participants in the annual Research and Creative Fair. For the last Fair held on May 15, 2012 winners included: Paul Adams, Kevin Cooper, Keith Hawkins, Binay Prasai, Ameneh Mohammadalipour, and Anthony Paul Ramirez.

News of Former Postdoctoral Fellows
Matthias Schindler, Lucas Platter, and Anders Gardestig all of whom worked with the Nuclear Theory Group (Elster, Phillips, and Prakash) have become a faculty member at the University of South Carolina, a staff member at Argonne National Laboratory, and an instructor at ITT in Columbia, SC, respectively.
Awards and Recognition

Many of our students and faculty have been recognized for outstanding achievement over the past year and in many cases their successes have been reported on Ohio University websites and the departmental webpages have links to many of these sources. Below, we highlight some of these successes and encourage you to follow up for more details at the given links.

Graduate students **Sean Krupa** and **Brett Ragozzine** in Physics and Astronomy and **Wamaka Gunawardena**, an Industrial and Systems Engineering graduate student, tied for first place in the recent “See the World in Infrared: 2012 Student Infrared Video Competition @ OHIO” competition. The contest was sponsored by DRS Technologies of Dallas, in cooperation with faculty members Ohio University. The contest focused on developing non-military, commercially viable applications for DRS’ new miniature infrared camera. The two teams will share the $1,000 award. Thanks to David Drabold for hearing about the contest and encouraging students from Ohio University to enter. For more information, see the article at [http://www.ohio.edu/compass/stories/11-12/8/see-the-world-in-infrared.cfm](http://www.ohio.edu/compass/stories/11-12/8/see-the-world-in-infrared.cfm)

Doctoral student **Heath Kersell** won the Distinguished Masters’ Thesis Award from the Mid-western Association of Graduate Schools. See the following for more information: [http://www.ohio.edu/research/communications/MAGSaward.cfm](http://www.ohio.edu/research/communications/MAGSaward.cfm)

Doctoral students **Greg Petersen** and **Andrew DiLullo** were chosen to participate in the Lindau Nobel Laureates in physics meeting that is held every four years on Lake Constance in Germany. See the following website for more information: [http://www.ohio.edu/compass/stories/11-12/5/lindau-nobel-laurate-2012.cfm](http://www.ohio.edu/compass/stories/11-12/5/lindau-nobel-laurate-2012.cfm)

The 2012 Undergraduate Research Conference was successfully held on Saturday, May 12 under the direction of SPS advisor **Gang Chen**. The event was well attended by students and faculty, and the research work and presentations were of very high-quality. **Keith Hawkins** and **Vincent Roberts** shared the Best Paper Award of the conference. The judging of the presentations was done by **Markus Böttcher** and **David Tees**.

**Gabriela Popa**, Assistant Professor at the Zanesville Regional Campus of Ohio University was elected Vice-Chair of the Ohio Section of the American Physics Society.

Graduate students **Desiree Cotto-Figueroa** was awarded an Ohio Space Grant Consortium Fellowship, **Zhiyuan Fan** was awarded the Donald Clippinger Graduate Fellowship, **Binay Prasai** won the Poster Award at the 2012 American Ceramic Society Glass and Optical Division Meeting. In the teaching area, **Andrea Richard** won the Arts & Sciences Outstanding TA award while **Tejinder Kaur** was the first recipient of the newly endowed Y.-C. Chang Graduate Fellowship.

Congratulations to graduate student **Karina Avila** along with her advisor **Horacio Castillo** and research collaborator **Azita Parsaeian**, PhD 2009 on having a figure from their paper being featured on the 23 December 2011 cover of Physical Review Letters.
Alumni News

Previous Graduates

1900–1979

Don Stevison, BS 1957, worked as a nuclear physicist at the Wright-Patterson Air Force Base for 31 years. His work directly involved research and lab work, which he enjoyed. However, it also provided him the opportunity to pursue other interests. At the encouragement of co-workers who played banjos together during their lunch break, Stevison bought a used banjo and joined the group practices. He retired in 1991, but his passion for playing the banjo continued to grow. In 2008, he was inducted into the National Four-String Banjo Hall of Fame in Oklahoma City, Okla. Today, Stevison plays the four-string banjo with the Kettering Banjo Society, which performs popular music from the 19th and 20th centuries, such as ragtime. See http://www.ohio.edu/comp/msgstories/11-12/2/banjo-don.cfm for more details.

Lawrence Crum, PhD 1967, had a paper on biomedical acoustics at the meeting “Acoustics 2012 Hong Kong.” He is at the Applied Physics Laboratory of the University of Washington. Burt Stumpf led his dissertation research in experimental acoustics.

Conrad Potemra, BS 1971, informed us of the death of his classmate Herman Kalifon (see Transitions) and updated us on his own life. After graduating he earned an MS degree from Bowling Green in August of 1972 and then taught high school physics before taking a programming job at Univac. Conrad said, “My career ended up following the guidance of Dr. Bishop and his programming courses. I worked my way up, eventually becoming a Manager of Communications Software Maintenance for GE in the early 80’s. Later, I worked as a Systems Engineering consultant to the FAA on Communications projects, the most fun being an independent consultant for several years starting in 1995. This was cut short by a tumor in my spinal cord. I had surgery 10 years ago, but I now walk with a cane and a brace and cannot do site surveys. I went on disability and retired and to keep myself from going to a wheelchair, I became the Crippled Farmer of Martinsburg! I have 7 acres that I do some vegetable farming on, mainly for exercise as I am only good for an hour and a half before my legs go. I am using my Grandfather’s 1947 Ford Tractor to help. I guess that makes Dr. Hunt the only thing older than that!!! On the personal front, I finally settled in Poolsewille, Maryland in 1978 and took time off from work and met my lovely bride in 1979. We were married in 1980 and had 4 kids who were all very good athletes and now have successful careers.

Thanks again for printing the information on Herman. To the best of my knowledge, he is the first to go from the physics class of 1971. He actually was in the states a few years ago to give a talk on the first trombones in symphony orchestras. I picked him up at Dulles Airport and we got caught up on the years. He actually made it out to my farm and marveled about how much work I had done and still had to do. He told me then that he had developed Parkinson’s disease and it was slowing him down.”

Richard Moyer, BS (HTC) 1979 contacted us upon learning of Professor Finlay’s unexpected passing last Spring. He said, “I was very sorry to hear this; Professor Finlay was a big part of my early development: I have very fond memories of running the MSU cyclotron over Christmas of 1978-1979 taking data for my BS thesis on the energy dependence of proton scattering from Moly. At the time of the APS Centennial Celebration in Atlanta, I connected again with former Director of Tutorial studies in the physics department, Professor Onley and dropped by the Ohio University physics department booth (I had an invited talk on signatures of self-organized criticality in turbulence and transport in magnetically confined plasmas).

“After leaving Ohio, I completed an MS in Nuclear Engineering and a Ph.D. in Physics at the U. of Wisconsin-Madison, where I did research on MHID instabilities in a poloidal divertor tokamak. Upon graduation, I took a position in the Institute for Plasma and Fusion Research at UCLA, spent two years at the Juelich Research Center collaborating on the TEXTOR tokamak, and returned to the states in 1990 as UCLA’s lead scientist at the DIII-D National Fusion Facility in San Diego. In 1994, our group transferred to UCSD where I’ve been ever since. I am currently the coordinator for the UCSD collaboration at DIII-D, the largest university collaboration. I received my 15 minutes of fame in 2003-2004 when a General Atomics colleague, Dr. Todd Evans, and I discovered a method for mitigating the deleterious effects of edge localized modes on plasma-facing components in high performance tokamak plasmas; this work led to the first plasma physics publication in Nature Physics in a long time. Today, nearly all the operating tokamak facilities are studying our use of external magnetic perturbations to induce a low level of chaos into the magnetic field behavior, in effect poking small holes in the edge transport barrier to allow steady state operation just below the stability boundary.

I have taught Physics 101 (3 years) at the University of San Diego (Physics and Energy Use and Sustainability), and continue to work with graduate students and postdocs in the Center for Energy Research and the Mechanical and Aerospace Engineering Department at UCSD. My first grad student received her Ph.D. in January 2011 and presented her thesis research as invited talk at the recent annual meeting of the Division of Plasma Physics of the APS.

My current title and positions are: Research Scientist (equiv. rank to full professor but untenured), Center for Energy Research, and Senior Lecturer, Mechanical and Aerospace Engineering Department, UCSD. I have fond memories of my time in Athens, and convey my best wishes to those of you still around Athens.”

1980–1989

Lawrence Gochioco, MS 1982 is owner of GeoNanoTechnology Corporation in Houston, Texas. He reports that he has never forgotten what the Ohio University Physics Department did for him as it opened lots of opportunities. As his global businesses mature and the global financial crisis stabilizes, he hopes to be able to make significant contributions to the department later. He is still married to Joanne Oliveto, who was Dr. Lee’s (former Library Director) secretary. She used to illegally park her small car by the accelerator driveway. They have three children aged 27, 24, and 18. The oldest son works for HALLIBURTON as an oil field engineer where he oversees the company horizontal drilling tool for hydrofracturing shale formations to produce gas.

Azman Hussin, BS 1983, MS 1985 dropped by the department for a visit in August, 2012. He and his family were bringing their son over to the US to enroll in college (Michigan). Azman is the owner of a software company based in Kuala Lumpur, Malaysia, but with international clients. The company is eNCoral Digital Solutions and is associated with Oracle. Azman remembers his time in Athens very fondly. He worked on his master’s research with Ron Cappelletti.

Javier Montenegro Joo, MS 1984, did his graduate research under the direction of Earle Hunt. He lives in Lima, Peru and wanted to report that he founded VirtualDynamicsSoft and created the Physics Virtual Lab (PVL), a software for computer-assisted physics teaching, useful in the classroom and as a virtual
lab where students can run experiments. The Virtual Lab is being successfully commercialized all over the world via the internet.

1990–1999

Philip Zecher, BS (HTC) 1990 partner and chief risk officer at EQA Partners, returned to campus to present “Research University Inc.” last September on the Ohio University Athens campus. The talk was the first in the 2011-12 Ellery Golos Lecture Series.

After Zecher graduated from Ohio University, he went on to earn his doctorate in nuclear physics at Michigan State University, where he is a member of the MSU Foundation’s Board of Directors and an outside member of the MSU Board of Trustee’s investment advisory subcommittee and the President’s Leadership Advisory Committee for the Facility for Rare Isotope Beams.

In 1998 Zecher co-founded Investor Analytics, a risk assessment firm that specialized in providing risk services for hedge funds and banks. He sold IA in 2006 and joined EQA Partners.

He spoke about research universities quest for new ways to raise revenue in the face of diminishing support from governments and legislatures and how this trend is driving a major cultural shift in societal use of research establishments and, most importantly, in the performance of science itself.

During his visit Phil met with interested faculty and students in the Department of Physics and Astronomy.

Michael Tung, MS 1990, returned to Germany after completing his Thesis and earned a PhD in particle physics. He is currently a Professor at the Universidad Politècnica de Madrid where students can run experiments. The Virtual Lab is being successfully commercialized all over the world via the internet.

2000–present

Sean Calhoun, BS 2001. After completing his BS degrees in Math, Physics and EE, Sean completed an MS in EE at Ohio University. He currently works as a contractor at Wright-Patterson Air Force Base and is enrolled in the PhD program at the Air Force Institute of Technology. Sean resides in Columbus with his wife and two children.

Timothy Steckmann MA 2001, reports that he is in the physics doctoral program at Florida International University and has passed the PhD qualifying exam. He is doing research in biophysics.

John Dulka, MS 2004, works at the US Patent Office (USPTO) and sent along a message encouraging science and engineering majors to consider seeking careers with the Patent Office. The following notice was widely distributed:

All USPTO employees are urged to spread the word to individuals interested in entry-level patent examiner positions with room to grow (GS-7 through GS-9) and who have studied or practiced in varied engineering disciplines such as mechanical, computer, chemical, electrical, biomedical, civil and industrial, as well as pharmacology, chemistry, computer science, physics and textile technology positions. All vacant positions have non-competitive promotion potential to GS-13 and are open to all U.S. citizens or nationals.

Gayani Perera, MA 2006, PhD 2011, has just begun her new job as a Post-doctoral Researcher at Brookhaven National Lab. Gayani did her doctoral research in the Atom/Molecule Manipulation Laboratory with Saw-Wai Hla.

2000–present

Serdar Kızılgil, PhD 2008, has recently started working at CERL, US Army Research Lab, as a computational physicist, writing a simulation software (similar to gencati) for heat transfer analysis. He has recently initiated the security clearance and background check process. His wife is also working here at CERL, as a material scientist. So they are both now living in the Urbana-Champaign area. Serdar’s doctoral research in experimental nuclear physics was directed by Ken Hicks.

Joel Smith, BS (HTC) 2009, reports that after graduating in 2009 from Ohio University with a BS in Physics and a BA in French, he went to France and taught English in Saint-Dié-des-Vosges for a year. Joel returned to Ohio University in the fall of 2010 as a graduate student in French, and received his French MA degree in June. He has accepted a position as the physics teacher at La Salle High School in Cincinnati, Ohio.

Ryan Braid, BS 2010, entered the graduate program in physics at the Colorado School of Mines (Mines) and reported to Carl Brune. He noted that “Mines” doesn’t have a qualifying exam and they spread their core courses out over 3 semesters instead of just
one year like most places, so it is taking Ryan a while to get all of his required classes completed. He expects to be a PhD candidate soon and his thesis will be on the halo nucleus Be-11. The experiment will be done at TRIUMF in Vancouver which Ryan is looking forward to. Ryan likes “Mines” very much in that the graduate department is large enough to have plenty of friends but small enough that to know everyone. On a personal level, Ryan reports that he and Jennifer Druerup BS (HTC) 2009 got married in August of 2011 and she transferred to the PhD program at Mines with a Masters from OSU. Ryan said, “Everything worked out really great as you can see. It was quite the odd experience taking Quantum Mechanics with my wife.” Ryan also advised that students going to graduate school should take Mathematical Physics, and that they should get as much lab experience as possible.

**Joel Vaughn**, PhD 2010, reports that he and his wife Cheryl are expecting a baby boy in October. Also Diamond Innovations is in the process of patenting several of Joel’s contribution. Joel’s doctoral research was directed by Martin Kordesch.

**Claire Chen Tianjiao**, BS 2011 (HTC), visited the department in January 2012 with her mother. She is in the Mechanical Engineering graduate program at MIT.

**Kevin Sweeney**, BS 2011 reports that he has started a new job in Phoenix where he will be a Continuous Improvement Specialist for an aerospace manufacturer called National Aviation. Kevin majored in Astrophysics.

**Dustin Keller**, PhD 2011, is a Post-doctoral Fellow at the University of Virginia. His doctoral research in experimental nuclear physics was directed by Ken Hicks.

### Recent Graduates

**David Bauer**, BS 2012 in Physics, is entering the physics graduate program at UCLA.

**Aaron Burdette**, BS 2012 in Applied Physics, will be a graduate student in Biomedical Engineering at Ohio University.

**Gary Canter**, BS 2012 in Physics, will be entering the workforce with plans to go to graduate school in a year.

**Soo Hyun Hwang**, BS 2012 in Applied Physics, will be a graduate student in Economics at Ohio University.

**Joshua Kaisen**, BS 2012 in Physics (HTC), will be going to graduate school in Particle Physics at SUNY Buffalo.

**John Kerr**, BS 2012 in Astrophysics, will be going to graduate school in Astrophysics at Case Western.

**Joshua Phipps**, BS 2012 in Astrophysics, will be going to graduate school in Astrophysics at Florida State University.

**Vince Roberts**, BS 2012 in Physics (HTC), is entering the Navy OCS with plans to become a naval aviator.

**Ariane Saunders**, BA 2012 in Physics.

**Tony Tracy**, BA 2012 in Physics, has received a Woodrow Wilson Teaching Fellowship.

**Nathan Turner**, BS 2012 in Physics, is entering graduate school at Washington State University in the field of optics/condensed matter.

**Joseph Zeallar**, BS 2012 in Physics, is entering the workforce in the field of banking/finance.

**Peng Zhao**, BS 2012 in Physics, is entering the graduate program at the University of Michigan in Electrical Engineering.

**Darshan Desai**, MS 2011, completed a Masters project with Eric Stinaff. He is entering the doctoral program at Texas Tech.

**Cody Parker**, MS 2012, completed a Masters project with Carl Brune and is in the doctoral program at Ohio University in experimental nuclear physics.

**Rebecca Santana**, MS 2012, completed a Masters project with Doug Clove and is in the doctoral program at Ohio University.

**Hoai Nguyen**, PhD 2012 in biophysics theory, is expecting a child in September and has joined her husband Ahn who is a Post-doctoral Fellow at the University of Wisconsin. Hoai did her doctoral research with Shura Nieman.

**Parisa Roustazadeh**, PhD 2012 in astrophysics, is now a Post-doctoral Fellow at Rice University. Parisa did her doctoral research under the direction of Markus Böttcher.

**Aman Ullah**, PhD 2012 in biophysics, now holds a joint Post-doctoral position at George Mason University, John Hopkins University and the University of Maryland. Aman did his doctoral research under the direction of Peter Jung.

**Kang Kang Wang**, PhD 2012, is now a Senior Engineer at the Magnetic Metrology and Media Physics (M3P) group, Recording Media Operations at Seagate Technologies, in Fremont, California.

**Kushal Wijesundara**, PhD 2012 in condensed matter, is a Post-doctoral Fellow at the University of North Carolina. Kushal’s doctoral research was directed by Eric Stinaff.

**Bin Cai**, PhD 2012 in condensed matter theory, is a Masters student in Medical Physics at Virginia Commonwealth University. His dissertation advisor was David Drabold.

**Abhijit Chinchore**, PhD 2012 in condensed matter experiment, holds a research position with Intel Corporation. His doctoral research was directed by Art Smith.

**Young Eun Choi**, PhD 2011 in experimental biophysics, is currently living in New York. Her doctoral research was directed by David Tees.

**Swati Ramanathan**, PhD 2012 in experimental condensed matter physics, is working in research and development KLA Tencore. Her doctoral research was directed by Eric Stinaff.

**Juan Rolon-Soto**, PhD 2012 in condensed matter theory, is a visiting scientist at North Carolina State University. His doctoral research was directed by Sergio Ulloa.

**Chen Ji**, PhD 2012, is moving to Vancouver to take up a Post-doctoral Fellowship at TRIUMF, the Canadian laboratory for subatomic physics. His doctoral research was directed by Daniel Phillips.

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**Incoming Graduate Class of 2012-2013**

*From left to right: Sai Dong, Perry Corbett, Tyler Danley, Norman Israel, Nick Compton, Kyaw Zin Latt, Amal Miranda, Thushan Wickramasinghe, Alex Plaseczyn, Noel lito Sayson, Ying Qiao Ma, Rekam Giri*
The Department of Physics and Astronomy launched a new mini-movies series about activities, tours, and demonstrations from the department’s November 2011 open house event.

The series of ten movies, two to eight minutes long, have individual themes related to research and activities as diverse as carbon nanotubes at the atomic level, to advice about what kind of telescope to buy your child. “Open House gives visitors and our volunteers a chance to explore the world in a new ways and have fun at the same time,” said Physics professor and organizer Mark Lucas. The movies can be viewed at: http://www.youtube.com/user/OhioUPhysics.

Movies were edited by undergraduate video production students from the School of Media Arts and Studies. Filmmaker Jean Andrews from the Department of Physics and Astronomy served as executive producer.

“We intend for this new series of short movies to highlight an important function we hold every two years. Our open house event is a source of pride for the students, faculty, and staff in our department, and demonstrates a sense of our commitment to our local community,” explained David Ingram, Professor and Chair of the Department of Physics and Astronomy.

Student video production leader Jacob Nemeth sees the effort as a chance to enhance his educational experience. “We don’t often get a chance to make short movies about cutting-edge science topics. This has been a great opportunity for us to focus on another important genre before graduation,” Nemeth said.

Gifts to Ohio University

Please consider designating the Department of Physics and Astronomy when you give your gift to Ohio University. The Department needs money for scholarships, books, travel funds for students, support of student research, and paying the expenses of visiting speakers. In this list, the greatest need is for undergraduate major scholarships. Our major endowment funds include:

- **John Edwards Scholarship Fund**
  Distinguished Professor John Edwards left a bequest of approximately $300,000 to endow this scholarship fund. The Scholarships are given to majors who have financial need and have demonstrated some initial success at Ohio University.

- **Robert Geczy Scholarship Fund**
  Endowed by Jeanette Grasselli-Brown in memory of her brother who was a physics student.

- **Darrell Huwe Scholarship Fund**
  Endowed by family and friends in memory of Professor Darrell Huwe. The scholarship is preferentially given to students from a rural background with financial need.

- **James Shipman Scholarship Fund**
  This fund was initiated by Professor Jim Shipman and Will Konneker (MS 1947) in the 1970s and has been supplemented greatly since then by Jim Shipman using money generated from his very successful physical science textbook. It provides our primary support for incoming freshman majors.

- **Abhishek Singh Scholarship Endowment**
  This endowment has been launched with gifts from faculty, staff and students of the department along with contributions from friends of Abhishek to honor his memory.

- **Mark Grimes Memorial Fund**
  Created to honor Mark Grimes and his interest in the undergraduate physics program. The purpose is to provide enrichment of the undergraduate experience of physics majors.

- **Edward R Sanford Astronomy Fund**
  Created to honor Professor Sanford, the income from this endowed fund is used in support of the astronomy program in the department.

- **Department of Physics and Astronomy Fund**
  A general endowed fund with major contributions from Professors Wright and Rollins.
If you would like to make a contribution to one of the departmental funds, include the following information in a letter to Newsletter--Louis E. Wright, Department of Physics and Astronomy, Ohio University, Athens, OH 45701 or for on-line giving visit www.ohio.edu/give and select Other on the pull-down menu and enter the fund you wish to contribute to. There is also a toll free phone number to the Ohio University Foundation (800-592-FUND) for making contributions.

☐ I would like to make a contribution of _______________ to ____________________________

Amount ____________________ (Fund Name) 

☐ I enclose a check made out to The Ohio University Foundation, OR

Credit Card Authorization I authorize $______________ to be charged to my ☐ Visa ☐ Mastercard ☐ AMEX 

Credit Card Number ____________________________ Exp.Date ____________________________

Signature ____________________________ Date ____________________________

Printed Name ____________________________

Alumni News

We like to maintain contact with our alumni and friends and we would like to help you stay in contact as well. In particular, if there are any changes or new developments in your career or in your family that you wish to share, please let us know by email to wright@ohiou.edu or a letter to the address above. Also, if you have information about other Department of Physics and Astronomy Alumni please include it. We are hoping to hear from you.