New Members of the Physics Faculty

DURING THE LAST TWO YEARS our Department has welcomed five new members to its faculty ranks. By bringing them into the Department we have strengthened our research programs in the areas of theoretical nuclear physics, experimental high-energy nuclear physics, theoretical particle physics, observational astrophysics and experimental biophysics.

Dr. Abhijit Majumder joined our Department in Fall 2011 as an Associate Professor. He received his Ph.D. from McGill University in Montreal, Canada, in nuclear physics. Prior to arriving on Wayne State’s campus, he worked as a postdoctoral fellow at Lawrence Berkeley National Laboratory, as a research associate at Duke University and as a visiting assistant professor at the Ohio State University. His research focuses on the theoretical investigation of the Quark-Gluon-Plasma (QGP), which is the state of matter at temperatures a million times hotter than the center of the Sun. This matter is currently being produced experimentally, for a fleeting instant, in the collisions of ultra-relativistic heavy ions, at the Relativistic Heavy-Ion Collider (RHIC) at Brookhaven National Laboratory in New York and at the Large Hadron Collider (LHC) at CERN in Geneva. This form of matter occurred naturally for a few microseconds after the Big Bang. Dr. Majumder’s research efforts, funded by the National Science Foundation, have been in the study of the modification of very high energy jets which are formed during the collisions, propagate through the expanding plasma, and then escape the medium. This subfield, often referred to as Jet-Quenching, is now a rapidly growing area of research within the broad field of heavy-ion collision physics. It offers researchers a microscope into the structure of this new and fascinating type of matter.

Dr. Joern Putschke joined the Department in Fall 2011 as an Associate Professor after receiving his Ph.D. from the Technical University Munich/Max Planck Institute for Physics in Germany. His studies focused on particle production at forward angles in ultra-high energy gold-gold nuclei collisions. He continued and extended his studies in heavy ion collisions as a post-doctoral researcher, first at the Lawrence Berkeley National Laboratory and later at Yale University. Dr. Putschke became well-known for his discovery of long-range longitudinal two-particle correlations in hard processes taking place in heavy-ion collisions. The discovery is remarkable because it demonstrates that heavy ion collisions behave rather differently than single proton-on-proton collisions. It specifically underlines the role of the collision geometry and initial state fluctuations. It also obviates the rather rapid thermalization of quark gluon matter produced in these heavy ion collisions. While at Yale, and since joining our Department, Dr. Putschke extended his research activities towards the use of high energy partons (gluons and quarks) produced inside heavy ion collisions as a probe of the quark gluon matter produced by these collisions. Dr. Putschke is a member of the ALICE collaboration at the LHC where he pursues the study of lead-on-lead nuclei collisions and most particularly studies in “jet physics.” Through collisions of lead-on-lead nuclei at several tera-electronvolts, the Large Hadron Collider produces quark matter at unprecedented conditions of high density and temperature, if only for a fleeting instant. The high density and temperature conditions prevailing in these collisions are believed to be similar to those that existed for a period of about one microsecond right after the Big Bang. Effectively, it provides an opportunity for Dr. Putschke to peer...
deep into the past and into the very nature of the forces that govern our universe. Dr. Putzke seeks to understand the transport properties, more specifically the “stopping power,” of this hot matter. This he accomplishes through the study of particle jets produced in hard parton interactions taking place within the lead–on–lead nuclei collisions. In effect, Dr. Putzke uses high momentum partons to probe the matter within which they are produced. This will enable tomographic studies of the hot matter systems produced in these collisions and eventually reveal how or whether partonic inter- actions are modified at extreme temperatures and densities. In the future, another extreme limit of QCD, the (gluon) saturation regime, will be accessible in the ALICE experiment, by studying hard probes at very forward rapidities. In order to perform these measurements in ALICE, detector upgrades are needed and Wayne State is playing an active role in this pursuit, so that another fundamental aspect of QCD can be explored in the “laboratory.”

Dr. Ed Cackett joined our department as an Assistant Professor in the Winter of 2012. He received his Ph.D. in Astronomy from the University of St. Andrews, in the United Kingdom, before moving to the University of Michigan as a postdoctoral fellow in 2006. In 2008 he won a prestigious Chandra Fellowship which he also took to the University of Michigan. In 2010, he moved to the University of Cambridge, as a Schlumberger Fellow at Darwin College. Cackett’s research focuses on the accretion of matter onto black holes and neutron stars. He studies the X-ray emission from the matter as it spirals onto these objects by using X-ray satellites run by NASA, ESA (European Space Agency) and JAXA (Japanese Space Agency). Black holes and neutron stars are both extremely compact objects, and thus have gravitational fields so strong that relativistic effects become important. Cackett’s research uses the impact of these relativistic effects on the X-ray emission in order to determine how matter accretes. He is also interested in the ultra-dense material inside neutron stars, and uses X-ray observations to measure the size and temperatures of neutron stars, which in turn leads to important constraints on the composition of these extreme objects.

Dr. Gil Paz joined our department as an Assistant Professor in the Fall of 2011. He received his Ph.D. in theoretical particle physics from Cornell University on charmless inclusive B-meson decays. After his Ph.D. he was a postdoctoral fellow at the Institute for Advanced Study at Princeton University where he worked on supersymmetric models of new physics and at the University of Chicago where he worked on the charge radius of the proton. His work provides insight and guidance for activities conducted by experimental groups worldwide, from the LHC to spectroscopic studies of muonic hydrogen, spanning sixteen orders of magnitude in energy. Paz’s current research at Wayne State includes three areas. The first is to try and better understand the structure of the proton and resolve the conflicting measurements of its charge radius. The second is to look for new physics indirectly by studying rare decays of B mesons. Such rare decays will be explored in the coming years at the LHCs experiment at CERN and Belle-II in Japan. The third is to explore the implications of the recently discovered Higgs-like particle at CERN on supersymmetric models of new physics.

Dr. Xiang-Quang (Rosie) Chu joined our department as an Assistant Professor in the Fall of 2012. She received her Ph.D. in Nuclear Science and Engineering from the Massachusetts Institute of Technology (MIT) in June 2010. She worked as a postdoctoral research associate at Oak Ridge National Laboratory (ORNL) for two years before joining our department. Her research interests focus on probing the structure and dynamics of biomolecules, nanomaterials and their hydration water or surface water through neutron and X-ray scattering spectroscopy and theoretical modeling. She is attempting to reveal the underlying mystery of bio-macromolecules, especially proteins, DNA and RNA. This will help us understand how their functions and dynamics are driven and how they affect our lives. Dr. Chu’s current research includes several projects. First, she is trying to understand the relationships between the slow dynamics of protein molecules and their functions by studying proteins under extreme conditions, such as high pressure and extremely low or very high temperatures. Proteins from hyperthermophiles (heat loving) and barophilic (high pressure) organisms are the primary targets for this study. The second research project is to detect phonons in both native and denatured proteins, which is essential for understanding the intra-protein dynamical behavior. The aim of this research is to obtain a full map of the milli-eV phonon-like excitations in the fully deuterated protein. The third is to study the structural changes and dynamical basis of α G protein-coupled receptor (GPCR) rhodopsin that lead to activation of the photoreceptor, which is responsible for triggering an amplified visual response in the process of vision. These studies involve both elastic and inelastic neutron and X-ray scattering techniques such as small angle neutron scattering, quasielastic neutron scattering, neutron spin echo and inelastic X-ray scattering. Molecular dynamics simulations are used in interpreting the scattering experimental data.
ON JULY 4TH OF 2012, an exciting announcement was made at the CERN laboratory in Geneva, Switzerland: a new particle was discovered that is an excellent candidate for the long-sought Higgs boson, the last missing piece of the standard model of particle physics. Along with the CERN announcement, Wayne State University issued a press-release highlighting the role of the team from the Department of Physics and Astronomy that participated in the Compact Muon Solenoid (CMS) experiment that was one of two experiments that made the discovery.

The WSU team members, led by Professors Paul Karchin and Rob Hart, were located at three key locations around the world: the CERN laboratory in Geneva, the Fermi National Accelerator Laboratory in Batavia, Illinois, and the Wayne State campus in Detroit. The team contributed to the 247-operation of the experiment and analysis of the data.

Evidence for the Higgs boson has been sought since the 1960s with the inception of the theoretical framework now called the Standard Model. Higgs boson is related to the origin of the mass of elementary particles in a process known as spontaneous symmetry breaking, an idea first developed in condensed matter physics to explain superconductivity. The quest for the Higgs boson at CMS has had a dramatic history, beginning with the first operation of the Large Hadron Collider (LHC) in September 2008. By this time, searches for the Higgs boson at lower energy accelerators had ruled out its existence, except in a narrow range of mass yet to be explored. But, after only a few days of operation, the LHC accelerator had a catastrophic failure! Quenching of one of the superconducting magnets occurred. This is a normal process in which a liquid-helium cooled superconducting magnet coil, made of niobium-tin alloy, is cooled to a high temperature. The liquid-helium dewar vaporized and the expanding nitrogen gas from the dewar exerted a great force against the magnet, which normally carries the large current at room temperature. As a result of the bad connection, all of the current was forced into the thin niobium-tin wire, which was heated to a high temperature. This caused a chain of disastrous events: the liquid helium dewar vaporized and the expanding nitrogen gas exploded parts of the magnet, damaging many other nearby accelerator components. The CERN laboratory took a stoic stance: even though their accelerator components were damaged, the team decided to make repairs and continue the effort to operate the CMS detector.

What comes next? Is the newly discovered particle the Higgs boson or something else? Early next year, the LHC will be shut down for about two years, during which time the entire set of accelerator magnets will be brought to room temperature and the hundreds of copper bus bar connections will be inspected and repaired as needed. This will allow the accelerator to operate in 2015 at 13.5 TeV, nearly the original design energy. At this high energy, the production rate of the new particle will be greatly increased, allowing detailed studies of its production cross-section and branching fractions into different decay modes. All of these properties are predicted for a standard model Higgs boson and their measurement provides a test whether the new particle is indeed a Higgs boson or something else. But the story does not stop there.

The standard model is not a complete theory of everything. It does not incorporate gravity, dark matter, or dark energy. The new particle could be related to those missing pieces – or there could be other particles that are the missing pieces. The LHC experiments, and the WSU team in CMS, are constantly scrutinizing the data for signs of new physics. It is enormously satisfying to be part of the collaborative effort to operate the CMS detector and the WSU team looks forward with great anticipation to explore the unknown landscape of the “high energy frontier” in the coming years.
Barber Interdisciplinary Research Fund Continues

THE COLLEGE OF LIBERAL ARTS AND SCIENCES has received many generous gifts from Richard J. Barber, Esq., an alumnus of Wayne State University. The Richard J. Barber Fund for Interdisciplinary Research continues to award scholarships to undergraduates in the Biomedical Physics program and support research and collaboration among the Departments of Physics & Astronomy, Physiology (School of Medicine) and Biomedical Engineering (College of Engineering).

Prior gifts were used to establish the Richard J. Barber Fund for Interdisciplinary Research, the Richard J. Barber Faculty/Staff Recognition Award and scholarships for biomedical physics majors. The Faculty/staff award honors outstanding achievement by a faculty or staff member in the Department of Physics & Astronomy whose accomplishments have significantly impacted research efforts, or whose efforts have elevated the stature of the department. During the past five years, 16-12 scholarships have been offered every year to biomedical physics majors with outstanding academic performance.

Following are the most recent projects supported by the Richard J. Barber Fund for Interdisciplinary Research:...

Warchol Family Cultural Exchange Continues

A GENSEROUS GIFT made by Mr. Frank Warchol and Mrs. Jane Warchol in 2006 established the Warchol Family Cultural Exchange Program. Since its inception, the Warchol Family Cultural Exchange Program has provided Wayne State students and faculty members opportunities for international travel and research collaboration.

In 2006, Dr. Gavin Lawes, accompanied by a graduate student, visited France to participate in a research collaboration with Dr. D. Suryanarayanan of the Université Paris-Sud at Orsay. In December-January 2008-2009, Dr. Lawes, accompanied his graduate student to the Indian Institute of Science in Bangalore and the Indian Institute of Technology Madras (IITM) in Chennai, India, hosted by Professor Ramachandran Rao (IITM). In December 2010-2011, Dr. Takeshi Sakamoto and his graduate student went to India for a collaborative research project with Professors Ramachandran Rao and Sudakar Chandran at IITM, and with Professor Kavitha Thirumurugan at the Vellore Institute of Technology (VIT) in the city of Vellore.

During the summers of 2011 and 2012, students from IITM and VIT visited Detroit to conduct research at Wayne State University, as well as to have the opportunity to interact with US students. Dr. Sakamoto recalls his experiences in India, and the experiences of students visiting Detroit: “We visited physics and biological laboratories at both IITM and VIT to learn of current research projects, and visited many places of great cultural significance such as ancient temples and an old French colony. A research project was also set up between my laboratory and Dr. Thirumurugan’s laboratories. When Dr. Thirumurugan and her graduate student Ankita Jaykumar came to US, much work was accomplished in our research projects. Dr. Thirumurugan and Ankita enjoyed many American traditions in the Detroit area (baseball games, museums, etc.). The exchange was a huge success. It was a great chance to build lifelong networks of academic, professional and personal contacts. In addition, it was a great opportunity to live and work in India and America, gain practical experience, and advance our understanding of science, medicine, and technology.”

For their generosity we thank the Warchols and appreciate the opportunities that they have provided for cultural exchange among students and faculty.

...an inspiration – and a true American hero.

NASA Astronaut Presents Vaden Miles Memorial Lecture

COLONEL TERRY VIRTS, NASA Astronaut, graced us with his presence as our 2012 Vaden W. Miles Memorial lecturer. On March 29th, Virts stopped on stage to a full house wearing his NASA flight jacket. Space Shuttle Endeavour pilot and lead robotic operator for mission STS-130, Virts described the mission in terms of complex spacewalks and robotics. Space Shuttle mission STS-130 was the final assembly mission to the International Space Station (ISS) program. Tranquility and Cupola – two important modules – were carried aloft and assembled on the ISS, providing a primary living complex and spectacular panoramic views of planet Earth.

Virts discussed scientific research conducted on board the ISS, namely the AMS-2 (Alpha Magnetic Spectrometer-2, a particle physics instrument), and the basic fields of research being conducted: human health and technology testing for future exploration, life and physical sciences, and Earth and space science.

The Vaden W. Miles Memorial lecture is held annually on the campus of Wayne State University. Mrs. Maxine Miles (deceased) established the physics lectureship in memory of her late husband, Professor Vaden Willis Miles. Known for his ability to convey physical science concepts in an exciting manner, Professor Miles was an inspiration to students. Each year a distinguished physicist is invited to present a public lecture to inspire, educate, and promote physics and astronomy to the WSU Community and the general public.

Virts joined students in an informal setting for a pizza party and was very open to questions about his youth, education, and what it is like to be an astronaut. Autographs were signed, and after Virts left, we talked about his visit for weeks. Virts’s visit left us in awe. Those of us who were fortunate to speak with Virts, share a meal with him, or receive an autographed photo from him all agree: Virts is a gracious and humble man – an inspiration – and a true American hero. And, we save the Vaden W. Miles legacy to thank for this wonderful experience.
Hoffmann Publishes First Book – Life’s Ratchet

PETER M. HOFFMANN, Professor of Physics and newly appointed Associate Dean in the College of Liberal Arts and Sciences, has published his first book: Life’s Ratchet – How Macromolecular Machines Extract Order from Chaos. Hoffmann, Souder and past director of the Biomedical Physics program, locates the answer to the age-old question, “What is life?”, at the nanoscale. “Life,” Hoffmann argues, “emerges from the random motions of atoms filtered through the sophisticated structures of our evolved machinery. We are essentially giant assemblies of interacting nanoscale machines; machines more amazing than can be found in any science fiction novel.”

Part history, part cutting-edge science, part philosophy, Life’s Ratchet takes us from ancient Greece to the laboratories of modern nanotechnology to tell the story of our quest for the machinery of life. The book is published by Basic Books and available as hardcopy or electronic book online. The book received a starred review from Kirkus and has been reviewed by Nature and New Scientist magazines, as well as at blogs at NBC and the Huffington Post. It was also reviewed by the British Institute of Physics and was listed as one of their top ten physics books of 2012. It has been consistently listed in the top 10 bestsellers in the categories of biophysics and nanostreams on amazon. Professor Hoffmann was invited to give a talk at the book at Microsoft research in Seattle. A video of this talk is available on the web. For more information, see http://clasweb.clas.wayne.edu/hoffmann or google “Life’s Ratchet.”

Faculty Host Conferences

SEVERAL MEMBERS OF THE FACULTY have been busy in planning and hosting various physics conferences. Dr. Claude Pruneau chaired the organization committee for Quark Matter 2013 – a high energy physics satellite meeting held on campus. The goal of the satellite meeting, held from August 20 to 23, was to review the most important new experimental measurements and theoretical breakthroughs presented at Quark Matter 2012 and Hard Probes 2012, and to critically address the question of whether a consistent picture of jet modification in heavy-ion collisions.

Dr. Gavin Laws and colleagues hosted OSAPS, the Ohio section of the American Physical Society conference. The meeting was held on October 5 and 6, 2012, at the McGregor Memorial Conference Center. Over 120 APS members from more than 20 different institutions in the Midwest attended. The event consisted of 70 oral and poster presentations in various physics conferences. Dr. Claude Pruneau chaired the organization committee for SeVeRal MemBeRS oF the FacuLty in Mount Pleasant, MI. This meeting provided a great opportunity to learn about graduate research in the Midwest attended. The event consisted of 70 oral and poster presentations including strong representation from graduate student researchers, a banquet featuring a keynote speaker, and a roundtable discussion among the most important new experimental measurements and theoretical breakthroughs presented at Quark Matter 2012 and Hard Probes 2012.

Dr. Hoffmann’s Generous Gift

Since 2008 Dr. William H. Weihofen, Wayne State University alumus (Ph.D. 1969), has been providing support to our Department through educational scholarships, research funding, and faculty/staff projects. During the past two years, the Department has offered ten scholarships to physics and astronomy majors using funds from Dr. Weihofen’s generosity. In the words of Dr. Weihofen, “Wayne State occupies a significant place in my fond memories; it deserves my support.” We greatly appreciate and thank Dr. Weihofen for his continued support, and wish him the best in his new home in Portland, Oregon.

New Kaczer Teaching Award

FOR SEVERAL YEARS EMIL KACZOR worked in our department as the supervisor of undergraduate teaching laboratories. Recently, he was awarded a retirement fund in our department for graduate teaching assistants. The purpose of the “Emil Kaczer and John H. Mary Kaczer Award” will be to recognize dedication and excellence in teaching by a GTA. Here Emil describes, in his own words, his reasons for setting up the award:

“My 60 plus years in the Department span from 1946 to my retirement in 1994. I have continued to volunteer my time in the Department to this day. At Wayne, I was a laboratory assistant during my own graduate studies (MS 1949) and became a full-time supervisor of the physics labs, preparation room and lecture halls in the newly built Science Hall in 1950. I continued in this position in the later added Physics Research Building and General Lectures Building. I had just come home after completing my last straight summers (1943 to 1946) of the accelerated undergraduated program and dormitory life at University of Michigan. The Wayne had a community college atmosphere, with emphasis on teaching and little research. It was “boom time” in physics, with job recruiters swarming to lure graduate students and staff away with high pay. Interest in tenure was low; job hopping was rampant, and turnovers were frequent.

For our department (specifically the Physical Sciences arm) this was the time of our “great lectures,” quick, hourly changeover in demonstration equipment in the two adjacent lecture rooms in Science Hall [with frequent fire marshals warnings of overcrowding!]. Leading the cast was our Professor Everett Phelps, Detroit’s first TV weatherman. (Hurry Hudy sat in these classes; he later filled the same TV role till his recent retirement.) My intense involvement and critiquing led to my later role in editing and coauthoring the physics and astronomy sections of our textbook and Instructor’s Manual.”

The Beard Endowed Student Prize Supports Student Research

Since 2008, undergraduate physics and astronomy majors and the Society of Physics Students have organized an annual Undergraduate Research Conference. This conference allows undergraduates from WSU and other colleges and universities to display posters of their physics and astronomy research to all students and faculty. Standards are high and students must also demonstrate verbal proficiency in their areas of expertise. This annual event was expanded in 2010 to include a separate Graduate Research Conference.

Evaluated by an academic panel of judges, a few selected students receive the George B. & Eveline R. Beard Endowed Student Prizes for their presentations. Through the combined generosity of loving sons Dr. Kevin B. Beard, William B. Beard, Glenn B. Beard, Randall B. Beard, and Keith McDonald, widower of Dr. Beard’s only daughter Lisa, as well as colleagues and friends of the late Dr. George B. Beard and Eveline R. Beard, this prize continues to inspire students today. Our department greatly appreciates the participation of Glenn Beard at the annual student conferences, and the continued support given to students from the Beard Endowed Student Prize.

Physics & Astronomy Matters
**Spring 2013**

**Physics and Astronomy Matters**

**QuarkNet**

QuarkNet is an educational program funded by the National Science Foundation and Department of Energy that connects researchers in particle physics with high school science teachers and students. Since 2004, Professors Robert Hart and Paul Karchin have run a QuarkNet center at Wayne State University. The activities for 2012 included a MasterClass, summer research for high school students, presentations about the search for the Higgs boson to the Detroit Metro Area Physics Teachers (DMAPT) association, and student presentations about the search for the Higgs boson. The activities were presented at the planetarium: Jonathan Kade of the Warren Astronomical Society presented a historical perspective on the transit of Venus one week prior to the actual transit, and Professor Praveen highlighted the Curiosity rover landing, this past August on the planet Mars.

We continue to advertise our physics and astronomy academic programs and planetarium events at local conferences such as the Metropolitan Detroit Science Teachers Association (MDSTA) and the Michigan Science Teachers Association (MSTA). And, we have a presence in the Detroit Metropolitan Area Physics Teachers (DMAPT) association. Jeff Conn, our Senior Lecturer, currently serves as DMAPT president. As members of the Great Lakes Association of Astronomy Clubs, we participate in local astronomy events such as Astronomy at the Beach, held annually at the Kensington MetroPark.

**QuarkNet Website**

http://quarknet.wayne.edu/ and http://physics.clas.wayne.edu/

**The Ovshinskys – Friends of Physics and Astronomy**

Dr. Stanford Ovshinsky and Dr. Rosa Young-Ovshinsky, a dynamic and entrepreneurial couple, have been friends of Wayne State University and of our department for a long time. With the passing away of Stan Ovshinsky in October 2012 we lost a true friend. Stan was a self-taught inventor and scientist who had accumulated more than 400 patents to his credit. The focus of his research and inventions was to develop environmentally friendly “green” energy technologies. One of his prominent inventions, the nickel-metal hydride battery, has found applications in laptop computers, smartphones and hybrid cars. Stan’s patents are related to technologies for solar energy panels, flat screen liquid crystal displays, hydrogen fuel cells and others. His publically-traded company Energy Conversion Devices (ECD) was responsible for creating products aimed at making fossil fuel obsolete. Some of our faculty members have benefitted in the past by close research collaborations with ECD. Several graduate students of our department found successful career paths at Stan Ovshinsky’s company.

More recently, Stan and Rosa Ovshinsky founded a new company, Ovshinsky Innovation LLC in Troy. The focus of this company has been to develop cost-effective sources of photovoltaic energy. During their visit in our Department in May 2011, Stan and Rosa outlined their vision of sources of alternative energy. Our faculty and students were inspired and stimulated by their visit. We will continue to benefit by the legacy left behind by Stan Ovshinsky.

**Friends of Physics and Astronomy Website**

http://physics.clas.wayne.edu/friendsphysics/
A Tribute to Robert L. Thomas

WHEN YOU LISTEN TO DR. ROBERT L. THOMAS, professor of physics and former Dean of the College of Liberal Arts and Sciences, you get the impression that his career is just beginning. He speaks in crisp phrases and his face lights up reflecting a passion for his life’s work. His years at Wayne State University add up to over 48 – yet approaching retirement and a major move to Portland, Oregon, you know his story does not end here.

Hailing from Dover-Foxcroft, a small town in Maine, Thomas credits a high school teacher for his interest in the sciences. Entering Bowdoin College in 1964 as a pre-med, Thomas was swayed by first year physics courses and the close interaction he had with physics faculty. An undergraduate research requirement and the small, close-knit community on the Bowdoin campus sealed Thomas’s fate – he was going to be a physicist.

Thomas headed next to Brown University. Following in the footsteps of the late emeritus professor of physics, Dr. Henry “Bunk” Bohn, Thomas was mentored by Dr. Robert W. Monte, and completed a Ph.D. thesis in “Ultrasonic Attenuation in Superconducting Tin.” In 1964, he moved to Detroit where, following a short postdoctoral appointment with Hank Bohn, he landed a faculty position at Wayne State University (WSU) in the Department of Physics and Astronomy. “And the rest is history,” says Thomas. Thomas quickly rose through the ranks to become a Full Professor in 1976, and by 1980 he was Assistant Chair of the Department of Physics & Astronomy.

INSTITUTE OF MANUFACTURING RESEARCH

A new era was dawning in the mid-to-late 1980s. The University wanted the Colleges of Engineering and Science to create on-campus institutes aimed at creating jobs and starting new businesses. One of these institutes was the Institute of Manufacturing Research (IMR), which would play a significant part in Thomas’s career. “In the good old days before decision-making by committee, WSU President David Adamany asked me to run this thing – to be the Director of the IMR. He wanted to foster relationships between Engineering, Physics, and Computer Science,” says Thomas. Thomas jumped in with both feet and founded an industrial advising board. “The goal was to support graduate students and fund faculty. The program was applied, with a strong connection to industry and eventually we were funded by oil and gas revenues from the state of Michigan through the Research Excellence and Economic Development Fund.”

In addition to creating jobs, Adamany wanted participants in the program to start companies and to file patents. Out of the IMR came the first WSU graduate student in physics recruited from Nanjing University. Three more confocal microscope patents followed and it wasn’t long before a group started receiving international attention: a Japanese company was interested in selling in Asia. Other companies noticed, too, namely sub-licensee PerkinElmer, Inc. WSU reaped the benefits, collecting hundreds of thousands of dollars in royalty fees over the duration of the patents on microscopes that are widely used in medical research laboratories.

SONIC IR

Thomas received federal funding beginning in 1965, and together with his faculty colleagues, the IMR had been funded continuously ever since. Funding agencies include the Federal Aviation Administration (FAA), the Navy, the Army, and the Air Force, in addition to funding from private industry.

“In 1999, the FAA was ready to pull the plug on our TWI funding. At the time, the FAA was really interested in detection of cracks. We had another idea but they did not believe what we were proposing could actually be done and we lost our FAA funding – temporarily,” says Thomas. Sonic IR’s confocal infrared imaging of fatigue crack growth became the team’s best invention for crack detection. The team was then hired by Engineering faculty members Xiaoyan Han and Golan Newaz, along with several graduate students from Physics. An ultrasonic welding gun was purchased, and Golan Newaz made a fatigue crack sample – a piece of aluminum with a crack. Turning their gun on the crack, they fired a short pulse of low frequency ultrasound causing the edges of the crack to rub together. An infrared video camera imaged, frame-by-frame, the evolution of the temperature change as heat flowed away from the crack. “Collectively, we went ‘Eureka’!” says Thomas. On the heels of this success came an invention disclosure and a patent. To further test their discovery, the team demonstrated it to local industry, including Ford Motor Company. “Ford provided us with a cracked aluminum cylinder head. We zapped the head with our gun and all the cracks lit up. Around the same time, we happened to mention our discovery to the FAA and carried out a demonstration on the cracked engine head at an FAA meeting in Albuquerque: they could not believe their eyes. Our FAA funding was renewed and has been ongoing ever since. To date, Sonic IR has received 9 patents,” in total. Thomas and his team have about 19 U.S. and foreign patents which have brought in a total of about $3 million in licensing and royalty revenue to the University.

THOMAS GOES TO CHINA

Along with business interests came scholarly alliances. Scholar Shi-yi Zhang of Nanjing University, China, visited WSU during 1983-1984. She was interested in photo-acoustic microscopy with the intent of organizing a microscopy group at Nanjing University. Zhang’s group at Nanjing became a reality in 1986 and in alliance she made with Thomas’s research team opened the door for a cultural exchange program that profoundly impacted the future of WSU and the life of Thomas.

In 1985, with PK, and again in 1990, with Skip, Thomas headed to Shanghai and Nanjing with the purpose of recruiting students from Nanjing and other Chinese Universities for cultural exchange programs. “At our point,” Thomas says, “we had 14 Chinese students in our research group at WSU and along with this came spouses, children, and extended family. The result: English communication went downhill rapidly. So, we made up a rule: in lab all graduate students must speak English and all faculty must speak Chinese. The penalty for not adhering to the rule: whoever got caught had to bring Bing qi liu [Chinese for ice cream] to our group meetings. We had bing qi liu each week! All kidding aside, what else could be done to promote cultural opportunities for the Chinese students and their families, to encourage improvement of their English language skills, and at the same time, offer WSU students the opportunity to learn the Chinese language and experience a different culture?”

SERENDIPITY

Thomas became interim Dean of the College of Science in 2000 with an official appointment one year later. Two years after that, the dean of the College of Liberal Arts wanted to step down. The Provost asked Thomas to be interim Dean of the College of Liberal Arts. “I agreed and became a double Dean for a year,” says Thomas. “To my Chinese friends I sent the message: Please send me your congratulation cards! I have become a mama baba Dean. In Chinese, ma is a horse and ba is a tiger, explains Thomas while holding up two glass figurines – one of a horse and one of a tiger – that sit on his desk. “If you string the horse and tiger together you come up with the Chinese phrase mama huhu. This means, not horse not tiger, just so so!”

Eventually, the two colleges merged under his leadership and Thomas became Dean of the College of Liberal Arts and Sciences. With this merger came access to the liberal arts community and the Department of Near East and Asian Studies. “At the time, there were only half-time instructors of Japanese and one half-time instructor of Chinese. I wanted to change this and offer more curricula in Asian Studies. I had a plan,” says Thomas. “As an experimentalist, I got all the Japanese and Chinese 101 students together for catered lunches and we talked. I asked them if they should have Chinese and Japanese degree programs: their response was overwhelmingly yes!”

continued on page 14
During a six-year period of travels to China while forming language skills to rural Chinese youth. The program enables students to provide much needed English.

Program in Rural China (as it is called today) gives WSU students a participating, including over 20 from WSU. The Summer Service Learning

Universities for poverty alleviation in rural China. With a multi-

an exchange program between Tsinghua University and U.S. During this trip, the Wangs convinced Chinese officials to set up

Program that had just begun from WSU. They were impressed and meeting would help to further his goals.

And, his vision for Asian Studies was hired faculty in the areas of Political Science, History, Sociology, Culture. Funding for these institutes is provided on a cost-shared basis by Hanban (Office of Chinese Language Council International) and the host institutions. With a fire in his belly for the expansion of programs, Thomas knew he had to become a fundraiser. A chance

mentoring will help to further his goals.

Thomas met philanthropists and WSU doctoral alumni Drs. Peter & Grace Wang in 2002. There is a program called the Junior Year in

Confucius Institute

Thomas had heard about the Confucius Institute – a Chinese institution centered on international collaboration between host universities throughout the world and their individual partner universities, with the purpose to promote Chinese language and culture. Funding for these institutes is provided on a cost-shared basis by Hanban (Office of Chinese Language Council International) and the host institutions. With a fire in his belly for the expansion of programs, Thomas knew he had to become a fundraiser. A chance meeting would help to further his goals.

Thomas met philanthropists and WSU doctoral alumni Drs. Peter & Grace Wang in 2002. There is a program called the Junior Year in

In 2004, Thomas travelled extensively with the Wangs visiting the Chinese Ministries of Education, Agriculture, and Forestry; Beijing University; and the Chinese equivalent of our White House. During this trip, the Wangs convinced Chinese officials to set up an exchange program between Tsinghua University and U.S. Universities for poverty alleviation in rural China. With a multi-

sufficient funds given to Tsinghua University by the Wangs, the first summer program in China opened in 2006 with approximately 400 Chinese and American undergraduates participat-

ing, including over 20 from WSU. The Summer Service Learning Program in Rural China (as it is called today) gives WSU students a chance to experience the language and culture of China. In return, the program enables students to provide much needed English language skills to rural Chinese youth.

During a six-year period of travels to China while forming personal and professional connections, Thomas was moving toward establishing a Confucius Institute at WSU. He remembers a conversation in Chicago in 2000 with the China Consul General: “Congratulations on your Confucius Institute. Who is your partner university?” says Thomas. “As you will recall, funding for the Institute is through Hanban and a partner (host) university. I needed a partner.” Luckily for Thomas, the Consul General pointed out that the Hanban Director-General of Confucius Institutes would soon be visiting the United States. Thomas hopped a plane to Nashville to meet with the Director-General. Thomas recalls a playful exchange of words that led him to ask, “Won’t you find me a bride,” referring to the age-old custom of arranged marriages in China. Thomas’s wit and determination won out and in January of 2008, Thomas found his bride: Huazhong University of Science and Technology (HUST), in Wuhan, China. WSU had its Hanban funding for the Confucius Institute, complete with a terrific collaboration with HUST, one of the top universities in China.

Today the Confucius Institute has many facets, including a K-12 outreach program; the Confucius Café and the Robert L. Thomas China Library; professional programs offering teaching majors in Chinese language and culture; and various exchange programs. On Thursday afternoons you’ll find Thomas at the Confucius Café on the 15th floor of the Maccabees Building converting in Mandarin. The café is a comfortable venue providing students of Chinese a place to converse with native speakers, share a beverage (usually tea), and talk about Chinese culture and current events. How did Thomas learn to speak Chinese? “I listened to Berlitz cassette tapes repeating simple phrases to get the correct tones,” says Thomas, “and during trips to China, by spending time in their packs. People knew we were foreigners and they would want to practice their English and we could practice our Chinese.”

PROFESSIONAL ASSOCIATIONS AND SCHOLARSHIP FUND

Thomas is a member of the WSU Academy of Scholars and an American Physical Society Fellow. Through the WSU Confucius Institute, he is also the founder of CLAM Chinese Learning Association of Michigan. Thomas has given his heart and soul to the WSU community and Southeastern Michigan, and has inspired generations of students in the United States and abroad. He has been a goodwill ambassador strengthening international relations by promoting cultural, economic and educational opportunities between the United States and China. His generosity continues in the form of an endowment he and his wife have established at Wayne State University. The Robert L. and Sandra E. Thomas Scholarship Fund for Physics or Chinese Studies.

In the words of Confucius: Wheresoever you go, go with your heart. And, we have no doubt Bob Thomas will.

HENRY V. BOHM

In Memory of Dr. Henry Bohm

HENRY V. BOHM, an emeritus professor of physics at Wayne State University on February 4, 2011 in Ypsilanti, Michigan, of congestive heart failure. His area of research was low temperature condensed matter physics and more recently the statistics of autism. In 1957, along with R. W. Morse, he published the first measurement of the temperature dependence of the superconducting energy gap (in tin) that was compared to the then new BCS theory of superconductivity. He remained active in research until a few weeks before his death.

Henry was born on July 16, 1929 in Vienna, Austria, and came to the United States with his family in 1941. He received his AB from Harvard University in 1950 and his MS from the University of Illinois, Urbana-Champaign, in 1951. Having been commissioned in the U.S. Navy he was then called to active duty and served two years on a destroyer escort in the Pacific during the Korean War. Upon returning to civilian life he received his Ph.D. from Brown University in 1958. After one year in industry he joined the WSU faculty, where he remained for the rest of his career.

At Wayne Henry had an active research group studying the properties of metals, and, along with several others, was instru-

mental in establishing the experimental research programs in the department. At that time the experimental part of the department’s research was housed on the second floor of a commercial building on Woodward Avenue, the department offices were in Science Hall, and the physics faculty were scattered among several buildings. It was pretty obvious that the physics department needed its own building, and Henry was the leader in securing the state and federal funding for the building. After the funding was in place, he and Leonard Borrelli worked with the architects to design one of the best physics buildings of that era. But it didn’t end with the design. During the two years of construction Henry visited the building site on almost a daily basis to consult with the contractors and make the myriad decisions concerning details that were not fully spelled out in the plans. It was due to Henry’s untiring efforts and diligence that the depart-

The café is a comfortable venue providing students of Chinese a

ment had a building that has served it exceedingly well for these past 45 years.

Henry also served in just about every academic administrative position that existed at Wayne State, from department chair to provost. This amounted to six different positions. He also served for six years as president of The Argonne Universities Association. This Association, along with the University of Chicago, oversaw the operation of the Argonne National Laboratory. He could well have stayed on as president, but he, and several others, recommended that the Association be disbanded, which it was.

After Henry returned to the department from Chicago, he published, along with Y. W. Kim, several articles concerning the then new field of high temperature superconductivity. He then turned his attention to the statistics of autism and with coauthor Melbourne Stewart published several articles in this area.

Henry was very active in community affairs and served until shortly before his death on a county foster care review board. The university and the department have lost a valuable colleague, and he is sorely missed.

In Memory of Rita Levy

OUR DEAR FRIEND RITA LEVY passed away on September 18, 2011. Rita and Stanley Levy were introduced in our 2010 Physics & Astronomy Matters newsletter as “dear friends of the WSU Department of Physics & Astronomy and great supporters of the WSU Planetarium.” Rita and Stan were both renowned for their philanthropic works. In 2009, the Levy’s opened their doors and hosted a very successful home-and-garden party fund-raiser for our planetarium. The Levys also contributed to our Camp Cosmos summer program providing scholarship money for several low-income children. Their donation of a bust of Albert Einstein, which was created by the famous sculptor Robert Berks, was placed in 2005 in Princeton, N.J., where the great scientist lived after fleeing the Nazis.

Rita’s warmth and great enthusiasm are missed by all. Her support of our planetarium efforts and support of The Orchards Children’s Services were a few of her many passions in life. In memory of Rita, her husband Stan has made an additional generous donation of support for free children to attend our Camp Cosmos 2013 summer program. A graduate of Wayne State University, Rita was an avid sailor and a licensed pilot. The void left by Rita cannot be filled, yet we will never forget her wonderful spirit and all the lives she touched. Her memory lives on through the continued generosity of the Levy Family.
Retirements of Chang, Kuo and Saperstein

PROFESSOR JHY-JIUN CHANG, affectionately known as JI by his friends and colleagues, retired at the end of 2011 academic year after serving the department for 34 years. JI received his Ph.D. in physics from Rutgers in 1973. He joined our department in Fall 1977, as an Assistant Professor, following his postdoctoral Research Associateship at the University of California at Santa Barbara. In addition, he served as a Senior Research Fellow at the California Institute of Technology before starting in the department. As a researcher, JI worked on the nonequilibrium behavior of superconductors. In his theoretical work he used a kinetic equation approach to investigate the properties of nonequilibrium superconductors. JI was a recipient of the prestigious WSU Career Development Chair Award in 1985.

Jhy-Jiun was a versatile teacher who was regarded by his students as tough but fair and able to present complicated concepts of physics in a very clear and concise manner. JI could easily teach any course in the department, from large physics service courses to an advanced specialized course with a limited enrollment. Based on his excellence in teaching, Jhy-Jiun was given the College of Science Teaching Award in 1998. During his retirement JI intends to continue his passion for teaching physics. In this spirit, he is currently working on writing a physics textbook.

After 42 years of service to Wayne State University, Professor Pao-Kuang (PK) Kuo retired at the end of the 2011 academic year. PK received his Ph.D. from the University of Minnesota in 1964 and worked as a postdoctoral Research Associate and a Lecturer at Cornell, MIT and Johns Hopkins before joining our department as an Assistant Professor in 1969. During his early years he developed, in collaboration with Lawrence ‘Skip’ Favro and David Fradkin, the theory of radiation from coherent modulated particle beams. He also dabbled in some research, again with Skip Favro, in marine biology related to the population and growth rate of trout fish in Michigan waters. Starting in the 1980s, Pao-Kuang worked on the nondestructive evaluation of materials using thermal wave imaging technique. Along with Skip Favro and Bob Thomas, PK wrote several technical publications on this topic and received numerous US patents. In 1984 Kuo was given the Wayne State University’s Board of Governors Faculty Recognition Award.

As a teacher, Pao-Kuang was responsible for starting several new courses in the department. He not only developed these courses but also taught them on a regular basis. His courses on computational physics and advanced applied optics were quite popular with graduate students. In fact, in the 1980s when personal computers were being introduced in offices, PK was considered as a computer guru of our department. During his retirement PK intends to visit China on a regular basis and build useful bridges between Chinese universities and Wayne State University.

Professor Alvin M. Saperstein retired at the end of 2011 after serving Wayne State for 48 years. Al received his Ph.D. in physics from Yale in 1956. After postdoctoral stints at Michigan and Brown, Al joined the University of Buffalo as Assistant Professor in 1959. He was lured to Wayne State as Associate Professor of physics in 1963.

As a scholar, Al Saperstein received numerous honors and awards during his career. Notably, he has been a Fulbright Research Scholar, a Fellow of the American Association for the Advancement of Science, a Danforth Fellow, and a Fellow of the American Physical Society. His research interests over the years have been quite diverse and noteworthy. Even though Saperstein was formally trained as a theoretical nuclear physicist, he made significant contributions in the development of dynamical models of outbreak of conflict, dispute and war. Al Saperstein has been a quintessential teacher who is capable of teaching at multiple levels. He has the experience of teaching descriptive astronomy and conceptual physics with as much ease as advanced quantum mechanics and nuclear physics. A proponent of distance-learning long before online courses became the vogue, Al taught physics at Open University in Great Britain for two years. A proponent of sexual equality long before issues of diversity became the vogue, Al received funding from the NSF–Early Alert Initiative to teach physics and mathematics to rising seventh grade girls. Al Saperstein has been the author of two textbooks, the first on Energy in the Environment and the second on Dynamical Models of the Onset of War. During his retirement, Al intends to continue his love of writing popular books.

We wish Jhy-Jiun, Pao-Kuang and Alvin good health and lots of happiness in their long retirements.

Alumni Notes

Petra Fedor (Ph.D. 2002) was promoted, in 2012, to Associate Professor of physics at Cleveland State University. Prior to joining Cleveland State University in 2006, Petra worked at the University of Pittsburgh as a Research Associate and as a Lecturer.

Nagesh Kulkarni (Ph.D. 2009), after completing his stint as a postdoctoral researcher at Louisiana State University, has started his own successful company, Quarkions Applied Research, in Detroit’s Techtown.

Andriy Badin (Ph.D. 2010) finished his two-year postdoctoral Research Associate appointment at Duke University in 2012. He is currently working as a Software Developer at Dimensional Control Systems, Inc.

Mohamed Elmir (Ph.D. 2010) is now a postdoctoral Research Associate at SUBATECH at Ecole des Mines de Nantes in France.

Shalhout Shalhout (Ph.D. 2010) is working as a postdoctoral Research Associate at the University of California at Davis. He is currently stationed at CERN in Geneva.

Ambesh Dixit (Ph.D. 2010) is working at the prestigious Indian Institute of Technology in Jodhpur, India, as an Assistant Professor of physics.

Shah Khan (Ph.D. 2010) is currently working as an Assistant Professor of physics at Peshawar in Pakistan.

Sarah Lzaponte, after completing her Ph.D. in 2011, joined Institute for Subatomic Physics of Utrecht University in the Netherlands. She will soon be joining the University of Turin in Italy as a prestigious INFN (Istituto Nazionale di Fisica Nucleare) Fellow.

Laurence Tarini (Ph.D. 2011) and Gagik Yeghiyan (Ph.D. 2011) have been working at Grand Valley State University as Visiting Assistant Professors of physics.

Rajesh Regmi (Ph.D. 2011) has joined the Medical Physics Residency program at Memorial Sloan-Kettering Cancer Center in New York City. His research interest is the development and implementation of a procedure to correct intrafractional target motion during radiation delivery.

Venkatesh Subba Rao (Ph.D. 2011) is working as an Applications Engineer at KLA-Tencor Corporation in Boise, Idaho. He writes: “I work with Optics and SEM based wafer inspection equipment, which are employed in semiconductor R&D and in manufacturing. My work involves trouble shooting, applications development for customers, technical documentation, and new tool evaluations at customer sites.” He will soon be transferring to his company’s branch in Chennai, India.

Pushkal Thapa (Ph.D. 2011) is employed by Janis Inc. as an Application Engineer in Boston, MA.

Sowjanya Gollapinni (Ph.D. 2012), working in experimental high energy particle physics, is currently a postdoctoral Research Associate at Kansas State University.

The husband-and-wife team of Akila Kumarasiri (Ph.D. 2012) and Suneretha Depvura (Ph.D. 2012) as well asessa mayras (Ph.D. 2011) have joined the Henry Ford Hospital of the Henry Ford Health Services as postdoctoral research associates.

Charles Bloch (B.S. 1978) is currently working as Associate Professor of Radiation Oncology at Washington University School of Medicine in St. Louis, MO.

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Physics...Astronomy Matters

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Acknowledgements

THE DEPARTMENT OF PHYSICS AND ASTRONOMY is very grateful to the following individuals and corporations for their new and continuing financial support during the period December 2010 to December 2012. These contributions are used to support the travel of both undergraduate and graduate students to attend APS meetings and other physics conferences. These funds are also used to award scholarships to outstanding undergraduate physics majors and to support the research of graduate students. If you are thinking about making a tax-deductible gift to our department, please see the Wayne State University Fund Gift Form in this newsletter.

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